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FIRST	edition, published in	three	volumes,	1768—1771.
SECOND	„ „	ten	„	1777—1784.
THIRD	„ „	eighteen	„	1788—1797.
FOURTH	„ „	twenty	„	1801—1810.
FIFTH	„ „	twenty	„	1815—1817.
SIXTH	„ „	twenty	„	1823—1824.
SEVENTH	„ „	twenty-one	„	1830—1842.
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NINTH	„ „	twenty-five	„	1875—1889.
TENTH	„ ninth edition and eleven supplementary volumes,			1902—1903.
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VOLUME IX

EDWARDES to EVANGELICAL ASSOCIATION

NEW YORK
THE ENCYCLOPÆDIA BRITANNICA COMPANY
1910

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L. D.*	Louis Duchesne. See the biographical article: Duchesne, L. M. O.	**Eleutherius;** **Eugenius I. and II.**
L. J. S.	Leonard James Spencer, M.A. Assistant in the Department of Mineralogy, British Museum. Formerly Scholar of Sidney Sussex College, Cambridge, and Harkness Scholar. Editor of the *Mineralogical Magazine*.	**Enstatite;** **Epidote;** **Erubescite.**
L. V.*	Luigi Villari. Italian Foreign Office (Emigration Department). Formerly Newspaper Correspondent in East of Europe. Italian Vice-Consul in New Orleans, 1906; Philadelphia, 1907; and Boston, U.S.A., 1907–1910. Author of *Italian Life in Town and Country*; &c.	**Este.**

M. G.	Moses Gaster, Ph.D. (Leipzig). Chief Rabbi of the Sephardic Communities of England. Vice-President, Zionist Congress, 1898, 1899, 1900. Ilchester Lecturer at Oxford on Slavonic and Byzantine Literature, 1886 and 1891. President, Folklore Society of England. Vice-President, Anglo-Jewish Association. Author of *History of Rumanian Popular Literature*; &c.	**Eminescu, Michail.**
M. H. S.	Marion H. Spielmann, F.S.A. Formerly Editor of the *Magazine of Art*. Member of Fine Art Committee of International Exhibitions of Brussels, Paris, Buenos Aires, Rome, and the Franco-British Exhibition, London. Author of *History of "Punch"*; *British Portrait Painting to the Opening of the Nineteenth Century*; *Works of G. F. Watts, R.A.*; *British Sculpture and Sculptors of To-day*; *Henriette Ronner*; &c.	**Effigies** (*in part*).
M. Ja.	Morris Jastrow, Ph.D. (Leipzig). Professor of Semitic Languages, University of Pennsylvania, U.S.A. Author of *Religion of the Babylonians and Assyrians*; &c.	**Ereshkigal**
M. O. B. C.	Maximilian Otto Bismarck Caspari, M.A. Reader in Ancient History at London University. Lecturer in Greek at Birmingham University, 1905–1908.	**Epaminondas.**
M. N. T.	Marcus Niebuhr Tod, M.A. Fellow and Tutor of Oriel College, Oxford. University Lecturer in Epigraphy. Joint Author of *Catalogue of the Sparta Museum*.	**Ephor.**
M. P.	Mark Pattison. See the biographical article: Pattison, Mark.	**Erasmus** (*in part*).
N. M.	Norman McLean, M.A. Lecturer in Aramaic, Cambridge University. Fellow and Hebrew Lecturer, Christ's College, Cambridge. Joint Editor of the larger *Cambridge Septuagint*.	**Ephraem Syrus.**
O. E.*	Oliver Elton, M.A. Professor of English Literature at the University of Liverpool. Author of *Modern Studies*; *The Augustan Ages*; *Michael Drayton*; &c.	**English Literature** (III., IV.).
O. J. R. H.	Osbert John Radcliffe Howarth, M.A. Christ Church, Oxford. Geographical Scholar, 1901. Assistant Secretary of the British Association.	**England:** *Topography, Population and Industries* (I., VI., VIII., IX.); **English Channel** (*in part*).
P. A. K.	Prince Peter Alexeivitch Kropotkin. See the biographical article: Kropotkin, Prince P. A.	**Esthonia** (*in part*).
P. La.	Philip Lake, M.A., F.G.S. Lecturer on Physical and Regional Geography in Cambridge University. Formerly of the Geological Survey of India. Author of *Monograph of British Cambrian Trilobites*. Translator and Editor of Kayser's *Comparative Geology*.	**Europe:** *Geology*.
P. M. T. C.	Mrs Craigie ("John Oliver Hobbes"). See the biographical article: Craigie, P. M. T.	**Eliot, George.**
P. S. A.	Percy Stafford Allen, M.A. Fellow of Merton College, Oxford. Editor of the *Letters of Erasmus*.	**Erasmus** (*in part*).
R. Ad.	Robert Adamson, LL.D. See the biographical article: Adamson, R.	**Erigena** (*in part*).
R. A. S. M.	Robert Alexander Stewart Macalister, M.A., F.S.A. Director of Excavations for the Palestine Exploration Fund.	**Ekron;** **Eleutheropolis.**
R. C. J.	Sir Richard Claverhouse Jebb, D.C.L., LL.D. See the biographical article: Jebb, Sir Richard C.	**Euripides.**
R. H. C.	Rev. Robert Henry Charles, M.A., D.D., D.Litt. Grinfield Lecturer, and Lecturer in Biblical Studies, Oxford. Fellow of the British Academy. Formerly Professor of Biblical Greek, Trinity College, Dublin. Author of *Critical History of the Doctrine of a Future Life*; *Book of Jubilees*; &c.	**Enoch, Book of;** **Esther:** *Additions to*.
R. H. V.	Colonel Robert Hamilton Vetch, R.E., C.B. Employed on defences of Bermuda, Bristol Channel, Plymouth Harbour and Malta, 1861–1876. Secretary of R.E. Institute, Chatham, 1877–1883. Commanded R.E. Submarine Mining Batt., 1884. Deputy Inspector-General of Fortifications, 1889–1894. Author of *Gordon's Campaign in China*; *Life of Lieutenant-General Sir Gerald Graham*. Editor of the *Professional Papers of the Corps of R.E.*; also the *R.E. Journal*, 1877–1884.	**Egypt:** *Military Operations*, 1885–1900.
R. J. M.	Ronald John McNeill, M.A. Christ Church, Oxford. Barrister-at-Law. Formerly Editor of the *St James's Gazette*, London.	**Emmet, Robert;** **Emmet, Thomas Addis.**
R. L.*	Richard Lydekker, F.R.S., F.Z.S., F.G.S. Formerly Member of the Staff of the Geological Survey of India. Author of *Catalogues of Fossil Mammals, Reptiles and Birds in British Museum*; *The Deer of all Lands*; &c.	**Eland; Elephant;** **Elk;** **Equidae.**
R. N.	Richard Norton. Formerly Director of the American School of Classical Studies in Rome, and Professor of History of Art and Archaeology, Bryn Mawr College, Pennsylvania.	**Etruria** (*in part*).
R. N. B.	Robert Nisbet Bain (d. 1909). Assistant Librarian, British Museum. Author of *Scandinavia: the Political History of Denmark, Norway and Sweden, 1513–1900*; *The First Romanovs, 1613 to 1725*; *Slavonic Europe: the Political History of Poland and Russia from 1469 to 1796*; &c.	**Elizabeth Petrovna;** **Eötvös, Baron; Eric XIV.;** **Esterházy of Galántha.**

R. S. C.	Robert Seymour Conway, M.A., D.Litt. (Cantab.). Professor of Latin and Indo-European Philology in the University of Manchester. Formerly Professor of Latin, University College, Cardiff, and Fellow of Gonville and Caius College, Cambridge.	**Etruria:** ***Language.***
R. S. P.	Reginald Stuart Poole. See the biographical article: Poole, Reginald Stuart.	**Egypt:** ***History,*** **I. (*in part*).**
R. W.*	Richard Williams.	**Eisteddfod.**
R. We.	Richard Webster, A.M. Formerly Fellow in Classics, Princeton University. Editor of *The Elegies of Maximianus*; &c.	**Edwards, Jonathan (*in part*).**
S. A. C.	Stanley Arthur Cook. Editor for Palestine Exploration Fund. Lecturer in Hebrew and Syriac, and formerly Fellow, Gonville and Caius College, Cambridge. Examiner in Hebrew and Aramaic, London University, 1904–1908. Council of Royal Asiatic Society, 1904–1905. Author of *Glossary of Aramaic Inscriptions*; *The Laws of Moses and the Code of Hammurabi*; *Critical Notes on Old Testament History*; *Religion of Ancient Palestine*; &c.	**Eli (*in part*);** **Elijah (*in part*);** **Elisha (*in part*);** **Ephod;** **Esau.**
St G. S.	St George Stock, M.A. Pembroke College, Oxford. Lecturer in Greek in the University of Birmingham.	**Essenes (*in part*).**
S. L.-P.	Stanley Lane-Poole, M.A., Litt.D. Formerly Professor of Arabic, Dublin University, and Examiner in the University of Wales. Corresponding Member of the Imperial Russian Archaeological Society. Member of the Khedivial Commission for the Preservation of the Monuments of Arab Art, &c. Author of *Life of Lord Stratford de Redcliffe*; *Life of Sir Harry Parkes*; *Cairo*; *Turkey*; &c. Edited *The Koran*; *The Thousand and One Nights*; &c.	**Egypt:** ***History,*** **II. (*in part*).**
S. R. G.	Samuel Rawson Gardiner, LL.D., D.C.L. See the biographical article: Gardiner, S. R.	**English History (VIII., IX., X.).**
S. W.	Sir Spencer Walpole, K.C.B. See the biographical article: Walpole, Sir Spencer.	**English History: XII. (*in part*).**
T. A. I.	Thomas Allan Ingram, M.A., LL.D. Trinity College, Dublin.	**England:** ***Local Government,*** **X. (*in part*).**
T. Ba.	Sir Thomas Barclay, M.P. Member of the Institute of International Law. Member of the Supreme Council of the Congo Free State. Officer of the Legion of Honour. Author of *Problems of International Practice and Diplomacy*; &c. M.P. for Blackburn, 1910.	**Embargo.**
T. F. C.	Dr Theodore Frelinghuysen Collier, Ph.D. Assistant Professor of History, Williams College, Williamstown, Mass., U.S.A.	**Elvira, Synod of;** **Ephesus, Council of.**
T. G. Br.	Thomas Gregor Brodie, M.D., F.R.S. Professor of Physiology in the University of Toronto. Author of *Essentials of Experimental Physiology*.	**Epithelial, Endothelial, Glandular Tissues.**
T. K.	Thomas Kirkup, M.A., LL.D. Author of *An Inquiry into Socialism*; *Primer of Socialism*; &c.	**Essenes (*in part*).**
T. K. C.	Rev. Thomas Kelly Cheyne, LL.D., D.D., D.Litt. See the biographical article: Cheyne, T. K.	**Esther.**
T. L. H.	Sir Thomas Little Heath, K.C.B., M.A., D.Sc. (Cantab.). Assistant Secretary to the Treasury. Formerly Fellow of Trinity College, Cambridge. Author of *Treatise on Conic Sections*; &c.	**Erathosthenes of Alexandria.**
T. R. R. S.	Rev. Thomas Roscoe Rede Stebbing, M.A., F.R.S., F.L.S., F.Z.S. Fellow of King's College, London. Hon. Fellow, and formerly Tutor, of Worcester College, Oxford. Zoological Secretary of Linnaean Society, 1903–1907. Author of *A History of Crustacea*; *The Naturalist of Cumbrae*; &c.	**Entomostraca.**
T. Se.	Thomas Seccombe, M.A. Balliol College, Oxford. Lecturer in History, East London and Birkbeck Colleges, University of London. Stanhope Prizeman, Oxford, 1887. Assistant Editor of *Dictionary of National Biography*, 1891–1901. Author of *The Age of Johnson*; &c.	**English Literature (V., VI.).**
W. A. B. C.	Rev. William Augustus Brevoort Coolidge, M.A., F.R.G.S., Ph.D. (Bern). Fellow of Magdalen College, Oxford. Professor of English History, St David's College, Lampeter, 1880–1881. Author of *Guide du Haut Dauphiné*; *The Range of the Tödi*; *Guide to Grindelwald*; *Guide to Switzerland*; *The Alps in Nature and in History*; &c. Editor of the *Alpine Journal*, 1880–1889; &c.	**Einsiedeln;** **Embrun;** **Engadine;** **Engelberg.**
W. A. P.	Walter Alison Phillips, M.A. Formerly Exhibitioner of Merton College and Senior Scholar of St John's College, Oxford. Author of *Modern Europe*; &c.	**English History (XI.);** **Episcopacy; Esquire;** **Europe:** ***History*** **(*in part*).**
W. Ba.	William Bacher, Ph.D. Professor of Biblical Science at the Rabbinical Seminary, Budapest. Author of *Die exegetische Terminologie der jüdischen Traditionslitteratur*; &c.	**Elias Levita.**
W. C. D. W.	William Cecil Dampier Whetham, M.A., F.R.S. Fellow and Tutor of Trinity College, Cambridge. Author of *Theory of Solution*; *Recent Development of Physical Science*; *The Family and the Nation*; &c.	**Electrolysis.**
W. C. T.	W. Cave Thomas. Author of *Symmetrical Education*; *Mural or Monumental Decoration*; *Revised Theory of Light*.	**Encaustic Painting.**

W. E. Co.	Rt. Rev. William Edward Collins, M.A., D.D. Bishop of Gibraltar. Formerly Professor of Ecclesiastical History, King's College, London. Lecturer of Selwyn and St John's Colleges, Cambridge. Author of *The Study of Ecclesiastical History*; *Beginnings of English Christianity*; &c.	**Establishment;** **Eucharist:** *Reservation*.
W. G.	William Garnett, M.A., D.C.L. Educational Adviser to the London County Council. Formerly Fellow and Lecturer of St John's College, Cambridge. Principal and Professor of Mathematics, Durham College of Science, Newcastle-on-Tyne. Author of *Elementary Dynamics*; &c.	**Energy** (*in part*).
W. G. M.	Walter G. M'Millan, F.C.S., M.I.Mech.E. (d. 1904). Formerly Secretary of the Institute of Electrical Engineers, and Lecturer on Metallurgy, Mason College, Birmingham. Author of *A Treatise on Electrometallurgy*.	**Electrochemistry;** **Electrometallurgy.**
W. Hu.	Rev. William Hunt, M.A., Litt.D. President of Royal Historical Society, 1905–1909. Author of *History of the English Church, 597–1066*; *The Church of England in the Middle Ages*; &c.	**England, Church of.**
W. M. F. P.	William Matthew Flinders Petrie, F.R.S., D.C.L., Litt.D. See the biographical article: Petrie, W. M. F.	**Egypt:** *Art and Archaeology*.
W. O.	Wilhelm Ostwald, D.Sc., LL.D. Formerly Professor of Chemistry at the University of Leipzig. Nobel Prizeman in Chemistry, 1909. Author of *Energetische Grundlagen der Kulturwissenschaft*; *Die Energie*; *Prinzipien der Chemie*; &c.	**Element.**
W. P. A.	Lieut.-Colonel William Patrick Anderson, M.Inst.C.E., F.R.G.S. Chief Engineer, Department of Marine and Fisheries of Canada. Member of the Geographic Board of Canada. Past President of Canadian Society of Civil Engineers.	**Erie, Lake.**
W. P. P.	William Plane Pycraft, F.Z.S. Assistant in the Zoological Department, British Museum. Formerly Assistant Linacre Professor of Comparative Anatomy, Oxford. Vice-President of the Selborne Society. Author of *A History of Birds*; &c.	**Egg.**
W. R. S.	William Robertson Smith, LL.D. See the biographical article: Smith, W. R.	**Eli** (*in part*); **Elijah** (*in part*); **Elisha** (*in part*).
W. W.	William Wallace. See the biographical article; Wallace, William (1844–1897).	**Empedocles** (*in part*); **Epictetus** (*in part*); **Epicurus** (*in part*).
W. Wr.	Williston Walker, Ph.D., D.D. Professor of Church History, Yale University. Author of *History of the Congregational Churches in the United States*; *The Reformation*; *John Calvin*; &c.	**Eliot, John.**

PRINCIPAL UNSIGNED ARTICLES

Egoism.
Elbe.
Election.
Electoral Commission.
Electroplating.
Electrotherapeutics.
Elevators.
Elginshire.
Elis.
Ellipse.
Elm.
Ely.
Elzevir.
Embalming.
Embezzlement.
Employers' Liability and Workmen's Compensation.
Encyclopaedia.
Endospora.
Engineers: *Military*.
Engraving.
Engrossing.
Epigram.
Epilepsy.
Epitaph.
Equity.
Ericaceae.
Eritrea.
Erysipelas.
Escorial.
Eskimo.
Essex.
Estate.
Etching.
Ethnology and Ethnography.
Etna.
Eton.
Eucalyptus.
Euchre.
Euler.
Euphorbiaceae.

ENCYCLOPÆDIA BRITANNICA

ELEVENTH EDITION

VOLUME IX

EDWARDES, SIR HERBERT BENJAMIN (1819–1868), English soldier-statesman in India, was born at Frodesley in Shropshire on the 12th of November 1819. His father was Benjamin Edwardes, rector of Frodesley, and his grandfather Sir John Edwardes, baronet, eighth holder of a title conferred on one of his ancestors by Charles I. in 1644. He was educated at a private school and at King's College, London. Through the influence of his uncle, Sir Henry Edwardes, he was nominated in 1840 to a cadetship in the East India Company; and on his arrival in India, at the beginning of 1841, he was posted as ensign in the 1st Bengal Fusiliers. He remained with this regiment about five years, during which time he mastered the lessons of his profession, obtained a good knowledge of Hindustani, Hindi and Persian, and attracted attention by the political and literary ability displayed in a series of letters which appeared in the *Delhi Gazette*.

In November 1845, on the breaking out of the first Sikh War, Edwardes was appointed aide-de-camp to Sir Hugh (afterwards Viscount) Gough, then commander-in-chief in India. On the 18th of December he was severely wounded at the battle of Mudki. He soon recovered, however, and fought by the side of his chief at the decisive battle of Sobraon (February 10, 1846). He was soon afterwards appointed third assistant to the commissioners of the trans-Sutlej territory; and in January 1847 was named first assistant to Sir Henry Lawrence, the resident at Lahore. Lawrence became his great exemplar and in later years he was accustomed to attribute to the influence of this "father of his public life" whatever of great or good he had himself achieved. He took part with Lawrence in the suppression of a religious disturbance at Lahore in the spring of 1846, and soon afterwards assisted him in reducing, by a rapid movement to Jammu, the conspirator Imam-ud-din. In the following year a more difficult task was assigned him—the conduct of an expedition to Banau, a district on the Waziri frontier, in which the people would not tolerate the presence of a collector, and the revenue had consequently fallen into arrear. By his rare tact and fertility of resource, Edwardes succeeded in completely conquering the wild tribes of the valley without firing a shot, a victory which he afterwards looked back upon with more satisfaction than upon others which brought him more renown. His fiscal arrangements were such as to obviate all difficulty of collection for the future. In the spring of 1848, in consequence of the murder of Mr vans Agnew and Lieutenant Anderson at Multan, by order of the diwan Mulraj, and of the raising of the standard of revolt by the latter, Lieutenant Edwardes was authorized to march against him. He set out immediately with a small force, occupied Leiah on the left bank of the Indus, was joined by Colonel van Cortlandt, and, although he could not attack Multan, held the enemy at bay and gave a check at the critical moment to their projects. He won a great victory over a greatly superior Sikh force at Kinyeri (June 18), and received in acknowledgment of his services the local rank of major. In the course of the operations which followed near Multan, Edwardes lost his right hand by the explosion of a pistol in his belt. On the arrival of a large force under General Whish the siege of Multan was begun, but was suspended for several months in consequence of the desertion of Shere Singh with his army and artillery. Edwardes distinguished himself by the part he took in the final operations, begun in December, which ended with the capture of the city on the 4th of January 1849. For his services he received the thanks of both houses of parliament, was promoted major by brevet, and created C.B. by special statute of the order. The directors of the East India Company conferred on him a gold medal and a good service pension of £100 per annum.

After the conclusion of peace Major Edwardes returned to England for the benefit of his health, married during his stay there, and wrote and published his fascinating account of the scenes in which he had been engaged, under the title of *A Year on the Punjab Frontier in 1848–1849*. His countrymen gave him fitting welcome, and the university of Oxford conferred on him the degree of D.C.L. In 1851 he returned to India and resumed his civil duties in the Punjab under Sir Henry Lawrence. In November 1853 he was entrusted with the responsible post of commissioner of the Peshawar frontier, and this he held when the Mutiny of 1857 broke out. It was a position of enormous difficulty, and momentous consequences were involved in the way the crisis might be met. Edwardes rose to the height of the occasion. He saw as if by inspiration the facts and the needs, and by the prompt measures which he adopted he rendered a service of incalculable importance, by effecting a reconciliation with Afghanistan, and securing the neutrality of the amir and the frontier tribes during the war. So effective was his procedure for the safety of the border that he was able to raise a large force in the Punjab and send it to co-operate in the siege and capture of Delhi. In 1859 Edwardes once more went to England, his health so greatly impaired by the continual strain of arduous work that it was doubtful whether he could ever return to India. During his stay he was created K.C.B., with the rank of brevet colonel; and the degree of LL.D. was conferred upon him by the university of Cambridge. Early in 1862 he again sailed for India, and was appointed commissioner of Umballa and agent for the Cis-Sutlej states. He had been offered the governorship of the Punjab, but on the ground of failing health had declined it. In February 1865 he was compelled to finally resign his post and return to England. A second good service pension was at once conferred on him; in May 1866 he was created K.C. of the Star of India; and early in 1868 was promoted major-general in the East Indian Army. He had been for some time engaged on a life of Sir Henry Lawrence, and high expectations were formed of the work; but he did not live to complete it, and after his death it was put into the hands of Mr Herman Merivale. He died in London on the 23rd of December 1868. Great in council and great in war, he was singularly beloved by his friends, generous and unselfish to a high degree, and a man of deep religious convictions.

See *Memorials of the Life and Letters of Sir Herbert Benjamin Edwardes*, by his wife (2 vols., London, 1886); T. R. E. Holmes, *Four Soldiers* (London, 1889); J. Ruskin, *Bibl. pastorum*, iv. "A Knight's Faith" (1885), passages from the life of Edwardes.

EDWARDS, AMELIA ANN BLANDFORD (1831–1892), English author and Egyptologist, the daughter of one of Wellington's officers, was born in London on the 7th of June 1831. At a very early age she displayed considerable literary and artistic talent. She became a contributor to various magazines and newspapers, and besides many miscellaneous works she wrote eight novels, the most successful of which were *Debenham's Vow* (1870) and *Lord Brackenbury* (1880). In the winter of 1873–1874 she visited Egypt, and was profoundly impressed by the new openings for archaeological research. She learnt the hieroglyphic characters, and made a considerable collection of Egyptian antiquities. In 1877 she published *A Thousand Miles up the Nile*, with illustrations by herself. Convinced that only by proper scientific investigations could the wholesale destruction of Egyptian antiquities be avoided, she devoted herself to arousing public opinion on the subject, and ultimately, in 1882, was largely instrumental in founding the Egypt Exploration Fund, of which she became joint honorary secretary with Reginald Stuart Poole. For the business of this Fund she abandoned her other literary work, writing only on Egyptology. In 1889–1890 she went on a lecturing tour in the United States. The substance of her lectures was published in volume form in 1891 as *Pharaohs, Fellahs, and Explorers*. She died at Weston-super-Mare, Somerset, on the 15th of April 1892, bequeathing her valuable collection of Egyptian antiquities to University College, London, together with a sum to found a chair of Egyptology. Miss Edwards received, shortly before her death, a civil list pension from the British government.

EDWARDS, BELA BATES (1802–1852), American man of letters, was born at Southampton, Massachusetts, on the 4th of July 1802. He graduated at Amherst College in 1824, was a tutor there in 1827–1828, graduated at Andover Theological Seminary in 1830, and was licensed to preach. From 1828 to 1833 he was assistant secretary of the American Education Society (organized in Boston in 1815 to assist students for the ministry), and from 1828 to 1842 was editor of the society's organ, which after 1831 was called the *American Quarterly Register*. He also founded (in 1833) and edited the *American Quarterly Observer*; in 1836–1841 edited the *Biblical Repository* (after 1837 called the *American Biblical Repository*) with which the *Observer* was merged in 1835; and was editor-in-chief of the *Bibliotheca Sacra* from 1844 to 1851. In 1837 he became professor of Hebrew at Andover, and from 1848 until his death was associate professor of sacred literature there. He died at Athens, Georgia, on the 20th of April 1852. Among his numerous publications were *A Missionary Gazetteer* (1832), *A Biography of Self-Taught Men* (1832), a once widely known *Eclectic Reader* (1835), a translation, with Samuel Harvey Taylor (1807–1871), of Kühner's *Schulgrammatik der Griechischen Sprache* and *Classical Studies* (1844), essays in ancient literature and art written in collaboration with Barnas Sears and C. C. Felton.

Edwards' *Addresses and Sermons*, with a memoir by Rev. Edwards A. Park, were published in two volumes at Boston in 1853.

EDWARDS, BRYAN (1743–1800), English politician and historian, was born at Westbury, Wiltshire, on the 21st of May 1743. His father died in 1756, when his maintenance and education were undertaken by his maternal uncle, Zachary Bayly, a wealthy merchant of Jamaica. About 1759 Bryan went to Jamaica, and joined his uncle, who engaged a private tutor to complete his education, and when Bayly died his nephew inherited his wealth, succeeding also in 1773 to the estate of another Jamaica resident named Hume. Edwards soon became a leading member of the colonial assembly of Jamaica, but in a few years he returned to England, and in 1782 failed to secure a seat in parliament as member for Chichester. He was again in Jamaica from 1787 to 1792, when he settled in England as a West India merchant, making in 1795 another futile attempt to enter parliament, on this occasion as the representative of Southampton. In 1796, however, he became member of parliament for Grampound, retaining his seat until his death at Southampton on the 15th or 16th of July 1800. In general Edwards was a supporter of the slave trade, and was described by William Wilberforce as a powerful opponent. By his wife, Martha, daughter of Thomas Phipps of Westbury, he left an only son, Hume.

In 1784 Edwards wrote *Thoughts on the late Proceedings of Government respecting the Trade of the West India Islands with the United States of America*, in which he attacked the restrictions placed by the government upon trade with the United States. In 1793 he published in two volumes his great work, *History, Civil and Commercial, of the British Colonies in the West Indies*, and in 1797 published his *Historical Survey of the French Colony in the Island of St Domingo*. In 1801 a new edition of both these works with certain additions was published in three volumes under the title of *History of the British Colonies in the West Indies*. This has been translated into German and parts of it into French and Spanish, and a fifth edition was issued in 1819. When Mungo Park returned in 1796 from his celebrated journey in Africa, Edwards, who was secretary of the Association for Promoting the Discovery of the Interior Parts of Africa, drew up from Park's narrative an account of his travels, which was published by the association in their *Proceedings*; and when Park wrote an account of his journeys he availed himself of Edwards' assistance. Edwards also wrote some poems and some other works relating to the history of the West Indies.

He left a short sketch of his life which was prefixed to the edition of the *History of the West Indies*, published in 1801.

EDWARDS, GEORGE (1693–1773), English naturalist, was born at Stratford, Essex, on the 3rd of April 1693. In his early years he travelled extensively over Europe, studying natural history, and gained some reputation for his coloured drawings of animals, especially birds. In 1733, on the recommendation of Sir Hans Sloane, he was appointed librarian to the Royal College of Physicians in London. In 1743 he published the first volume of his *History of Birds*, the fourth volume of which appeared in 1751, and three supplementary volumes, under the title *Gleanings of Natural History*, were issued in 1758, 1760 and 1764. The two works contain engravings and descriptions of more than 600 subjects in natural history not before described or delineated. He likewise added a general index in French and English, which was afterwards supplied with Linnaean names by Linnaeus himself, with whom he frequently corresponded. About 1764 he retired to Plaistow, Essex, where he died on the 23rd of July 1773. He also wrote *Essays of Natural History* (1770) and *Elements of Fossilogy* (1776).

EDWARDS, HENRY THOMAS (1837–1884), Welsh divine, was born on the 6th of September 1837 at Llan ym Mawddwy, Merioneth, where his father was vicar. He was educated at Westminster and at Jesus College, Oxford (B.A., 1860), and after teaching for two years at Llandovery went to Llangollen as his father's curate. He became vicar of Aberdare in 1866 and of Carnarvon in 1869. Here he began his lifelong controversy with Nonconformity, especially as represented by the Rev. Evan Jones (Calvinistic Methodist) and Rev. E. Herber Evans (Congregationalist). In 1870 he fought in vain for the principle of all-round denominationalism in the national education system, and in the same year addressed a famous letter to Mr Gladstone on "The Church of the Cymry," pointing out that the success of Nonconformity in Wales was largely due to "the withering effect of an alien episcopate." One immediate result of this was the appointment of the Welshman Joshua Hughes (1807–1889) to the vacant see of St Asaph. Edwards became dean of Bangor in 1876 and at once set about restoring the cathedral, and he promoted a clerical education society for supplying the diocese with educated Welsh-speaking clergy. He was a popular preacher and an earnest patriot; his chief defect was a lack of appreciation of the theological attainments of Nonconformity, and a Welsh commentary on St Matthew, which he had worked at for many years and published in two volumes in 1882, was severely handled by a Bangor Calvinistic Methodist minister. Edwards suffered from overwork and insomnia and a Mediterranean cruise in 1883 failed to restore his health; and he died by his own hand on the 24th of May 1884 at Ruabon.

See V. Morgan, *Welsh Religious Leaders in the Victorian Era.*

EDWARDS, JONATHAN (1703–1758), American theologian and philosopher, was born on the 5th of October 1703 at East (now South) Windsor, Connecticut. His earliest known ancestor was Richard Edwards, Welsh by birth, a London clergyman in Elizabeth's reign. His father Timothy Edwards (1669–1758), son of a prosperous merchant of Hartford, had graduated at Harvard, was minister at East Windsor, and eked out his salary by tutoring boys for college. His mother, a daughter of the Rev. Solomon Stoddard, of Northampton, Mass., seems to have been a woman of unusual mental gifts and independence of character. Jonathan, the only son, was the fifth of eleven children. The boy was trained for college by his father and by his elder sisters, who all received an excellent education. When ten years old he wrote a semi-humorous tract on the immateriality of the soul; he was interested in natural history, and at the age of twelve wrote a remarkable essay on the habits of the "flying spider." He entered Yale College in 1716, and in the following year became acquainted with Locke's *Essay*, which influenced him profoundly. During his college course he kept note books labelled "The Mind," "Natural Science" (containing a discussion of the atomic theory, &c.), "The Scriptures" and "Miscellanies," had a grand plan for a work on natural and mental philosophy, and drew up for himself rules for its composition. Even before his graduation in September 1720 as valedictorian and head of his class, he seems to have had a well formulated philosophy. The two years after his graduation he spent in New Haven studying theology. In 1722–1723 he was for eight months stated supply of a small Presbyterian church in New York city, which invited him to remain, but he declined the call, spent two months in study at home, and then in 1724–1726 was one of the two tutors at Yale, earning for himself the name of a "pillar tutor," by his steadfast loyalty to the college and its orthodox teaching at the time when Yale's rector (Cutler) and one of her tutors had gone over to the Episcopal Church.

The years 1720 to 1726 are partially recorded in his diary and in the resolutions for his own conduct which he drew up at this time. He had long been an eager seeker after salvation and was not fully satisfied as to his own "conversion" until an experience in his last year in college, when he lost his feeling that the election of some to salvation and of others to eternal damnation was "a horrible doctrine," and reckoned it "exceedingly pleasant, bright and sweet." He now took a great and new joy in the beauties of nature, and delighted in the allegorical interpretation of the Song of Solomon. Balancing these mystic joys is the stern tone of his Resolutions, in which he is almost ascetic in his eagerness to live earnestly and soberly, to waste no time, to maintain the strictest temperance in eating and drinking. On the 15th of February 1727 he was ordained minister at Northampton and assistant to his grandfather, Solomon Stoddard. He was a student minister, not a visiting pastor, his rule being thirteen hours of study a day. In the same year he married Sarah Pierrepont, then aged seventeen, daughter of James Pierrepont (1659–1714), a founder of Yale, and through her mother great-granddaughter of Thomas Hooker. Of her piety and almost nun-like love of God and belief in His personal love for her, Edwards had known when she was only thirteen, and had written of it with spiritual enthusiasm; she was of a bright and cheerful disposition, a practical housekeeper, a model wife and the mother of his twelve children. Solomon Stoddard died on the 11th of February 1729, leaving to his grandson the difficult task of the sole ministerial charge of one of the largest and wealthiest congregations in the colony, and one proud of its morality, its culture and its reputation.

In 1731 Edwards preached at Boston the "Public Lecture" afterwards published under the title *God Glorified in Man's Dependence.* This was his first public attack on Arminianism. The leading thought was God's absolute sovereignty in the work of redemption: that while it behoved God to create man holy, it was of His "good pleasure" and "mere and arbitrary grace" that any man was now made holy, and that God might deny this grace without any disparagement to any of His perfections. In 1733 a revival of religion began in Northampton, and reached such intensity in the winter of 1734 and the following spring as to threaten the business of the town. In six months nearly three hundred were admitted to the church. The revival gave Edwards an opportunity of studying the process of conversion in all its phases and varieties, and he recorded his observations with psychological minuteness and discrimination in *A Faithful Narrative of the Surprising Work of God in the Conversion of Many Hundred Souls in Northampton* (1737). A year later he published *Discourses on Various Important Subjects*, the five sermons which had proved most effective in the revival, and of these none, he tells us, was so immediately effective as that on the *Justice of God in the Damnation of Sinners*, from the text, "That every mouth may be stopped." Another sermon, published in 1734, on the *Reality of Spiritual Light* set forth what he regarded as the inner, moving principle of the revival, the doctrine of a "special" grace in the immediate and supernatural divine illumination of the soul. In the spring of 1735 the movement began to subside and a reaction set in. But the relapse was brief, and the Northampton revival, which had spread through the Connecticut valley and whose fame had reached England and Scotland, was followed in 1739–1740 by the Great Awakening, distinctively under the leadership of Edwards. The movement met with no sympathy from the orthodox leaders of the church. In 1741 Edwards published in its defence *The Distinguishing Marks of a Work of the Spirit of God*, dealing particularly with the phenomena most criticized, the swoonings, outcries and convulsions. These "bodily effects," he insisted, were not "distinguishing marks" of the work of the Spirit of God; but so bitter was the feeling against the revival in the more strictly Puritan churches that in 1742 he was forced to write a second apology, *Thoughts on the Revival in New England*, his main argument being the great moral improvement of the country. In the same pamphlet he defends an appeal to the emotions, and advocates preaching terror when necessary, even to children, who in God's sight "are young vipers . . . if not Christ's." He considers "bodily effects" incidentals to the real work of God, but his own mystic devotion and the experiences of his wife during the Awakening (which he gives in detail) make him think that the divine visitation usually overpowers the body, a view in support of which he quotes Scripture. In reply to Edwards, Charles Chauncy anonymously wrote *The Late Religious Commotions in New England Considered* (1743), urging conduct as the sole test of conversion; and the general convention of Congregational ministers in the Province of Massachusetts Bay protested "against disorders in practice which have of late obtained in various parts of the land." In spite of Edwards's able pamphlet, the impression had become widespread that "bodily effects" were recognized by the promoters of the Great Awakening as the true tests of conversion. To offset this feeling Edwards[1] preached at Northampton during the years 1742 and 1743 a series of sermons published under the title of *Religious Affections* (1746), a restatement in a more philosophical and general tone of his ideas as to "distinguishing marks." In 1747 he joined the movement started in Scotland called the "concert in prayer," and in the same year published *An Humble Attempt to Promote Explicit Agreement and Visible Union of God's People in Extraordinary Prayer for the Revival of Religion and the Advancement of Christ's Kingdom on Earth*. In 1749 he published a memoir of David Brainerd; the latter had lived in his family for several months, had been constantly attended by Edwards's daughter Jerusha, to whom he had been engaged to be married, and had died at Northampton on the 7th of October 1747; and he had been a case in point for the theories of conversion held by Edwards, who had made elaborate notes of Brainerd's conversations and confessions.

In 1748 there had come a crisis in his relations with his congregation. The Half-Way Covenant adopted by the synods of 1657 and 1662 had made baptism alone the condition to the civil privileges of church membership, but not of participation in the sacrament of the Supper. Edwards's grandfather and predecessor, Solomon Stoddard, had been even more liberal, holding that the Supper was a converting ordinance and that baptism was a sufficient title to all the privileges of the church. As early as 1744 Edwards, in his sermons on the Religious Affections, had plainly intimated his dislike of this practice. In the same year he had published in a church meeting the names of certain young people, members of the church, who were suspected of reading improper books,[2] and also the names of those who were to be called as witnesses in the case. But witnesses and accused were not distinguished on this list, and the congregation was in an uproar. A great many, fearing a scandal, now opposed an investigation which all had previously favoured. Edwards's preaching became unpopular; for four years no candidate presented himself for admission to the church; and when one did in 1748, and was met with Edwards's formal but mild and gentle tests, as expressed in the *Distinguishing Marks* and later in *Qualifications for Full Communion* (1749) the candidate refused to submit to them; the church backed him and the break was complete. Even permission to discuss his views in the pulpit was refused him. The ecclesiastical council voted by 10 to 9 that the pastoral relation be dissolved. The church by a vote of more than 200 to 23 ratified the action of the council, and finally a town meeting voted that Edwards should not be allowed to occupy the Northampton pulpit, though he did this on occasion as late as May 1755. He evinced no rancour or spite; his "Farewell Sermon" was dignified and temperate; nor is it to be ascribed to chagrin that in a letter to Scotland after his dismissal he expresses his preference for Presbyterian to Congregational church government. His position at the time was not unpopular throughout New England, and it is needless to say that his doctrine that the Lord's Supper is not a cause of regeneration and that communicants should be professing Christians has since (very largely through the efforts of his pupil Joseph Bellamy) become a standard of New England Congregationalism.

Edwards with his large family was now thrown upon the world, but offers of aid quickly came to him. A parish in Scotland could have been procured, and he was called to a Virginia church. He declined both, to become in 1750 pastor of the church in Stockbridge and a missionary to the Housatonic Indians. To the Indians he preached through an interpreter, and their interests he boldly and successfully defended by attacking the whites who were using their official position among them to increase their private fortunes. In Stockbridge he wrote the *Humble Relation*, also called *Reply to Williams* (1752), which was an answer to Solomon Williams (1700–1776), a relative and a bitter opponent of Edwards as to the qualifications for full communion; and he there composed the treatises on which his reputation as a philosophical theologian chiefly rests, the essay on *Original Sin*, the *Dissertation concerning the Nature of True Virtue*, the *Dissertation concerning the End for which God created the World*, and the great work on the Will, written in four months and a half, and published in 1754 under the title, *An Inquiry into the Modern Prevailing Notions Respecting that Freedom of the Will which is supposed to be Essential to Moral Agency*.

In 1757, on the death of President Burr, who five years before had married Edwards's daughter Esther, he reluctantly accepted the presidency of the College of New Jersey (now Princeton University), where he was installed on the 16th of February 1758. Almost immediately afterwards he was inoculated for smallpox, which was raging in Princeton and vicinity; and, always feeble, he died of the inoculation on the 28th of March 1758. He was buried in the old cemetery at Princeton. He was slender and fully six feet tall, and with his oval, gentle, almost feminine face looked the scholar and the mystic.

The Edwardean System.—It is difficult to separate Edwards's philosophy from his theology, except as the former is contained in the early notes on the Mind, where he says that matter exists only in idea; that space is God; that minds only are real; that in metaphysical strictness there is no being but God; that entity is the greatest and only good; and that God as infinite entity, wherein the agreement of being with being is absolute, is the supreme excellency, the supreme good. It seems certain that these conclusions were independent of Berkeley and Malebranche, and were not drawn from Arthur Collier's *Clavis universalis* (1713), with which they have much in common, but were suggested, in part at least, by Locke's doctrine of ideas, Newton's theory of colours, and Cudworth's Platonism, with all of which Edwards was early familiar. But they were never developed systematically, and the conception of the material universe here contended for does not again explicitly reappear in any of his writings. The fundamental metaphysical postulate that being and God are ultimately identical remained, however, the philosophical basis of all his thinking, and reverence for this being as the supreme good remained the fundamental disposition of his mind. That he did not interpret this idea in a Spinozistic sense was due to his more spiritual conception of "being" and to the reaction on his philosophy of his theology. The theological interest, indeed, came in the end to predominate, and philosophy to appear as an instrument for the defence of Calvinism. Perhaps the best criticism of Edwards's philosophy as a whole is that, instead of being elaborated on purely rational principles, it is mixed up with a system of theological conceptions with which it is never thoroughly combined, and that it is exposed to all the disturbing effects of theological controversy. Moreover, of one of his most central convictions, that of the sovereignty of God in election, he confesses that he could give no account.

Edwards's reputation as a thinker is chiefly associated with his treatise on the Will, which is still sometimes called "the one large contribution that America has made to the deeper philosophic thought of the world." The aim of this treatise was to refute the doctrine of free-will, since he considered it the logical, as distinguished from the sentimental, ground of most of the Arminian objections to Calvinism. He defines the will as that by which the "mind chooses anything.' To act voluntarily, he says, is to act electively. So far he and his opponents are agreed. But choice, he holds, is not arbitrary; it is determined in every case by "that motive which as it stands in the view of the mind is the strongest," and that motive is strongest which presents in the immediate object of volition the "greatest apparent good," that is, the greatest degree of agreeableness or pleasure. What this is in a given case depends on a multitude of circumstances, external and internal, all contributing to form the "cause" of which the voluntary act and its consequences are the "effect." Edwards contends that the connexion between cause and effect here is as "sure and perfect" as in the realm of physical nature and constitutes a "moral necessity." He reduces the opposite doctrine to three assumptions, all of which he shows to be untenable: (1) "a self-determining power in the will"; (2) "indifference ... that the mind previous to the act of volition (is) in equilibrio"; (3) "contingence ... as opposed to ... any fixed and certain connexion (of the volition) with some previous ground or reason for its existence." Although he denies liberty to the will in this sense—indeed, strictly speaking, neither liberty nor necessity, he says, is properly applied to the will, "for the will itself is not an agent that has a will"—he nevertheless insists that the subject willing is a free moral agent, and argues that without the determinate connexion between volition and motive which he asserts and the libertarians deny, moral agency would be impossible. Liberty, he holds, is simply freedom from constraint, "the power . . . that any one has to do as he pleases." This power man possesses. And that the right or wrong of choice depends not on the cause of choice but on its nature, he illustrates by the example of Christ, whose acts were necessarily holy, yet truly virtuous, praiseworthy and rewardable. Even God Himself, Edwards here maintains, has no other liberty than this, to carry out without constraint His will, wisdom and inclination.

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[1] Edwards recognized the abuse of impulses and impressions, opposed itinerant and lay preachers, and defended a well-ordered and well-educated clergy.

[2] These were probably not fiction like *Pamela*, as Sir Leslie Stephen suggested, for Edwards listed several of Richardson's novels for his own reading, and considered *Sir Charles Grandison* a very moral and excellent work.

There is no necessary connexion between Edwards's doctrine of the motivation of choice and the system of Calvinism with which it is congruent. Similar doctrines have more frequently perhaps been associated with theological scepticism. But for him the alternative was between Calvinism and Arminianism, simply because of the historical situation, and in the refutation of Arminianism on the assumptions common to both sides of the controversy, he must be considered completely successful. As a general argument his account of the determination of the will is defective, notably in his abstract conception of the will and in his inadequate, but suggestive, treatment of causation, in regard to which he anticipates in important respects the doctrine of Hume. Instead of making the motive to choice a factor within the concrete process of volition, he regards it as a cause antecedent to the exercise of a special mental faculty. Yet his conception of this faculty as functioning only in and through motive and character, inclination and desire, certainly carries us a long way beyond the abstraction in which his opponents stuck, that of a bare faculty without any assignable content. Modern psychology has strengthened the contention for a fixed connexion between motive and act by reference to subconscious and unconscious processes of which Edwards, who thought that nothing could affect the mind which was unperceived, little dreamed; at the same time, at least in some of its developments, especially in its freer use of genetic and organic conceptions, it has rendered much in the older forms of statement obsolete, and has given a new meaning to the idea of self-determination, which, as applied to an abstract power, Edwards rightly rejected as absurd.

Edwards's controversy with the Arminians was continued in the essay on *Original Sin*, which was in the press at the time of his death. He here breaks with Augustine and the Westminster Confession by arguing, consistently with his theory of the Will, that Adam had no more freedom of will than we have, but had a special endowment, a supernatural gift of grace, which by rebellion against God was lost, and that this gift was withdrawn from his descendants, not because of any fictitious imputation of guilt, but because of their real participation in his guilt by actual identity with him in his transgression.

The *Dissertation on the Nature of True Virtue*, posthumously published, is justly regarded as one of the most original works on ethics of the 18th century, and is the more remarkable as reproducing, with no essential modification, ideas on the subject written in the author's youth in the notes on the Mind. Virtue is conceived as the beauty of moral qualities. Now beauty, in Edwards's view, always consists in a harmonious relation in the elements involved, an agreement of being with being. He conceives, therefore, of virtue, or moral beauty, as consisting in the cordial agreement or consent to intelligent being. He defines it as benevolence (good-will), or rather as a disposition to benevolence, towards being in general. This disposition, he argues, has no regard primarily to beauty in the object, nor is it primarily based on gratitude. Its first object is being, "simply considered," and it is accordingly proportioned, other things being equal, to the object's "degree of existence." He admits, however, benevolent being as a second object, on the ground that such an object, having a like virtuous propensity, "is, as it were, enlarged, extends to, and in some sort comprehends being in general." In brief, since God is the "being of beings" and comprehends, in the fullest extent, benevolent consent to being in general, true virtue consists essentially in a supreme love to God. Thus the principle of virtue—Edwards has nothing to say of "morality"—is identical with the principle of religion. From this standpoint Edwards combats every lower view. He will not admit that there is any evidence of true virtue in the approbation of virtue and hatred of vice, in the workings of conscience or in the exercises of the natural affections; he thinks that these may all spring from self-love and the association of ideas, from "instinct" or from a "moral sense of a secondary kind" entirely different from "a sense or relish of the essential beauty of true virtue." Nor does he recognize the possibility of a natural development of true virtue out of the sentiments directed on the "private systems"; on the contrary, he sets the love of particular being, when not subordinated to being in general, in opposition to the latter and as equivalent to treating it with the greatest contempt. All that he allows is that the perception of natural beauty may, by its resemblance to the primary spiritual beauty, quicken the disposition to divine love in those who are already under the influence of a truly virtuous temper.

Closely connected with the essay on Virtue is the boldly speculative *Dissertation on the End for which God Created the World*. As, according to the doctrine of virtue, God's virtue consists primarily in love to Himself, so His final end in creation is conceived to be, not as the Arminians held, the happiness of His creatures, but His own glory. Edwards supposes in the nature of God an original disposition to an "emanation" of His being, and it is the excellency of this divine being, particularly in the elect, which is, in his view, the final cause and motive of the world.

Edwards makes no attempt to reconcile the pantheistic element in his philosophy with the individuality implied in moral government. He seems to waver between the opinion that finite individuals have no independent being and the opinion that they have it in an infinitesimal degree; and the conception of "degrees of existence" in the essay on Virtue is not developed to elucidate the point. His theological conception of God, at any rate, was not abstractly pantheistic, in spite of the abstractness of his language about "being," but frankly theistic and trinitarian. He held the doctrine of the trinitarian distinctions indeed to be a necessity of reason. His *Essay on the Trinity*, first printed in 1903, was long supposed to have been withheld from publication because of its containing Arian or Sabellian tendencies. It contains in fact nothing more questionable than an attempted deduction of the orthodox Nicene doctrine, unpalatable, however, to Edwards's immediate disciples, who were too little speculative to appreciate his statement of the subordination of the "persons" in the divine "oeconomy," and who openly derided the doctrine of the eternal generation of the Son as "eternal nonsense"; and this perhaps was the original reason why the essay was not published.

Though so typically a scholar and abstract thinker on the one hand and on the other a mystic, Edwards is best known to the present generation as a preacher of hell fire. The particular reason for this seems to lie in a single sermon preached at Enfield, Connecticut, in July 1741 from the text, "Their foot shall slide in due time," and commonly known from its title, *Sinners in the Hands of an Angry God*. The occasion of this sermon is usually overlooked. It was preached to a congregation who were careless and loose in their lives at a time when "the neighbouring towns were in great distress for their souls." A contemporary account of it says that in spite of Edwards's academic style of preaching, the assembly was "deeply impressed and bowed down, with an awful conviction of their sin and danger. There was such a breathing of distress and weeping, that the preacher was obliged to speak to the people and desire silence, that he might be heard." Edwards preached other sermons of this type, but this one was the most extreme. The style of the imprecatory sermon, however, was no more peculiar to him than to his period. He was not a great preacher in the ordinary meaning of the word. His gestures were scanty, his voice was not powerful, but he was desperately in earnest, and he held his audience whether his sermon contained a picturesque and detailed description of the torments of the damned, or, as was often the case, spoke of the love and peace of God in the heart of man. He was an earnest, devout Christian, and a man of blameless life. His insight into the spiritual life was profound. Certainly the most able metaphysician and the most influential religious thinker of America, he must rank in theology, dialectics, mysticism and philosophy with Calvin and Fénelon, Augustine and Aquinas, Spinoza and Novalis; with Berkeley and Hume as the great English philosophers of the 18th century; and with Hamilton and Franklin as the three American thinkers of the same century of more than provincial importance.

Edwards's main aim had been to revivify Calvinism, modifying it for the needs of the time, and to promote a warm and vital Christian piety. The tendency of his successors was—to state the matter roughly—to take some one of his theories and develop it to an extreme. Of his immediate followers Joseph Bellamy is distinctly Edwardean in the keen logic and in the spirit of his *True Religion Delineated*, but he breaks with his master in his theory of general (not limited) atonement. Samuel Hopkins laid even greater stress than Edwards on the theorem that virtue consists in disinterested benevolence; but he went counter to Edwards in holding that unconditional resignation to God's decrees, or more concretely, willingness to be damned for the glory of God, was the test of true regeneration; for Edwards, though often quoted as holding this doctrine, protested against it in the strongest terms. Hopkins, moreover, denied Edwards's identity theory of original sin, saying that our sin was a result of Adam's and not identical with it; and he went much further than Edwards in his objection to "means of grace," claiming that the unregenerate were more and more guilty for continual rejection of the gospel if they were outwardly righteous and availed themselves of the means of grace. Stephen West (1735-1819), too, out-Edwardsed Edwards in his defence of the treatise on the *Freedom of the Will*, and John Smalley (1734–1820) developed the idea of a natural (not moral) inability on the part of man to obey God. Emmons, like Hopkins, considered both sin and holiness "exercises" of the will. Timothy Dwight (1752–1847) urged the use of the means of grace, thought Hopkins and Emmons pantheistic, and boldly disagreed with their theory of "exercises," reckoning virtue and sin as the result of moral choice or disposition, a position that was also upheld by Asa Burton (1752–1836), who thought that on regeneration the disposition of man got a new relish or "taste."

JONATHAN EDWARDS[1] the younger (1745–1801), second son of the philosopher, born at Northampton, Massachusetts, on the 26th of May 1745, also takes an important place among his followers. He lived in Stockbridge in 1751–1755 and spoke the language of the Housatonic Indians with ease, for six months studied among the Oneidas, graduated at Princeton in 1765, studied theology at Bethlehem, Connecticut, under Joseph Bellamy, was licensed to preach in 1766, was a tutor at Princeton in 1766–1769, and was pastor of the White Haven Church, New Haven, Connecticut, in 1769–1795, being then dismissed for the nominal reason that the church could not support him, but actually because of his opposition to the Half-Way Covenant as well as to slavery and the slave trade. He preached at Colebrook, Connecticut, in 1796–1799 and then became president of Union College, Schenectady, New York, where he died on the 1st of August 1801. His studies of the Indian dialects were scholarly and valuable. He edited his father's incomplete *History of the Work of Redemption*, wrote in answer to Stephen West, *A Dissertation Concerning Liberty and Necessity* (1797), which defended his father's work on the Will by a rather strained interpretation, and in answer to Chauncy on universal salvation formulated what is known as the "Edwardean," New England or Governmental theory of the atonement in *The Necessity of the Atonement and its Consistency with Free Grace in Forgiveness* (1785). His collected works were edited by his grandson Tryon Edwards in two volumes, with memoir (Andover, 1842). His place in the Edwardean theology is principally due to his defence against the Universalists of his father's doctrine of the atonement, namely, that Christ's death, being the equivalent of the eternal punishment of sinners, upheld the authority of the divine law, but did not pay any debt, and made the pardon of all men a possibility with God, but not a necessity.

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[1] Besides the younger Jonathan many of Edwards's descendants

Bibliography.—There have been various editions of Edwards's works. His pupil, Samuel Hopkins, in 1765 published two volumes from manuscript containing eighteen sermons and a memoir; the younger Jonathan Edwards with Dr Erskine published an edition in 4 volumes (1744 sqq.), and Samuel Austin in 1808 edited an edition in 8 volumes. In 1829 Sereno E. Dwight, a great-grandson of Edwards, published the *Life and Works* in 10 volumes, the first volume containing the memoir, which is still the most complete and was the standard until the publication (Boston, 1889) of *Jonathan Edwards*, by A. V. G. Allen, who attempts to "distinguish what he (Edwards) meant to affirm from what he actually teaches." In 1865 the Rev. Alexander B. Grosart edited from original manuscripts *Selections from the Unpublished Writings of Jonathan Edwards of America* (Edinburgh, 1865, printed for private circulation). This was the only part of a complete edition planned by Grosart that ever appeared. It contained the important Treatise on Grace, Annotations on the Bible, Directions for Judging of Persons' Experiences, and Sermons, the last for the most part merely in outline. E. C. Smyth published from a copy *Observations Concerning the Scripture Oeconomy of the Trinity and Covenant of Redemption* (New York, 1880), a careful edition from the manuscript of the essay on the Flying Spider (in the *Andover Review*, January 1890) and "Some Early Writings of Jonathan Edwards," with specimens from the manuscripts (in *Proceedings of the American Antiquarian Society*, October, 1895). In 1900 on the death of Prof. Edwards A. Park, the entire collection of Edwards's manuscripts loaned to him by Tryon Edwards was transferred to Yale University. Professor Park, like Mr. Grosart before him, had been unable to accomplish the great task of editing this mass of manuscript. "A Study of the Manuscripts of Jonathan Edwards" was published by F. B. Dexter in the *Proceedings of the Massachusetts Historical Society*, series 2, vol. xv. (Boston, 1902), and in the same volume of the *Proceedings* appeared "A Study of the Shorthand Writings of Jonathan Edwards," by W. P. Upham. The long sought for essay on the Trinity was edited (New York, 1903) with valuable introduction and appendices by G. P. Fisher under the title, *An Unpublished Essay of Edwards's on the Trinity*. The only other edition of Edwards (in whole or in part) of any importance is *Selected Sermons of Jonathan Edwards* (New York, 1904), edited by H. N. Gardiner, with brief biographical sketch and annotations on seven sermons, one of which had not previously been published.

For estimates of Edwards consult: *The Volume of the Edwards Family Meeting at Stockbridge, Massachusetts, September 6-7, A.D. 1870* (Boston, 1871); *Jonathan Edwards, a Retrospect, Being the Addresses Delivered in Connecticut with the Unveiling of a Memorial in the First Church of Christ in Northampton, Massachusetts, on the One Hundred and Fiftieth Anniversary of his Dismissal from the Pastorate of that Church*, edited by H. N. Gardiner (Boston, 1901); *Exercises Commemorating the Two Hundredth Anniversory of the Birth of Jonathan Edwards, held at Andover Theological Seminary, October 4-5, 1903* (Andover, 1904); and among the addresses delivered at Stockbridge in October 1903, John De Witt, "Jonathan Edwards: A Study," in the *Princeton Theological Review* (January, 1904). Also H. C. King, "Edwards as Philosopher and Theologian," in *Hartford Theological Seminary Record*, vol. xiv. (1903), pp. 23-57; H. N. Gardiner, "The Early Idealism of Jonathan Edwards," in the *Philosophical Review*, vol. ix. (1900), pp. 573-596; E. C. Smyth, *American Journal of Theology*, vol. i. (1897), pp. 960-964; Samuel P. Hayes, "An Historical Study of the Edwardean Revivals," in *American Journal of Psychology*, vol. xiii. (1902), pp. 550 ff.; J. H. MacCracken, "Philosophical Idealism of Edwards" in *Philosophical Review*, vol. xi. (1902), pp. 26-42, suggesting that Edwards did not know Berkeley, but Collier, and the same author's *Jonathan Edwards' Idealismus* (Halle, 1899); F. J. E. Woodbridge, "Jonathan Edwards," in *Philosophical Review*, vol. xiii. (1904) pp. 393-408; W. H. Squires, *Jonathan Edwards und seine Willenslehre* (Leipzig, 1901); Samuel Simpson, "Jonathan Edwards, A Historical Review," in *Hartford Seminary Record*, vol. xiv. (1903), pp. 3-22; and *The Edwardean, a Quarterly Devoted to the History of Thought in America* (Clinton, New York, 1903–1904), edited by W. H. Squires, of which only four parts appeared, all devoted to Edwards and all written by Squires. (H. N. G.; R. We.)

EDWARDS, LEWIS (1809–1887), Welsh Nonconformist divine, was born in the parish of Llanbadarn Fawr, Cardiganshire, on the 27th of October 1809. He was educated at Aberystwyth and at Llangeitho, and then himself kept school in both these places. He had already begun to preach for the Calvinistic Methodists when, in December 1830, he went to London to take advantage of the newly-opened university. In 1832 he settled as minister at Laugharne in Carmarthenshire, and the following year went to Edinburgh, where a special resolution of the senate allowed him to graduate at the end of his third session. He was now better able to further his plans for providing a trained ministry for his church. Previously, the success of the Methodist preachers had been due mainly to their natural gifts. Edwards made his home at Bala, and there, in 1837, with David Charles, his brother-in-law, he opened a school, which ultimately became the denominational college for north Wales. He died on the 19th of July 1887.

Edwards may fairly be called one of the makers of modern Wales. Through his hands there passed generation after generation of preachers, who carried his influence to every corner of the principality. By fostering competitive meetings and by his writings, especially in *Y Traethodydd* ("The Essayist"), a quarterly magazine which he founded in 1845 and edited for ten years, he did much to inform and educate his countrymen on literary and theological subjects. A new college was built at Bala in 1867, for which he raised £10,000. His chief publication was a noteworthy book on *The Doctrine of the Atonement*, cast in the form of a dialogue between master and pupil; the treatment is forensic, and emphasis is laid on merit. It was due to him that the North and South Wales Calvinistic Methodist Associations united to form an annual General Assembly; he was its moderator in 1866 and again in 1876. He was successful in bringing the various churches of the Presbyterian order into closer touch with each other, and unwearying in his efforts to promote education for his countrymen.

See *Bywyd a Llythyrau y Parch.* (*i.e.* Life and Letters of the Rev.) *Lewis Edwards, D.D.*, by his son T. C. Edwards.

EDWARDS, RICHARD (*c.* 1523–1566), English musician and playwright, was born in Somersetshire, became a scholar of Corpus Christi College, Oxford, in 1540, and took his M. A. degree in 1547. He was appointed in 1561 a gentleman of the chapel royal and master of the children, and entered Lincoln's Inn in 1564, where at Christmas in that year he produced a play which was acted by his choir boys. On the 3rd of September 1566 his play, *Palamon and Arcite*, was performed before Queen Elizabeth in the Hall of Christ Church, Oxford. Another play, *Damon and Pithias*, tragic in subject but with scenes of vulgar farce, entered at Stationers' Hall in 1567–8, appeared in 1571 and was reprinted in 1582; it may be found in Dodsley's

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were great, brilliant or versatile men. Among them were: his son Pierrepont (1750–1826), a brilliant but erratic member of the Connecticut bar, tolerant in religious matters and bitterly hated by stern Calvinists, a man whose personal morality resembled greatly that of Aaron Burr; his grandsons, William Edwards (1770–1851), an inventor of important leather rolling machinery; Aaron Burr the son of Esther Edwards; Timothy Dwight (1752–1817), son of Mary Edwards, and his brother Theodore Dwight, a Federalist politician, a member, the secretary and the historian of the Hartford Convention; his great-grandsons, Tryon Edwards (1809–1894) and Sereno Edwards Dwight, theologian, educationalist and auther; and his great-great-grandsons, Theodore William Dwight, the jurist, and Timothy Dwight, second of that name to be president of Yale.

Old Plays, vol. i., and *Ancient British Drama*, vol. i. It is written in rhymed lines of rude construction, varying in length and neglecting the *caesura*. A number of the author's shorter pieces are preserved in the *Paradise of Dainty Devices*, first published in 1575, and reprinted in the *British Bibliographer*, vol. iii.; the best known are the lines on May, the *Amantium Irae*, and the *Commendation of Music*, which has the honour of furnishing a stanza to *Romeo and Juliet*. The *Historie of Damocles and Dionise* is assigned to him in the 1578 edition of the *Paradise*. Sir John Hawkins credited him with the part song "In going to my lonely bed"; the words are certainly his, and probably the music. In his own day Edwards was highly esteemed. The fine poem, "The Soul's Knell," is supposed to have been written by him when dying.

See *Grove's Dict. of Music* (new edition); the *Shakespeare Soc. Papers*, vol. ii. art. vi.; Ward, *English Dram. Literature*, vol. i.

EDWARDS, THOMAS CHARLES (1837–1900), Welsh Nonconformist divine and educationist, was born at Bala, Merioneth, on the 22nd of September 1837, the son of Lewis Edwards (*q.v.*). His resolve to become a minister was deepened by the revival of 1858–1859. After taking his degrees at London (B.A. 1861, M.A. 1862), he matriculated at St Alban Hall, Oxford, in October 1862, the university having just been opened to dissenters. He obtained a scholarship at Lincoln College in 1864, and took a first class in the school of Literae Humaniores in 1866. He was especially influenced by Mark Pattison and Jowett, who counselled him to be true to the church of his father, in which he had already been ordained. Early in 1867 he became minister at Windsor Street, Liverpool, but left it to become first principal of the University College of Wales at Aberystwyth, which had been established through the efforts of Sir Hugh Owen and other enthusiasts. The college was opened with a staff of three professors and twenty-five students in October 1872, and for some years its career was chequered enough. Edwards, however, proved a skilful pilot, and his hold on the affection of the Welsh people enabled him to raise the college to a high level of efficiency. When it was destroyed by fire in 1885 he collected £25,000 to rebuild it; the remainder of the necessary £40,000 being given by the government (£10,000) and by the people of Aberystwyth (£5000). In 1891 he gave up what had been the main work of his life to accept an undertaking that was even nearer his heart, the principalship of the theological college at Bala. A stroke of paralysis in 1894 fatally weakened him, but he continued at work till his death on the 22nd of March 1900. The Calvinistic Methodist Church of Wales bestowed on him every honour in their possession, and he received the degree of D.D. from the universities of Edinburgh (1887) and Wales (1898). His chief works were a *Commentary on 1 Corinthians* (1885), the *Epistle to the Hebrews* ("Expositor's Bible" series, 1888), and *The God-Man* ("Davies Lecture," 1895).

EDWARDSVILLE, a city and the county-seat of Madison county, Illinois, U.S.A., in the south-western part of the state, on Cahokia Creek, about 18 m. N.E. of St Louis. Pop. (1890) 3561; (1900) 4157 (573 foreign-born); (1910) 5014. Edwardsville is served by the Toledo, St Louis & Western, the Wabash, the Litchfield & Madison, and the Illinois Terminal railways, and is connected with St Louis by three electric lines. It has a Carnegie library. The city's principal manufactures are carriages, ploughs, brick, machinery, sanitary ware and plumber's goods. Bituminous coal is extensively mined in the vicinity. Adjoining Edwardsville is the co-operative village Leclaire (unincorporated), with the factory of the N. O. Nelson Manufacturing Co., makers of plumber's supplies, brass goods, sanitary fixtures, &c.; the village was founded in 1890 by Nelson O. Nelson (b. 1844), and nearly all of the residents are employed by the company of which he is the head; they share to a certain extent in its profits, and are encouraged to own their own homes. The company supports a school, Leclaire Academy, and has built a club-house, bowling alleys, tennis-courts, base-ball grounds, &c. The first settlement on the site of Edwardsville was made in 1812, and in 1815 the town was laid out and named in honour of Ninian Edwards (1775–1833), the governor of the Illinois Territory (1809–1818), and later United States senator (1818–1824) and governor of the state of Illinois (1826–1830). Edwardsville was incorporated in 1819 and received its present charter in 1872.

EDWARDSVILLE, a borough of Luzerne county, Pennsylvania, U.S.A., on the north branch of the Susquehanna river, adjoining Kingston and close to the north-western limits of Wilkes-Barre (on the opposite side of the river), in the north-eastern part of the state; the official name of the post office is Edwardsdale. Pop. (1890), 3284; (1900), 5165, of whom 2645 were foreign-born; (1910 census), 8407. It is served by the electric line of the Wilkes-Barre & Wyoming Valley Traction Co. Coal mining and brewing are the chief industries. Edwardsville was incorporated in 1884.

EDWIN, Aeduini or Edwine (585–633), king of Northumbria, was the son of Ella of Deira. On the seizure of Deira by Æthelfrith of Bernicia (probably 605), Edwin was expelled and is said to have taken refuge with Cadfan, king of Gwynedd. After the battle of Chester, in which Æthelfrith defeated the Welsh, Edwin fled to Rœdwald, the powerful king of East Anglia, who after some wavering espoused his cause and defeated and slew Æthelfrith at the river Idle in 617. Edwin thereupon succeeded to the Northumbrian throne, driving out the sons of Æthelfrith. There is little evidence of external activity on the part of Edwin before 625. It is probable that the conquest of the Celtic kingdom of Elmet, a district in the neighbourhood of the modern Leeds, ruled over by a king named Cerdic (Ceredig) is to be referred to this period, and this may have led to the later quarrel with Cadwallon, king of Gwynedd. Edwin seems also to have annexed Lindsey to his kingdom by 625. In this year he entered upon negotiations with Eadbald of Kent for a marriage with his sister Æthelberg. It was made a condition that Christianity should be tolerated in Northumbria, and accordingly Paulinus was consecrated bishop by Justus in 625, and was sent to Northumbria with Æthelberg. According to Bede, Edwin was favourably disposed towards Christianity owing to a vision he had seen at the court of Rœdwald, and in 626 he allowed Eanfled, his daughter by Æthelberg, to be baptized. On the day of the birth of his daughter, the king's life had been attempted by Eomer, an emissary of Cwichelm, king of Wessex. Preserved by the devotion of his thegn Lilla, Edwin vowed to become a Christian if victorious over his treacherous enemy. He was successful in the ensuing campaign, and abstained from the worship of the gods of his race. A letter of Pope Boniface helped to decide him, and after consulting his friends and counsellors, of whom the priest Coifi afterwards took a prominent part in destroying the temple at Goodmanham, he was baptized with his people and nobles at York, at Easter 627. In this town he granted Paulinus a see, built a wooden church and began one of stone. Besides York, Yeavering and Maelmin in Bernicia, and Catterick in Deira, were the chief scenes of the work of Paulinus. It was the influence of Edwin which led to the conversion of Eorpwald of East Anglia. Bede notices the peaceful state of Britain at this time, and relates that Edwin was preceded on his progresses by a kind of standard like that borne before the Roman emperors. In 633 Cadwallon of North Wales and Penda of Mercia rose against Edwin and slew him at Hatfield near Doncaster. His kinsman Osric succeeded in Deira, and Eanfrith the son of Æthelfrith in Bernicia. Bede tells us that Edwin had subdued the islands of Anglesey and Man, and the *Annales Cambriae* record that he besieged Cadwallon (perhaps in 632) in the island of Glannauc (Puffin Island). He was definitely recognized as overlord by all the other Anglo-Saxon kings of his day except Eadbald of Kent.

See Bede, *Hist. Eccl.* (ed. Plummer, Oxford, 1896), ii. 5, 9, 11, 12, 13, 15, 16, 18, 20; Nennius (ed. San Marte, 1844), § 63; *Vita S. Oswaldi*, ix. Simeon of Durham (ed. Arnold, London, 1882–1885, vol. i. R.S.). (F. G. M. B.)

EDWIN, JOHN (1749–1790), English actor, was born in London on the 10th of August 1749, the son of a watchmaker. As a youth, he appeared in the provinces, in minor parts; and at Bath in 1768 he formed a connexion with a Mrs Walmsley, a milliner, who bore him a son, but whom he afterwards deserted. His first London appearance was at the Haymarket in 1776 as

Flaw in Samuel Foote's *The Cozeners*, but when George Colman took over the theatre he was given better parts and became its leading actor. In 1779 he was at Covent Garden, and played there or at the Haymarket until his death on the 31st of October 1790. Ascribed to him are *The Last Legacy of John Edwin*, 1780; *Edwin's Jests* and *Edwin's Pills to Purge Melancholy*.

His son, JOHN EDWIN (1768–1805), made a first appearance on the stage at the Haymarket as Hengo in Beaumont and Fletcher's *Bonduca* in 1778, and from that time acted frequently with his father, and managed the private theatricals organized by his intimate friend Lord Barrymore at Wargrave, Berks. In 1791 he married Elizabeth Rebecca Richards, an actress already well known in juvenile parts, and played at the Haymarket and elsewhere thereafter with her. He died in Dublin on the 22nd of February 1805. His widow joined the Drury Lane company (then playing, on account of the fire of 1809, at the Lyceum), and took all the leading characters in the comedies of the day. She died on the 3rd of August 1854.

EDWY (EADWIG), "THE FAIR" (*c.* 940–959), king of the English, was the eldest son of King Edmund and Ælfgifu, and succeeded his uncle Eadred in 955, when he was little more than fifteen years old. He was crowned at Kingston by Archbishop Odo, and his troubles began at the coronation feast. He had retired to enjoy the company of the ladies Æthelgifu (perhaps his foster-mother) and her daughter Ælfgifu, whom the king intended to marry. The nobles resented the king's withdrawal, and he was induced by Dunstan and Cynesige, bishop of Lichfield, to return to the feast. Edwy naturally resented this interference, and in 957 Dunstan was driven into exile. By the year 956 Ælfgifu had become the king's wife, but in 958 Archbishop Odo of Canterbury secured their separation on the ground of their being too closely akin. Edwy, to judge from the disproportionately large numbers of charters issued during his reign, seems to have been weakly lavish in the granting of privileges, and soon the chief men of Mercia and Northumbria were disgusted by his partiality for Wessex. The result was that in the year 957 his brother, the Ætheling Edgar, was chosen as king by the Mercians and Northumbrians. It is probable that no actual conflict took place, and in 959, on Edwy's death, Edgar acceded peaceably to the combined kingdoms of Wessex, Mercia and Northumbria.

AUTHORITIES.—*Saxon Chronicle* (ed. Earle and Plummer, Oxford), *sub ann.*; *Memorials of St Dunstan* (ed. Stubbs, Rolls Series); William of Malmesbury, *Gesta regum* (ed. Stubbs, Rolls Series); Birch, *Cartularium Saxonicum*, vol. ii. Nos. 932-1046; Florence of Worcester.

EECKHOUT, GERBRAND VAN DEN (1621–1674), Dutch painter, born at Amsterdam on the 19th of August 1621, entered early into the studio of Rembrandt. Though a companion pupil to F. Bol and Govaert Flinck, he was inferior to both in skill and in the extent of his practice; yet at an early period he assumed Rembrandt's manner with such success that his pictures were confounded with those of his master; and, even in modern days, the "Resurrection of the Daughter of Jairus," in the Berlin museum, and the "Presentation in the Temple," in the Dresden gallery, have been held to represent worthily the style of Rembrandt. As evidence of the fidelity of Eeckhout's imitation we may cite his "Presentation in the Temple," at Berlin, which is executed after Rembrandt's print of 1630, and his "Tobit with the Angel," at Brunswick, which is composed on the same background as Rembrandt's "Philosopher in Thought." Eeckhout not merely copies the subjects; he also takes the shapes, the figures, the Jewish dress and the pictorial effects of his master. It is difficult to form an exact judgment of Eeckhout's qualities at the outset of his career. His earliest pieces are probably those in which he more faithfully reproduced Rembrandt's peculiarities. Exclusively his is a tinge of green in shadows marring the harmony of the work, a certain gaudiness of jarring tints, uniform surface and a touch more quick than subtle. Besides the pictures already mentioned we should class amongst early productions on this account the "Woman taken in Adultery," at Amsterdam; "Anna presenting her Son to the High Priest," in the Louvre; the "Epiphany," at Turin; and the "Circumcision," at Cassel. Eeckhout matriculated early in the Gild of Amsterdam. A likeness of a lady at a dressing-table with a string of beads, at Vienna, bears the date of 1643, and proves that the master at this time possessed more imitative skill than genuine mastery over nature. As he grew older he succeeded best in portraits, a very fair example of which is that of the historian Dappers (1669), in the Städel collection. Eeckhout occasionally varied his style so as to recall in later years the "small masters" of the Dutch school. Waagen justly draws attention to his following of Terburg in "Gambling Soldiers," at Stafford House, and a "Soldiers' Merrymaking," in the collection of the marquess of Bute. A "Sportsman with Hounds," probably executed in 1670, now in the Vander Hoo gallery, and a "Group of Children with Goats" (1671), in the Hermitage, hardly exhibit a trace of the artist's first education. Amongst the best of Eeckhout's works "Christ in the Temple" (1662), at Munich, and the "Haman and Mordecai" of 1665, at Luton House, occupy a good place. Eeckhout died at Amsterdam on the 22nd of October 1674.

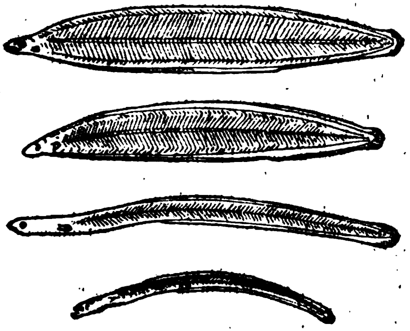
EEL. The common freshwater eel (Lat. *anguilla*; O. Eng. *æl*) belongs to a group of soft-rayed fishes distinguished by the presence of an opening to the air-bladder and the absence of the pelvic fins. With its nearest relatives it forms the family *Muraenidae*, all of which are of elongated cylindrical form. The peculiarities of the eel are the rudimentary scales buried in the skin, the well-developed pectoral fins, the rounded tail fin continuous with the dorsal and ventral fins. Only one other species of the family occurs in British waters, namely, the conger, which is usually much larger and lives in the sea. In the conger the eyes are larger than in the eel, and the upper jaw overlaps the lower, whereas in the eel the lower jaw projects beyond the upper. Both species are voracious and predatory, and feed on almost any animal food they can obtain, living or dead. The conger is especially fond of squid or other Cephalopods, while the eel greedily devours carrion. The common eel occurs in all the rivers and fresh waters of Europe, except those draining towards the Arctic Ocean, the Black Sea and the Caspian Sea. It also occurs on the Atlantic side of North America. The conger has a wider range, extending from the western and southern shores of Britain and Ireland to the East Indian Archipelago and Japan. It is common in the Mediterranean.

The ovaries of the eel resemble somewhat those of the salmon in structure, not forming closed sacs, as in the majority of Teleostei, but consisting of laminae exposed to the body cavity. The laminae in which the eggs are produced are very numerous, and are attached transversely by their inner edges to a membranous band running nearly the whole length of the body-cavity. The majority of the eels captured for market are females with the ovaries in an immature condition. The male eel was first discovered in 1873 by Syrski at Trieste, the testis being described by him as a lobed elongated organ, in the same relative position as the ovary in the female, surrounded by a smooth surface without laminae. He did not find ripe spermatozoa. He discovered the male by examining small specimens, all the larger being female. L. Jacoby, a later observer, found no males exceeding 19 in. in length, while the female may reach a length of 39 in. or more. Dr C. G. J. Petersen, in a paper published in 1896, states that in Denmark two kinds of eels are distinguished by the fishermen, namely, yellow eels and silver eels. The silver eels are further distinguished by the shape of the snout and the size of the eyes. The snout in front of the eyes is not flat, as in the yellow eels, but high and compressed, and therefore appears more pointed, while the eyes are much larger and directed outwards. In both kinds there are males and females, but Petersen shows that the yellow eels change into silver eels when they migrate to the sea. The sexual organs in the silver eels are more developed than in the yellow eels, and the former have almost or entirely ceased to take food. The male silver eels are from 11½ to 19 in. in length, the females from 16½ to about 39 in. It is evident, therefore, that if eels only spawn once, they do not all reach the same size when they become sexually mature. The male conger was first described in 1879 by Hermes, who obtained a ripe specimen in the Berlin Aquarium. This specimen was not quite 2½ ft. in length, and of the numerous males which have been identified at the Plymouth Laboratory, none exceeded this length. The large numbers of conger above this size caught for the market are all immature females. Female conger of 5 or 6 ft. in length and weighing from 30 to 50 lb are common enough, and occasionally they exceed these limits. The largest recorded was 8 ft. 3 in. long, and weighed 128 lb.

There is every reason to believe that eels and conger spawn but once in their lives, and die soon after they have discharged their generative products. When kept in aquaria, both male and female conger are vigorous and voracious. The males sooner or later cease to feed, and attain to the sexually mature condition, emitting ripe milt when handled and gently squeezed. They live in this condition five or six months, taking no food and showing gradual wasting and disease of the bodily organs. The eyes and skin become ulcerated, the sight is entirely lost, and the bones become soft through loss of lime. The females also after a time cease to feed, and live in a fasting condition for five or six months, during which time the ovaries develop and reach great size and weight, while the bones become soft and the teeth disappear. The female, however, always dies in confinement before the ova are perfectly ripe and before they are liberated from the ovarian tissue. The absence of some necessary condition, perhaps merely of the pressure which exists at the bottom of the sea, evidently prevents the complete development of the ovary. The invariable death of the fish in the same almost ripe condition leads to the conclusion that under normal conditions the fish dies after the mature ova have been discharged. G. B. Grassi states that he obtained ripe male eels, and ripe specimens of *Muraena*, another genus of the family, in the whirlpools of the Strait of Messina. A ripe female *Muraena* has also been described at Zanzibar. Gravid female eels, *i.e.* specimens with ovaries greatly enlarged, have been occasionally obtained in fresh water, but there is no doubt that, normally, sexual maturity is attained only in the sea.

Until recent years nothing was known from direct observation concerning the reproduction of the common eel or any species of the family. It was a well-known fact that large eels migrated towards the sea in autumn, and that in the spring small transparent eels of 2 in. in length and upwards were common on the shore under stones, and ascended rivers and streams in vast swarms. It was reasonable, therefore, to infer that the mature eels spawned in the sea, and that there the young were developed.

A group of peculiar small fishes were, however, known which were called Leptocephali, from the small proportional size of the head. The first of these described was captured in 1763 near Holyhead, and became the type of *L. Morrisii*, other specimens of which have been taken either near the shore or at the surface of the sea. Other forms placed in the same genus had been taken by surface fishing in the Mediterranean and in tropical ocean currents. The chief peculiarities of Leptocephali, in addition to the smallness of the head, are their ribbon-like shape and their glassy transparency during life. The body is flattened from side to side, and broad from the dorsal to the ventral edge. Like the eels, they are destitute of pelvic fins and no generative organs have been observed in them (see fig.).



Leptocephali. (By permission of J. & A. Churchill.)

In 1864 the American naturalist, T. N. Gill, published the conclusion that *L. Morrisii* was the young or larva of the conger, and Leptocephali generally the young stages of species of *Muraenidae*. In 1886 this conclusion was confirmed from direct observation by Yves Delage, who kept alive in a tank at Roscoff a specimen of *L. Morrisii*, and saw it gradually transformed into a young conger. From 1887 to 1892 Professor Grassi and Dr Calandruccio carried on careful and successful researches into the development of the Leptocephali at Catania, in Sicily. The specimens were captured in considerable numbers in the harbour, and the transformation of *L. Morrisii* into young conger, and of various other forms of Leptocephalus into other genera of *Muraenidae*, such as *Muraena*, *Congromuraena* and *Ophichthys*, was observed. In 1894 the same authors published the announcement that another species of Leptocephalus, namely, *L. brevirostris*, was the larva of the common eel. This larval form was captured in numbers with other Leptocephali in the strong currents of the Strait of Messina. In the metamorphosis of all Leptocephali a great reduction in size occurs. The *L. brevirostris* reaches a length of 8 cm., or a little more than 2½ in., while the perfectly-formed young eel is 2 in. long or a little more.

The Italian naturalists have also satisfied themselves that certain pelagic fish eggs originally described by Raffaele at Naples are the eggs of *Muraenidae*, and that among them are the eggs of *Conger* and *Anguilla*. They believe that these eggs, although free in the water, remain usually near the bottom at great depths, and that fertilization takes place under similar conditions. No fish eggs of the kind to which reference is here made have yet been obtained on the British coasts, although conger and eels are so abundant there. Raffaele described and figured the larva newly hatched from one of the eggs under consideration, and it is evident that this larva is the earliest stage of a Leptocephalus.

Although young eels, some of them more or less flat and transparent, are common enough on the coasts of Great Britain and north-western Europe in spring, neither eggs nor specimens of *Leptocephalus brevirostris* have yet been taken in the North Sea, English Channel or other shallow waters in the neighbourhood of the British Islands, or in the Baltic. Marked eels have been proved to migrate from the inmost part of the Baltic to the Kattegat. Recently, however, search has been made for the larvae in the more distant and deeper portions of the Atlantic Ocean. In May 1904 a true larval specimen was taken at the surface south-west of the Faeroe Islands, and another was taken 40 m. north by west of Achill Head, Ireland. In 1905 numbers were taken in deep water in the Atlantic. The evidence at present available indicates that the spawning of mature eels takes place beyond the 100 fathom line, and that the young eels which reach the coast are already a year old. As eels, both young and old, are able to live for a long time out of water and have the habit of travelling at night over land in wet grass and in damp weather, there is no difficulty in explaining their presence in wells, ponds or other isolated bodies of fresh water at any distance from the sea.

See "The Eel Question," *Report U.S. Commissioner of Fisheries for 1879* (Washington, 1882); J. T. Cunningham, "Reproduction and Development of the Conger," *Journ. Mar. Biol. Assn.* vol. ii.; C. G. J. Petersen, *Report Dan. Biol. Station*, v. (1894); G. B. Grassi, *Quart. Journ. Mic. Sci.* vol. xxxix. (1897). (J. T. C.)

EFFENDI (a Turkish word, corrupted from the Gr. *αὐθέντης*, a lord or master), a title of respect, equivalent to the English "sir," in the Turkish empire and some other eastern countries. It follows the personal name, when that is used, and is generally given to members of the learned professions, and to government officials who have no higher rank, such as Bey, Pasha, &c. It may also indicate a definite office, as *Hakim effendi*, chief physician to the sultan. The possessive form *effendim* (my master) is used by servants and in formal intercourse.

EFFIGIES, MONUMENTAL. An "effigy" (Lat. *effigies*, from *effingere*, to fashion) is, in general, a material image or likeness of a person; and the practice of hanging or burning people "in effigy," *i.e.* their semblance only, preserves the more general sense of the word. Such representations may be portraits, caricatures or models. But, apart from general usages of the term (see *e.g.* WAX FIGURES), it is more particularly applied in the history of art to a particular class of sculptured figures, in the flat or the round, associated with Christian sepulchral monuments, dating from the 12th century. The earliest of these attempts at commemorative portraiture were executed in low relief upon coffin-lids of stone or purbeck marble, some portions of the designs for the most part being executed by means of incised lines, cut upon the raised figure. Gradually, with the increased size and the greater architectural dignity of monumental structures, effigies attained to a high rank as works of art, so that before the close of the 13th century very noble examples of figures of this order are found to have been executed in full relief; and, about the same period, similar figures also began to be engraved, either upon monumental slabs of stone or marble, or upon plates of metal, which were affixed to the surfaces of slabs that were laid in the pavements of churches.

Engraved plates of this class, known as "Brasses" (see BRASSES, MONUMENTAL), continued in favour until the era of the Reformation, and in recent times their use has been revived. It seems probable that the introduction and the prevalence of flat engraved memorials, in place of commemorative effigies in relief, was due, in the first instance, to the inconvenience resulting from increasing numbers of raised stones on the pavement of churches; while the comparatively small cost of engraved plates, their high artistic capabilities, and their durability, combined to secure for them the popularity they unquestionably enjoyed. If considerably less numerous than contemporary incised slabs and engraved brasses, effigies sculptured in relief—with some exceptions in full relief—continued for centuries to constitute the most important features in many medieval monuments. In the 13th century, their origin being apparently derived from the endeavour to combine a monumental effigy with a monumental cross upon the same sepulchral stone (whether in sculpture or by incised lines), parts only of the human figure sometimes were represented, such as the head or bust, and occasionally also the feet; in some of the early examples of this curious class the cross symbol was not introduced, and after awhile half-length figures became common.

Except in very rare instances, that most important element, genuine face-portraiture, is not to be looked for, in even the finest sculptured effigies, earlier than about the middle of the 15th century. In works of the highest order of art, indeed, the memorials of personages of the most exalted rank, effigies from an early period in their existence may be considered occasionally to have been portraits properly so called; and yet even in such works as these an approximately correct general resemblance but too frequently appears to have been all that was contemplated or desired. At the same time, in the earliest monumental effigies we possess contemporary examples of vestments, costume,[1] armour, weapons, royal and knightly insignia, and other personal appointments and accessories, in all of which accurate fidelity has been certainly observed with scrupulous care and minute exactness. Thus, since the monumental effigies of England are second to none in artistic merit, while they have been preserved in far greater numbers, and generally in better condition than those in other countries, they represent in unbroken continuity an unrivalled series of original personal representations of successive generations, very many of them being, in the most significant acceptation of that term, veritable contemporaneous portraits.

Once esteemed to be simply objects of antiquarian curiosity, and either altogether disregarded or too often subjected to injurious indignity, the monumental effigies in England long awaited the formation of a just estimate of their true character and their consequent worth in their capacity as authorities for face-portraiture. In the original contract for the construction of the monument at Warwick to Richard Beauchamp, the fifth earl, who died in 1439, it is provided that an effigy of the deceased noble should be executed in bronze gilt, with all possible care, by the most skilful and experienced artists of the time; and the details of the armour and the ornaments of the figure are specified with minute precision. It is remarkable, however, that the effigy itself is described only in the general and indefinite terms—"an image of a man armed." There is no provision that the effigy should be "an image" of the earl; and much less is anything said as to its being such a "counterfeit presentment" of the features and person of the living man, as the contemporaries of Shakespeare had learned to expect in what they would accept as true portraiture. The effigy, almost as perfect as when it left the sculptor's hands, still bears witness, as well to the conscientious care with which the conditions of the contract were fulfilled, as to the eminent ability of the artists employed. So complete is the representation of the armour, that this effigy might be considered actually to have been equipped in the earl's own favourite suit of the finest Milan steel. The cast of the figure also was evidently studied from what the earl had been when in life, and the countenance is sufficiently marked and endowed with the unmistakable attributes of personal character. Possibly such a resemblance may have been the highest aim in the image-making of the period, somewhat before the middle of the 15th century. Three-quarters of a century later, a decided step towards fidelity in true portraiture is shown to have been taken, when, in his will (1510 A.D.), Henry VII. spoke of the effigies of himself and of his late queen, Elizabeth of York, to be executed for their monument, as "an image of our figure and another of hers." The existing effigies in the Beauchamp chapel and in Henry VII.'s chapel, with the passages just quoted from the contract made by the executors of the Lancastrian earl, strikingly illustrate the gradual development of the idea of true personal portraiture in monumental effigies, during the course of the 15th and at the commencement of the 16th century in England.

Study of the royal effigies still preserved must commence in Worcester Cathedral with that of King John. This earliest example of a series of effigies of which the historical value has never yet been duly appreciated is rude as a work of art, and yet there is on it the impress of such individuality as demonstrates that the sculptor did his best to represent the king. Singularly fine as achievements of the sculptor's art are the effigies of Henry III., Queen Eleanor of Castile, and her ill-fated son Edward II., the two former in Westminster Abbey, the last in Gloucester cathedral; and of their fidelity also as portraits no doubt can be entertained. In like manner the effigies of Edward III. and his queen Philippa, and those of their grandson Richard II. and his first consort, Anne of Bohemia (all at Westminster), and of their other grandson, Henry of Lancaster, with his second consort, Joan of Navarre, at Canterbury—all convince us that they are true portraits. Next follow the effigies of Henry VII. and Elizabeth of York,—to be succeeded, and the royal series to be completed, by the effigies of Queen Elizabeth and Mary Stuart, all of them in Westminster Abbey. Very instructive would be a close comparison between the two last-named works and the painted portraits of the rival queens, especially in the case of Mary, the pictures of whom differ so remarkably from one another.

As the 15th century advanced, the rank of the personage represented and the character of the art that distinguishes any effigy goes far to determine its portrait qualities. Still later, when more exact face-portraiture had become a recognized element, sculptors must be supposed to have aimed at the production of such resemblance as their art would enable them to give to their works; and accordingly, when we compare effigies with painted portraits of the same personages, we find that they corroborate one another. The prevalence of portraiture in the effigies of the 16th and 17th centuries, when their art generally underwent a palpable decline, by no means raises all works of this class, or indeed the majority of them, to the dignity of true portraits; on the contrary, in these effigies, as in those of earlier periods, it is the character of the art in each particular example that affects its merit, value and authority as a portrait. In judging of these latter effigies, however, we must estimate them by the standard of art of their own era; and, as a general rule, the effigies that are the best as works of art in their own class are the best also and the most faithful in their portraiture. The earlier effigies, usually produced without any express aim at exact portraiture, as we now employ that expression, have nevertheless strong claims upon our veneration. Often their sculpture is very noble; and even when they are rudest as works of art, there is rarely lacking a rough grandeur about them, as exhibited in the fine bold figure of Fair Rosamond's son, Earl William of the Long Sword, which reposes in such dignified serenity in his own cathedral at Salisbury. These effigies may not bring us closely face to face with remote generations, but they do place before us true images of what the men and women of those generations were.

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[1] It is well known that the costume of effigies nearly always represented what was actually worn by the remains of the person commemorated, when prepared for interment and when lying in state; and, in like manner, the aspect of the lifeless countenance, even if not designedly reproduced by medieval "image" makers, may long have exercised a powerful influence upon their ideas of consistent monumental portraiture.

Observant students of monumental effigies will not fail to appreciate the singular felicity with which the medieval sculptors adjusted their compositions to the recumbent position in which their "images" necessarily had to be placed. Equally worthy of notice is the manner in which many monumental effigies, particularly those of comparatively early date, are found to have assumed an aspect neither living nor lifeless, and yet impressively life-like. The sound judgment also, and the good taste of those early sculptors, were signally exemplified in their excluding, almost without exception, the more extravagant fashions in the costume of their era from their monumental sculpture, and introducing only the simpler but not less characteristic styles of dress and appointments. Monumental effigies, as commonly understood, represent recumbent figures, and the accessories of the effigies themselves have been adjusted to that position. With the exceptions when they appear on one side resting on the elbow (as in the case of Thomas Owen (d. 1598) and Sir Thomas Heskett (d. 1605), both in Westminster Abbey), these effigies lie on their backs, and as a general rule (except in the case of episcopal figures represented in the act of benediction, or of princes and warriors who sometimes hold a sceptre or a sword) their hands are uplifted and conjoined as in supplication. The crossed-legged attitude of numerous armed effigies of the era of mail-armour has been supposed to imply the personages so represented to have been crusaders or Knights of the Temple; but in either case the supposition is unfounded and inconsistent with unquestionable facts. Much beautiful feeling is conveyed by figures of ministering angels being introduced as in the act of supporting and smoothing the pillows or cushions that are placed in very many instances to give support to the heads of the recumbent effigies. The animals at the feet of these effigies, which frequently have an heraldic significance, enabled the sculptors, with equal propriety and effectiveness, to overcome one of the special difficulties inseparable from the recumbent position. In general, monumental effigies were carved in stone or marble, or cast in bronze, but occasionally they were of wood: such is the effigy of Robert Curthose, son of William I. (d. 1135), whose altar tomb in Gloucester cathedral was probably set up about 1320.

In addition to recumbent statues, upright figures must receive notice here, especially those set in wall-monuments in churches mainly. These usually consisted in half-length figures, seen full-face, placed in a recess within an architectural setting more or less elaborate. They belong mainly to the 16th and 17th centuries. Among the many examples in old St Paul's cathedral (destroyed in the Great Fire of 1666) were those of Dean Colet (d. 1519), William Aubrey (1595) and Alexander Nowell (d. 1601). In St Giles's, Cripplegate, is the similarly designed effigy of John Speed (d. 1629); while that of John Stow (d. 1605) is a full-length, seated figure. This, like the figure of Thomas Owen, is in alabaster, but since its erection has always been described as terra-cotta—a material which came into considerable favour for the purpose of busts and half-lengths towards the end of the 16th century, imported, of course, from abroad. Sometimes the stone monuments were painted to resemble life, as in the monuments to Shakespeare and John Combe (the latter now over-painted white), in Holy Trinity Church, Stratford-on-Avon.

Bibliography.—Among the more noteworthy publications are the following: *Monumental Effigies in Great Britain* (Norman Conquest to Henry VIII.), by C. A. Stothard, folio (London, 1876); *The Recumbent Monumental Effigies in Northamptonshire*, by A. Hartshorne (4to, London, 1867–1876); *Sepulchral Memorials* (Northamptonshire), by W. H. Hyett (folio, London, 1817); *Ancient Sepulchral Effigies and Monumental Sculpture of Devon*, by W. H. H. Rogers (4to, Exeter, 1877); *The Ancient Sepulchral Monuments of Essex*, ed. by C. M. Carlton (4to, Chelmsford, 1890); and other works dealing with the subject according to counties. Of particular value is the *Report of the Sepulchral Monuments Committee* of the Society of Antiquaries, laboriously compiled at the request of the Office of Works, arranged (1) personally and chronologically, and (2) locally (1872). (C. B.; M. H. S.)

EGAN, PIERCE (1772–1849), English sporting writer, was born in London in 1772. He began life as sporting reporter for the newspapers, and was soon recognized as the best of his day. In 1814 he wrote, set and printed a book about the relations of the prince regent (afterwards George IV.) and Miss Robinson, called *The Mistress of Royalty, or the Loves of Florizel and Perdita*. But his best-known work is *Life in London, or Days and Nights of Jerry Hawthorne and his Elegant Friend Corinthian Tom* (1821), a book describing the amusements of sporting men, with illustrations by Cruikshank. This book took the popular fancy and was one of Thackeray's early favourites (see his *Roundabout Papers*). It was repeatedly imitated, and several dramatic versions were produced in London. A sequel containing more of country sports and misadventures probably suggested Dickens's *Pickwick Papers*. In 1824 *Pierce Egan's Life in London and Sporting Guide* was started, a weekly newspaper afterwards incorporated with *Bell's Life*. Among his numerous other books are *Boxiana* (1818), *Life of an Actor* (1824), *Book of Sports* (1832), and the *Pilgrims of the Thames* (1838). Egan died at Pentonville on the 3rd of August 1849.

His son, Pierce Egan (1814–1880), illustrated his own and his father's books, and wrote a score of novels of varying merit, of which *The Snake in the Grass* (1858) is perhaps the best.

EGBO, a secret society flourishing chiefly among the Efiks of the Calabar district, West Africa. Egbo or Ekpê is a mysterious spirit who lives in the jungle and is supposed to preside at the ceremonies of the society. Only males can join, boys being initiated about the age of puberty. Members are bound by oath of secrecy, and fees on entrance are payable. The Egbo-men are ranked in seven or nine grades, for promotion to each of which fresh initiation ceremonies, fees and oaths are necessary. The society combines a kind of freemasonry with political and law-enforcing aims. For instance any member wronged in an Egbo district, that is one dominated by the society, has only to address an Egbo-man or beat the Egbo drum in the Egbo-house, or "blow Egbo" as it is called, *i.e.* sound the Egbo horn before the hut of the wrong-doer, and the whole machinery of the society is put in force to see justice done. Formerly the society earned as bad a name as most secret sects, from the barbarous customs mingled with its rites; but the British authorities have been able to make use of it in enforcing order and helping on civilization. The Egbo-house, an oblong building like the nave of a church, usually stands in the middle of the villages. The walls are of clay elaborately painted inside and ornamented with clay figures in relief. Inside are wooden images, sometimes of an obscene nature, to which reverence is paid. Much social importance attaches to the highest ranks of Egbo-men, and it is said that very large sums, sometimes more than a thousand pounds, are paid to attain these dignities. At certain festivals in the year the

Egbo-men wear black wooden masks with horns which it is death for any woman to look on.

See Mary H. Kingsley, *West African Studies* (1901); Rev. Robt. H. Nassau, *Fetichism in West Africa* (1904); C. Partridge, *Cross River Natives* (1905).

EGEDE, HANS (1686–1758), Norwegian missionary, was born in the vogtship of Senjen, Norway, on the 31st of January 1686. He studied at the university of Copenhagen, and in 1706 became pastor at Vaagen in the Lofoten islands, but the study of the chronicles of the northmen having awakened in him the desire to visit the colony of Northmen in Greenland, and to convert them to Christianity, he resigned his charge in 1717; and having, after great difficulty, obtained the sanction and help of the Danish government in his enterprise, he set sail with three ships from Bergen on the 3rd of May 1721, accompanied by his wife and children. He landed on the west coast of Greenland on the 3rd of July, but found to his dismay that the Northmen were entirely superseded by the Eskimo, in whom he had no particular interest, and whose language he would be able to master, if at all, only after years of study. But, though compelled to endure for some years great privations, and at one time to see the result of his labours almost annihilated by the ravages of small-pox, he remained resolutely at his post. He founded the colony of Godthaab, and soon gained the affections of the people. He converted many of them to Christianity, and established a considerable commerce with Denmark. Ill-health compelling him to return home in 1736, he was made principal of a seminary at Copenhagen, in which workers were trained for the Greenland mission; and from 1740 to 1747 he was superintendent of the mission. He died on the 5th of November 1758. He is the author of a book on the natural history of Greenland.

His work in Greenland was continued, on his retirement, by his son Paul Egede (1708–1789), who afterwards returned to Denmark and succeeded his father as superintendent of the Greenland mission. Paul Egede also became professor of theology in the mission seminary. He published a Greenland-Danish-Latin dictionary (1750), Greenland grammar (1760) and Greenland catechism (1756). In 1766 he completed the translation begun by his father of the New Testament into the Greenland tongue; and in 1787 he translated Thomas à Kempis. In 1789 he published a journal of his life in Greenland.

EGER, AQIBA (1761–1837), Jewish scholar, was for the last twenty-five years of his life rabbi of Posen. He was a rigorous casuist of the old school, and his chief works were legal notes on the Talmud and the code of Qaro (*q.v.*). He believed that religious education was enough, and thus opposed the party which favoured secular schools. He was a determined foe of the reform movement, which began to make itself felt in his time.

EGER (Czech, *Cheb*), a town of Bohemia, Austria, 148 m. W.N.W. of Prague by rail. Pop. (1900) 23,665. It is situated on the river Eger, at the foot of one of the spurs of the Fichtelgebirge, and lies in the centre of a German district of about 40,000 inhabitants, who are distinguished from the surrounding population by their costumes, language, manners and customs. On the rock, to the N.W. of the town, lies the Burg or Castle, built probably in the 12th century, and now in ruins. It possesses a massive black tower, built of blocks of lava, and in the courtyard is an interesting chapel, in Romanesque style with fantastic ornamentations, which was finished in the 13th century. In the banquet-room of this castle Wallenstein's officers Terzky, Kinsky, Illo and Neumann were assassinated a few hours before Wallenstein himself was murdered by Captain Devereux. The murder took place on the 25th of February 1634 in the town-house, which was at that time the burgomaster's house. The rooms occupied by Wallenstein have been transformed since 1872 into a museum, which contains many historical relics and antiquities of the town of Eger. The handsome and imposing St Nicholas church was built in the 13th century and restored in 1892. There is a considerable textile industry, together with the manufacture of shoes, machinery and milling. Eger was the birthplace of the novelist and playwright Braun von Braunthal (1802–1866). About 3 m. N.W. of Eger is the well-known watering place of Franzensbad (*q.v.*).

The district of Eger was in 870 included in the new margraviate of East Franconia, which belonged at first to the Babenbergs, but from 906 to the counts of Vohburg, who took the title of margraves of Eger. By the marriage, in 1149, of Adela of Vohburg with the emperor Frederick I., Eger came into the possession of the house of Swabia, and remained in the hands of the emperors until the 13th century. In 1265 it was taken by Ottakar II. of Bohemia, who retained it for eleven years. After being repeatedly transferred from the one power to the other, according to the preponderance of Bohemia or the empire, the town and territory were finally incorporated with Bohemia in 1350, after the Bohemian king became the emperor Charles IV. Several imperial privileges, however, continued to be enjoyed by the town till 1849. It suffered severely during the Hussite war, during the Swedish invasion in 1631 and 1647, and in the War of the Austrian Succession in 1742.

See Drivok, *Ältere Geschichte der deutschen Reichstadt Eger und des Reichsgebietes Egerland* (Leipzig, 1875).

EGER (Ger. *Erlau*, Med. Lat. *Agria*), a town of Hungary, capital of the county of Heves, 90 m. E.N.E. of Budapest by rail. Pop. (1900) 24,650. It is beautifully situated in the valley of the river Eger, an affluent of the Theiss, and on the eastern outskirts of the Mátra mountains. Eger is the see of an archbishopric, and owing to its numerous ecclesiastical buildings has received the name of "the Hungarian Rome." Amongst the principal buildings are the beautiful cathedral in the Italian style, with a handsome dome 130 ft. high, erected in 1831–1834 by the archbishop Ladislaus Pyrker (1772–1847); the church of the Brothers of Mercy, opposite which is a handsome minaret, 115 ft. high, the remains of a mosque dating from the Turkish occupation, other Roman Catholic churches, and an imposing Greek church. The archiepiscopal palace; the lyceum, with a good library and an astronomical observatory; the seminary for Roman priests; and the town-hall are all noteworthy. On an eminence N.E. of the town, laid out as a park, are the ruins of the old fortress, and a monument of Stephen Dobó, the heroic defender of the town against the assaults of the Turks in 1552. The chief occupation of the inhabitants is the cultivation of the vineyards of the surrounding hills, which produce the red Erlauer wine, one of the best in Hungary. To the S.W. of Eger, in the same county of Heves, is situated the town of Gyöngyös (pop. 15,878). It lies on the south-western outskirts of the Mátra mountains, and carries on a brisk trade in the Erlauer wine, which is produced throughout the district. The Hungarians defeated the Austrians at Gyöngyös on the 3rd of April 1849. To the S.W. of Gyöngyös is situated the old town of Hatvan (pop. 9698), which is now a busy railway junction, and possesses several industrial establishments.

Eger is an old town, and owes its importance to the bishopric created by King Stephen in 1010, which was one of the richest in the whole of Hungary. In 1552 Eger resisted the repeated assaults of a large Turkish force; in 1596, however, it was given up to the Turks by the Austrian party in the garrison, and remained in their possession until 1687. It was created an archbishopric in 1814. During the revolution of 1848–1849, Eger was remarkable for the patriotic spirit displayed by its inhabitants; and it was here that the principal campaigns against the Austrians were organized.

EGERIA, an ancient Italian goddess of springs. Two distinct localities were regarded as sacred to her,—the grove of Diana Nemorensis at Aricia, and a spring in the immediate neighbourhood of Rome at the Porta Capena. She derives her chief importance from her legendary connexion with King Numa, who had frequent interviews with her and consulted her in regard to his religious legislation (Livy i. 19; Juvenal iii. 12). These meetings took place on the spot where the sacred shield had fallen from heaven, and here Numa dedicated a grove to the Camenae, like Egeria deities of springs. After the death of Numa, Egeria was said to have fled into the grove of Aricia, where she was changed into a spring for having interrupted the rites of Diana by her lamentations (Ovid, *Metam.* xv. 479). At Aricia there was also a Manius Egerius, a male counterpart of Egeria. Her connexion with Diana Nemorensis, herself a birth goddess, is confirmed by the fact that her aid was invoked by pregnant women. She also possessed the gift of prophecy; and the statement (Dion. Halic. ii. 60) that she was one of the Muses is due to her connexion with the Camenae, whose worship was displaced by them.

EGERTON, SIR PHILIP DE MALPAS GREY, Bart. (1806–1881), English palaeontologist, was born on the 13th of November 1806, the son of the 9th baronet. He was educated at Eton and Christ Church, Oxford, where he graduated B.A. in 1828. While at college his interest in geology was aroused by the lectures of W. Buckland, and by his acquaintance with W. D. Conybeare. Subsequently when travelling in Switzerland with Lord Cole (afterwards 3rd earl of Enniskillen) they were introduced to Prof. L. Agassiz at Neufchatel, and determined to make a special study of fossil fishes. During the course of fifty years they gradually gathered together two of the largest and finest of private collections—that of Sir Philip Grey Egerton being at Oulton Park, Tarporley, Cheshire. He described the structure and affinities of numerous species in the publications of the Geological Society of London, the *Geological Magazine* and the Decades of the Geological Survey; and in recognition of his services the Wollaston medal was awarded to him in 1873 by the Geological Society. He was elected F.R.S. in 1831, and was a trustee of the British Museum. As a member of Parliament he represented the city of Chester in 1830, the southern division of Cheshire from 1835 until 1868, and the western division from 1868 to 1881. He died in London on the 6th of April 1881. His collection of fossil fishes is now in the British Museum.

EGG, AUGUSTUS LEOPOLD (1816–1863), English painter, was born on the 2nd of May 1816 in London, where his father carried on business as a gun-maker. He had some schooling at Bexley, and was not at first intended for the artistic profession; but, developing a faculty in this line, he entered in 1834 the drawing class of Mr Sass, and in 1836 the school of the Royal Academy. His first exhibited picture appeared in 1837 at the Suffolk Street gallery. In 1838 he began exhibiting in the Academy, his subject being a "Spanish Girl"; altogether he sent twenty-seven works to this institution. In 1848 he became an associate and in 1860 a full member of the Academy: he had considerable means, apart from his profession. In 1857 he took a leading part in selecting and arranging the modern paintings in the Art-Treasures Exhibition in Manchester. His constitution being naturally frail, he went in 1853, with Dickens and Wilkie Collins, to Italy for a short trip, and in 1863 he visited Algeria. Here he benefited so far as his chronic lung-disease was concerned; but exposure to a cold wind while out riding brought on an attack of asthma, from which he died on the 26th of March 1863 at Algiers, near which city his remains were buried.

Egg was a gifted and well-trained painter of genre, chiefly in the way of historical anecdote, or of compositions from the poets and novelists. Among his principal pictures may be named: 1843, the "Introduction of Sir Piercie Shafton and Halbert Glendinning" (from Scott's *Monastery*); 1846, "Buckingham Rebuffed"; 1848, "Queen Elizabeth discovers she is no longer young"; 1850, "Peter the Great sees Catharine for the first time"; 1854, "Charles I. raising the Standard at Nottingham" (a study); 1855, the "Life and Death of Buckingham"; 1857 and 1858, two subjects from Thackeray's *Esmond*; 1858, "Past and Present, a triple picture of a faithless wife"; 1859, the "Night before Naseby"; 1860, his last exhibited work, the Dinner Scene from *The Taming of the Shrew*. The Tate Gallery contains one of his earlier pictures, Patricio entertaining two Ladies, from the *Diable boiteux*; it was painted in 1844.

Egg was rather below the middle height, with dark hair and a handsome well-formed face; the head of Peter the Great (in the picture of Peter and Catharine, which may be regarded as his best work, along with the Life and Death of Buckingham) was studied, but of course considerably modified, from his own countenance. He was manly, kind-hearted, pleasant, and very genial and serviceable among brother-artists; social and companionable, but holding mainly aloof from fashionable circles. As an actor he had uncommon talent. He appeared among Dickens's company of amateurs in 1852 in Lord Lytton's comedy *Not so Bad as we Seem*, and afterwards in Wilkie Collins's *Frozen Deep*, playing the humorous part of Job Want.

EGG (O.E. *aeg*, cf. Ger. *Ei*, Swed. *oegg*, and prob. Gr. *ᾠόν*, Lat. *ovum*), the female reproductive cell or ovum of animals, which gives rise generally only after fertilization to the young. The largest eggs are those of birds; and this because, to the minute essential portion of the egg, or germ, from which the young bird grows, there is added a large store of food-material—the yolk and white of the egg—destined to nourish the growing embryo while the whole is enclosed within a hard shell.

The relative sizes of eggs depend entirely on the amount of the food-yolk thus enclosed with the germ; while the form and texture of the outer envelope are determined by the nature of the environment to which the egg is exposed. Where the food material is infinitesimal in quantity the egg is either not extruded—the embryo being nourished by the maternal tissues,—or it passes out of the parental body and gives rise at once to a free-living organism or "larva" (see Larval Forms), as in the case of many lowly freshwater and marine animals. In such cases no "egg" in the usual sense of the term is produced.

The number of eggs periodically produced by any given individual depends on the risks of destruction to which they, and the young to which they give rise, are exposed: not more than a single egg being annually laid by some species, while with others the number may amount to millions.

Birds' Eggs.—The egg of the bird affords, for general purposes, the readiest example of the modifications imposed on eggs by the external environment. Since it must be incubated by the warmth of the parent's body, the outer envelope has taken the form of a hard shell for the protection of the growing chick from pressure, while the dyes which commonly colour the surface of this shell serve as a screen to hide it from egg-eating animals.

Carbonate of lime forms the principal constituent of this shell; but in addition phosphate of lime and magnesia are also present. In section, this shell will be found to be made up of three more or less distinct crystalline layers, traversed by vertical canals, whereby the shell is made porous so as to admit air to the developing chick.

The outermost, or third, layer of this shell often takes the form of a glaze, as of procelain, as for example in the burnished egg of the ostrich: or it may assume the character of a thick, chalky layer as in some cuckoos (*Guira*, *Crotophaga ani*), cormorants, grebes and flamingoes: while in some birds as in the auks, gulls and tinamous, this outer layer is wanting; yet the tinamous have the most highly glazed eggs of all birds, the second layer of the shell developing a surface even more perfectly burnished than that formed by the outermost, third layer in the ostrich.

While the eggs of some birds have the shell so thin as to be translucent, *e.g.* kingfisher, others display considerable thickness, the maximum being reached in the egg of the extinct *Aepyornis*.

Though in shape differing but little from that of the familiar hen's egg, certain well-marked modifications of form are yet to be met with. Thus the eggs of the plover are pear-shaped, of the sand-grouse more or less cylindrical, of the owls and titmice spherical and of the grebes biconical.

In the matter of coloration the eggs of birds present a remarkable range. The pigments to which this coloration is due have been shown, by means of their absorption spectra (Sorby, *Proc. Zool. Soc.*, 1875), to be seven in number. The first of these, oorhodeine, is brown-red in tone, and rarely absent: the second and third, oocyanin, and banded oocyanin, are of a beautiful blue, and though differing spectroscopically give rise to the same product when oxidized: the fourth and fifth are yellow, and rufous ooxanthine, the former combining with oocyanin gives rise to the wonderful malachite green of the emu's egg, while the latter occurs only in the eggs of tinamous: the sixth is lichenoxanthine, a pigment not yet thoroughly known but present in the shells of all eggs having a peculiar brick-red colour. Still less is known of the seventh pigment which is, as yet, nameless. It is a substance giving a banded absorption spectrum, and which, mixed with other pigments, imparts an abnormally browner tint. The origin of these pigments is yet uncertain, but it is probable that they are derived from the haemoglobin or red colouring matter of the blood. This being so, then the pigments of the egg-shell differ entirely in their nature from those which colour the yolk or the feathers.

While many eggs are either colourless or of one uniform tint, the majority have the surface broken up by spots or lines, or a combination of both, of varying tints: the pigment being deposited as the egg passes down the lower portion of the oviduct. That the egg during this passage turns slowly on its long axis is shown by the fact that the spots and lines have commonly a spiral direction; though some of the markings are made during periods of rest, as is shown by their sharp outlines, movement giving a blurred effect. Where the egg is pyriform, the large end makes way for the smaller. Many eggs display, in addition to the strongly marked spots, more or fewer fainter spots embedded in a deeper layer of the shell, and hence such eggs are said to be "double-spotted," *e.g.* rails and plovers.

Among some species, as in birds of prey, the intensity of this coloration is said to increase with age up to a certain point, when it as gradually decreases. Frequently, especially where but two eggs are laid (Newton), all the dye will be deposited, sometimes on the first, sometimes on the last laid, leaving the other colourless. But although of a number of eggs in a "clutch"—as the full complement of eggs in a nest is called—no two are exactly alike, they commonly bear a very close resemblance. Among certain species, however, which lay several eggs, one of the number invariably differs markedly from the rest, as for example in the eggs of the house-sparrow or in those of the sparrow-hawk, where, of a clutch of six, two generally differ conspicuously from the rest. Differing though these eggs do from the rest of the clutch, all yet present the characters common to the species. But the eggs of some birds, such as the Australian swamp quail, *Synoecus australis*, present a remarkably wide range of variation in the matter of coloration, no two clutches being alike, the extremes ranging from pure white to eggs having a greenish ground colour and rufous spots or blotches. But a still more interesting illustration of variation equally marked is furnished by the chikor partridge (*Caccabis chukar*), since here the variation appears to be correlated with the geographical distribution of the species. Thus eggs taken in Greece are for the most part cream-coloured and unspotted; those from the Grecian Archipelago are generally spotted and blotched; while more to the eastward spots are invariably present, and the blotches attain their maximum development.

But in variability the eggs of the guillemot (*Lomvia troile*) exceed all others: both in the hue of the ground colour and in the form of the superimposed markings, these eggs exhibit a wonderful range for which no adequate explanation has yet been given.

Individual peculiarities of coloration are commonly reproduced, not only with this species but also in others, year after year.

The coloration of the egg bears no sort of relation to the coloration of the bird which lays it; but it bears on the other hand a more or less direct relation to the nature of the environment during incubation.

Significance of colour.

White eggs may generally be regarded as representing the primitive type of egg, since they agree in this particular with the eggs of reptiles. And it will generally be found that eggs of this hue are deposited in holes or in domed nests. So long indeed as nesting-places of this kind are used will the eggs be white. And this because coloured eggs would be invisible in dimly lighted chambers of this description, and therefore constantly exposed to the risk of being broken by the sitting bird, or rolling out of reach where the chamber was large enough to admit of this, whereas white eggs are visible so long as they can be reached by the faintest rays of light. Pigeons invariably lay white eggs; and while some deposit them in holes others build an open nest, a mere platform of sticks. These exceptions to the rule show that the depredations of egg-eating animals are sufficiently guarded against by the overhanging foliage, as well as by the great distance from the ground at which the nest is built. Birds which have reverted to the more ancient custom of nesting in holes after having developed pigmented eggs, have adopted the device of covering the shell with a layer of chalky matter (*e.g.* puffins), or, to put the case more correctly, they have been enabled to maintain survival after their return to the more ancient mode of nidification, because this reversion was accompanied by the tendency to cover the pigmented surface of the shell with this light-reflecting chalky incrustation.

Eggs which are deposited on the bare ground, or in other exposed situations, are usually protectively coloured: that is to say, the hue of the shell more or less completely harmonizes with the ground on which the egg is placed. The eggs of the plover tribe afford the most striking examples of this fact.

But the majority of birds deposit their eggs in a more or less elaborately constructed nest, and in such cases the egg, so far from being protectively coloured, often displays tints that would appear calculated rather to attract the attention of egg-stealing animals; bright blue or blue spotted with black being commonly met with. It may be, however, that coloration of this kind is less conspicuous than is generally supposed, but in any case the safety of the egg depends not so much on its coloration as on the character of the nest, which, where protective devices are necessary, must harmonize sufficiently with its surroundings to escape observation from prowling egg-stealers of all kinds.

The size of the egg depends partly on the number produced and partly on the conditions determining the state of the young bird at hatching: hence there is a great disparity in the relative sizes of the eggs of different birds. Thus it will be found that young birds which emerge in the world blind, naked and helpless are the product of relatively small eggs, while on the contrary young hatched from relatively large eggs are down-clad and active from birth.

The fact that the eggs must be brooded by the parent is also a controlling factor in so far as number is concerned, for no more can be hatched than can be covered by the sitting bird. Other factors, however, less understood, also exercise a controlling influence in this matter. Thus the ostrich lays from 12 to 16, the teal 15, the partridge 12–20, while among many other species the number is strictly limited, as in the case of the hornbills and guillemots, which lay but a single egg; the apteryx, divers, petrels and pigeons never lay more than 2, while the gulls and plovers never exceed 4. Tropical species are said to lay fewer eggs than their representatives in temperate regions, and further immature birds lay more and smaller eggs than when fully adult.

Partly owing to the uniformity of shape, size and texture of the shell, the eggs of birds are by no means easy to distinguish, except in so far as their family resemblances are concerned: that is to say, except in particular cases, they cannot be specifically distinguished, and hence they are of but little or no value for the purposes of classification.

Save only among the megapodes, all birds brood their eggs, the period of incubation varying from 13 days, as in small passerine birds, to 8 weeks, as in the cassowary, though eggs of the rhea and of *Struthio* hatch in from 5 to 6 weeks. But the megapodes deposit their eggs in mounds of decaying vegetable matter or in sand in the neighbourhood of hot springs, and there without further apparent care leave them. Where the nestling is active from the moment of hatching the eggs have a relatively longer incubation period than in cases where the nestlings are for a long while helpless.

Eggs of Mammals.—Only in the spiny ant-eater, or *Echidna*, and the duck-billed platypus, or *Ornithorhynchus*, among the Mammalia, are the eggs provided with a large store of yolk, enclosed within a shell, and extruded to undergo development apart from the maternal tissues. In the case of the echidna the eggs, two in number, are about as large as those of a sparrow, similar in shape, and have a white, parchment-like shell. After expulsion they are transferred by the beak of the mother to a pouch resembling that of the marsupial kangaroos, and there they undergo development. The *Ornithorhynchus*, on the other hand, lays from two to four eggs, which in size and general appearance resemble those of the echidna. They are, however, deposited in a loosely constructed nest at the end of a long burrow and there brooded. In Marsupials, the eggs are smaller than those of *Echidna* and *Ornithorhynchus*, and they contain a larger proportion of yolk than occurs in higher mammals.

Eggs of Reptiles.—The eggs of reptiles are invariably provided with a large amount of food yolk and enclosed with a firm test or shell, which though generally parchment-like in texture may be calcareous as in birds, as, for example, in many of the tortoises and turtles and in the crocodiles.

Among reptiles the egg is always white or yellowish, while the number laid often far exceeds that in the case of birds. The tuatara of New Zealand, however, lays but ten—white hard-shelled, long and oval—at intervals between November and January. The long intervals between the appearance of the successive eggs is a characteristic feature of the reptiles, but is met with among the birds only in the megapodes, which, like the reptiles, do not "brood" their eggs.

Among the Chelonia the number of eggs varies from two to four in some of the tortoises, to 200 in some of the turtles: while in the crocodiles between 20 and 30 are produced, hard-shelled and white.

The eggs of the lizards are always white or yellowish, and generally soft-shelled; but the geckos and the green lizard lay hard-shelled eggs. Many of the soft-shelled eggs are remarkable for the fact that they increase in size after extrusion, owing to the stretching of the membranous shell by the growing embryo. In the matter of number lizards are less prolific than many of the Chelonia, a dozen eggs being the general number, though as many as thirty may be produced at a time, as in the case of the common chameleon.

While as a general rule the eggs of lizards are laid in burrows or buried, some are retained within the body of the parent until the young are ready to emerge; or they may even hatch within the oviduct. This occurs with some chameleons and some lizards, *e. g.* the slow-worm. The common English lizard is also viviparous. Normally the young leaves the egg immediately after its extrusion, but if by any chance this extrusion is delayed they escape while yet in the oviduct.

The majority of the snakes lay eggs, but most of the vipers and the aquatic snakes are viviparous, as also are a few terrestrial species. The shell of the egg is always soft and parchment-like. As a rule the number of eggs produced among the snakes is not large, twenty or thirty being common, but some species of python lay as many as a hundred. Generally, among the oviparous snakes the eggs are buried, but some species of boas jealously guard them, enclosing them within the coils of the body.

Eggs of Amphibia.—Among the amphibia a greater variety obtains in the matter of the investment of the egg, as well as in the number, size and method of their disposal. The outer covering is formed by a toughening of the surface of a thick gelatinous coat which surrounds the essential parts of the egg. This coat in many species of salamander—using this name in the wide sense—is produced into threads which serve either to anchor the eggs singly or to bind them together in bunches.

Viviparity occurs both among the limbless and the tailed Amphibia, the eggs hatching before they leave the oviduct or immediately after extrusion. The number of young so produced is generally not large, but the common salamander (*Salamandra maculosa*) may produce as many as fifty at a birth, though fifteen is the more normal figure. When the higher number is reached the young are relatively small and weak.

As a rule among the Amphibia the young leave the egg in the form of larvae, generally known as "tadpoles"; but many species produce eggs containing a sufficient amount of food material to enable the whole of the larval phase to be completed before hatching.

Among the tailless Amphibia (frogs and toads) there are wide differences in the number of eggs produced, while the methods by which these eggs are disposed of present a marvellous variety.

As a rule vast quantities of eggs are shed by the female into the water in the form of "spawn." In the common toad as many as 7000 eggs may be extruded at a time. These leave the body in the form of two long strings—one from each oviduct—of translucent globules, gelatinous in texture, and enclosing a central sphere of yolk, the upper pole of which is black. The spawn of the common frog differs from that of the toad in that the eggs all adhere to form a huge jelly-like mass. But in many species the number of eggs produced are few; and these may be sufficiently stored with food-yolk to allow of the tadpole stage being passed before hatching, as in frogs of the genus *Hylodes*. In many cases the eggs are deposited out of the water and often in quite remarkable ways.

Eggs of Fishes.—The eggs of fishes present an extremely wide range of form, and a no less extensive range in the matter of number. Both among the cartilaginous and bony fishes viviparity occurs. Most of the sharks and rays are viviparous, but in the oviparous species the eggs present some interesting and peculiar forms. Large in size, the outer coat or "shell" is in all cases horn-like and flexible, but differs greatly in shape. Thus in the egg of the larger spotted dog-fish it is oblong in shape, flattened from side to side, and has the angles produced into long, slender tendrils. As the egg is laid the lower tendrils project from the vent, and the mother rubs herself against some fixed body. The tendrils soon catch fast in some slight projection, when the egg is dragged forth there to remain till hatching takes place. A couple of narrow slits at each corner of the upper end serve to admit fresh water to the imprisoned embryo during the later stages of development; when development is complete escape is made through the end of the shell. In the rays or "skates," long spines take the place of tendrils, the egg simply resting at the bottom of the sea. The empty egg-cases of the rays are often found on the seashore, and are known as "Mermaids' purses." The egg of the Port Jackson shark (*Cestracion*) is of enormous size, pear-shaped, and provided with a spiral flange extending along the whole length of the capsule. In the *Chimaera* the egg is long, more or less spindle-shaped, and produced on each side into a broad flange having a fringed edge, so that the whole bears a close resemblance to a long leaf, broad and notched at one end, pointed at the other. This likeness to the seaweed among which it rests is doubtless a protective device, akin to that of protectively coloured birds' eggs.

Among the bony fishes the eggs generally take the form of small spheres, enclosed within a tough membrane or capsule. But they present many important differences, being in some fishes heavy and remaining at the bottom of the water, in other light and floating on the surface. While in some species they are distributed separately, in others they adhere together in masses. The eggs of the salmon, for example, are heavy, hard and smooth, and deposited separately in a trough dug by the parent and afterwards covered to prevent them from being carried away by the stream. In the perch they are adhesive and form long band-like masses of spawn adhering to water-plants. In the gobies the egg is spindle-shaped, and attached by one end by means of a network of fibres, resembling rootlets; while in the smelt the egg is loosely suspended by a membrane formed by the peeling off of a part of the outer sheath of the capsule. The eggs of the garfish (*Belone vulgaris*) and of the flying-fish of the genus *Exocoetus*, attach themselves to foreign objects, or to one another, by means of threads or cords developed at opposite poles of the egg.

Among a number of fishes the eggs float at the surface of the sea, often in enormous masses, when they are carried about at the mercy of tides and currents. An idea of the size which such masses attain may be gathered from the fact that the spawn of the angler-fish, *Lophius piscatorius*, takes the form of a sheet from 2 to 3 ft. wide, and 30 ft. long. Another remarkable feature of these floating eggs is their transparency, inasmuch as they are extremely difficult to see, and hence they probably escape the rapacious maws of spawn-eating animals. The cod tribe and flat-fishes lay floating eggs of this description.

The maximum number of eggs laid by fishes varies greatly, some species laying relatively few, others an enormous number. But in all cases the number increases with the weight and age of the fish. Thus it has been calculated that the number laid by the salmon is roughly about 1000 to every pound weight of the fish, a 15 ℔ salmon laying 15,000 eggs. The sturgeon lays about 7,000,000; the herring 50,000; the turbot 14,311,000; the sole 134,000; the perch 280,000. Briefly, the number is greatest where the risks of destruction are greatest.

The eggs of the degenerate fishes known as the lampreys and hag-fishes are remarkable for the fact that in the latter they are large in size, cylindrical in shape, and provided at each end with hooklets whereby they adhere one to another; while in the lampreys they are extremely small and embedded in a jelly.

Molluscs.—Among the Mollusca, Crustacea and Insecta yolk-stored eggs of very remarkable forms are commonly produced.

In variety, in this connexion, the Mollusca must perhaps be given the first place. This diversity, indeed, is strikingly illustrated by the eggs of the Cephalopoda. In the squids (*Loligo*), for example, the eggs are enclosed in long cylindrical cases, of which there are several hundreds, attached by one end to a common centre; the whole series looking strangely like a rough mop-head. Each case, in such a cluster, contains about 250 eggs, or about 40,000 in all. By way of contrast the eggs of the true cuttle-fish (*Sepia*) are deposited separately, each enclosed in a tough, black, pear-shaped capsule which is fastened by a stalk to fronds of sea-weed or other object. They appear to be extruded at short intervals, till the full complement is laid, the whole forming a cluster looking like a bunch of grapes. The octopus differs yet again in this matter, its eggs being very small, berry-like, and attached to a stalk which runs through the centre of the mass.

The eggs of the univalve Mollusca are hardly less varied in the shapes they take. In the common British *Purpura lapillus* they resemble delicate pink grains of rice set on stalks; in *Busycon* they are disk-shaped, and attached to a band nearly 3 ft. long. The eggs of the shell-bearing slugs (*Testacella*) are large, and have the outer coat so elastic that if dropped on a stone floor they will rebound several inches; while some of the snails (*Bulimus*) lay eggs having a white calcareous and slightly iridescent shell, in size and shape closely resembling the egg of the pigeon. Some are even larger than the egg of the wood-pigeon. The beautiful violet-snail (*Ianthina*)—a marine species—carries its eggs on the under side of a gelatinous raft. No less remarkable are the eggs of the whelk; since, like those of the squids, they are not laid separately but enveloped in capsules, and these to the number of many hundreds form the large, ball-like masses so commonly met with on the seashore. When the eggs in these capsules hatch, the crowd of embryos proceed to establish an internecine warfare, devouring one another till only the strongest survives!

With the Mollusca, as with other groups of animals, where the eggs are exposed to great risks they are small, produced in great numbers, and give rise to larvae. This is well illustrated by the common oyster which annually disperses about 60,000,000 eggs. But where the risk of destruction is slight, the eggs are large and produce young differing from the parent only in size, as in the case of the pigeon-like eggs of *Bulimus*.

Crustaceans.—Among the higher Crustacea, as a rule, the eggs are carried by the female, attached to special appendages on the under side of the body. But in some—Squillas—they are deposited in burrows. Generally they are relatively small so that the young which emerge therefrom differ markedly in appearance from the parents, but in deep-sea and freshwater species the eggs are large, when the young, on emerging, differ but little from the adults in appearance.

Insects, &c.—The eggs of insects though minute, are also remarkable for the great variety of form which they present, while they are frequently objects of great beauty owing to the sculptured markings of the shell. They are generally laid in clusters, either on the ground, on the leaves of plants, or in the water. Some of the gnats (*Culex*) lay them on the water. Cylindrical in shape they are packed closely together, set on end, the whole mass forming a kind of floating raft. Frequently, as in the case of the stick and leaf insect, the eggs are enclosed in capsules of very elaborate shapes and highly ornamented.

As to the rest of the Invertebrata—above the Protozoa the eggs are laid in water, or in damp places. In the former case they are as a rule small, and give rise to larvae; while eggs hatched on land are sometimes enclosed in capsules, "cocoons," as in the case of the earthworm, where this capsule is filled with a milky white fluid, of a highly nutritious character, on which the embryos feed.

Among some invertebrates two different kinds of eggs are laid by the same individual. The water-flea, *Daphnia* (a crustacean), lays two kinds of eggs known as "summer" and "winter" eggs. The summer eggs are carried by the female in a "brood-pouch" on the back. The "winter" eggs, produced at the approach of winter, differ markedly in appearance from the summer eggs, being larger, darker in colour, thicker shelled, and enclosed in a capsule formed from the shell or carapace, of the parent's body. "Winter eggs," however, may be produced in the height of summer. While the "summer eggs" are unfertilized, the winter eggs are fertilized by the male, and possess the remarkable power of lying dormant for months or even years before they develop. The production of these two kinds of eggs is a device to overcome the cold of winter, or the drying up of the pools in which the species lives, during the heat of the summer. The power of resistance which such eggs possess may be seen in the fact that a sample of mud which had been kept dry for ten years still contained living eggs. In deep water where neither drought nor winter cold can seriously affect the *Daphnias*, they propagate all the year round by unfertilized "summer" eggs.

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EGGENBERG, HANS ULRICH VON, Prince (1568–1634), Austrian statesman, was a son of Siegfried von Eggenberg (d. 1594), and began life as a soldier in the Spanish service, becoming about 1596 a trusted servant of the archduke of Styria, afterwards the emperor Ferdinand II. Having become a Roman Catholic, he was soon the chancellor and chief adviser of Ferdinand, whose election as emperor he helped to secure in 1619. He directed the imperial policy during the earlier part of the Thirty Years' War, and was in general a friend and supporter of Wallenstein, and an opponent of Maximilian I., duke of Bavaria, and of Spain. He was largely responsible for Wallenstein's return to the imperial service early in 1632, and retired from public life just after the general's murder in February 1634, dying at Laibach, on the 18th of October 1634. Eggenberg's influence with Ferdinand was so marked that it was commonly said that Austria rested upon three hills (*Berge*): Eggenberg, Questenberg and Werdenberg. He was richly rewarded for his services to the emperor. Having received many valuable estates in Bohemia and elsewhere, he was made a prince of the Empire in 1623, and duke of Krumau in 1625.

See H. von Zwiedineck-Südenhorst, *Hans Ulrich, Fürst von Eggenberg* (Vienna, 1880); and F. Mares, *Beiträge zur Geschichte der Beziehungen des Fürsten J. U. von Eggenberg zu Kaiser Ferdinand II. und zu Waldstein* (Prague, 1893).

EGGER, ÉMILE (1813–1885), French scholar, was born in Paris on the 18th of July 1813. From 1840 till 1855 he was assistant professor, and from 1855 till his death professor of Greek literature in the Faculté des Lettres at Paris University. In 1854 he was elected a member of the Académie des Inscriptions and in 1873 of the Conseil supérieur de l'instruction publique. He was a voluminous writer, a sound and discerning scholar, and his influence was largely responsible for the revival of the study of classical philology in France. His most important works were *Essai sur l'histoire de la critique chez les Grecs* (1849), *Notions élémentaires de grammaire comparée* (1852), *Apollonius Dyscole, essai sur l'histoire des théories grammaticales dans l'antiquité* (1854), *Mémoires de littérature ancienne* (1862), *Mémoires d'histoire ancienne et de philologie* (1863), *Les Papyrus grecs du Musée du Louvre et de la Bibliothèque Impériale* (1865), *Études sur les traités publics chez les Grecs et les Romains* (1866), *L'Hellénisme en France* (1869), *La Littérature grecque* (1890). He was also the author of *Observations et réflexions sur le développement de l'intelligence et du langage chez les enfants* (1879). Egger died in Paris on the 1st of September 1885.

EGGLESTON, EDWARD (1837–1902), American novelist and historian, was born in Vevay, Indiana, on the 10th of December 1837, of Virginia stock. Delicate health, by which he was more or less handicapped throughout his life, prevented his going to college, but he was naturally a diligent student. He was a Methodist circuit rider and pastor in Indiana and Minnesota (1857–1866); associate editor (1866–1867) of *The Little Corporal*, Chicago; editor of *The National Sunday School Teacher*, Chicago (1867–1870); literary editor and later editor-in-chief of *The Independent*, New York (1870–1871); and editor of *Hearth and Home* in 1871–1872. He was pastor of the church of Christian Endeavour, Brooklyn, in 1874–1879. From 1880 until his death on the 2nd of September 1902, at his home on Lake George, New York, he devoted himself to literary work. His fiction includes *Mr Blake's Walking Stick* (1869), for children; *The Hoosier Schoolmaster* (1871); *The End of the World* (1872); *The Mystery of Metropolisville* (1873); *The Circuit Rider* (1874); *Roxy* (1878); *The Hoosier Schoolboy* (1883); *The Book of Queer Stories* (1884), for children; *The Graysons* (1888), an excellent novel; *The Faith Doctor* (1891); and *Duffels* (1893), short stories. Most of his stories portray the pioneer manners and dialect of the Central West, and the *Hoosier Schoolmaster* was one of the first examples of American local realistic fiction; it was very popular, and was translated into French, German and Danish. During the last third of his life Eggleston laboured on a *History of Life in the United States*, but he lived to finish only two volumes—*The Beginners of a Nation* (1896) and *The Transit of Civilization* (1900). In addition he wrote several popular compendiums of American history for schools and homes.

See G. C. Eggleston, *The First of the Hoosiers* (Philadelphia, 1903), and Meredith Nicholson, *The Hoosiers* (1900).

His brother GEORGE CARY EGGLESTON (1839–), American journalist and author, served in the Confederate army; was managing editor and later editor-in-chief of *Hearth and Home* (1871–1874); was literary editor of the *New York Evening Post* (1875–1881), literary editor and afterwards editor-in-chief of the New York *Commercial Advertiser* (1884–1889), and editorial writer for *The World* (New York) from 1889 to 1900. Most of his books are stories for boys; others, and his best, are romances dealing with life in the South especially in the Virginias and the Carolinas—before and during the Civil War. Among his publications may be mentioned: *A Rebel's Recollections* (1874); *The Last of the Flatboats* (1900); *Camp Venture* (1900); *A Carolina Cavalier* (1901); *Dorothy South* (1902); *The Master of Warlock* (1903); *Evelyn Byrd* (1904); *A Daughter of the South* (1905); *Blind Alleys* (1906); *Love is the Sum of it all* (1907); *History of the Confederate War* (1910); and *Recollections of a Varied Life* (1910).

EGHAM, a town in the Chertsey parliamentary division of Surrey, England, on the Thames, 21 m. W.S.W. of London by the London & South Western railway. Pop. (1901) 11,895. The church of St John the Baptist is a reconstruction of 1817; it contains monuments by John Flaxman. Above the right bank of the river a low elevation, Cooper's Hill, commands fine views over the valley, and over Windsor Great Park to the west. On the hill was the Royal Indian Civil Engineering College, commonly called Cooper's Hill College, of which Sir George Tomkyns Chesney was the originator and first president (1871). It educated men for the public works, accounts, railways and telegraph departments of India, and included a school of forestry; but it was decided, in the face of some opposition, to close it in 1906, on the theory that it was unnecessary for a college with such a specialized object to be maintained by the government, in view of the readiness with which servants for these departments could be recruited elsewhere. Part of the organization, including the school of forestry, was transferred to Oxford University. Cooper's Hill gives name to a famous poem of Sir John Denham (1642). A large and handsome building houses the Royal Holloway College for Women (1886), founded by Thomas Holloway; in the neighbourhood is the sanatorium of the same founder (1885) for the treatment of mental ailments, accommodating about 250 patients. The college for women, surrounded by extensive grounds, commands a wide view from the wooded slope on which it stands. The recreation hall, with its fine art collection, is the most notable room in this handsome building, which can receive 250 students. Within the parish, bordering the river, is the field of Runnymede, which, with Magna Charta Island lying off it, is famous in connexion with the signature of the charter by King John. Virginia Water, a large and picturesque artificial lake to the south of Windsor Great Park, is much frequented by visitors. It was formed under the direction of the duke of Cumberland, about 1750, and was the work of the brothers Thomas and Paul Sandby.

EGIN (Armenian *Agn*, "the spring"), an important town in the Mamuret el-Aziz vilayet of Asiatic Turkey (altitude 3300 ft.). Pop. about 20,000, fairly equally divided between Armenian Christians and Moslems. It is picturesquely situated in a theatre of lofty, abrupt rocks, on the right bank of the western Euphrates, which is crossed by a wooden bridge. The stone houses stand in terraced gardens and orchards, and the streets are mere rock ladders. Egin was settled by Armenians who emigrated from Van in the 11th century with Senekherim. On the 8th of November 1895 and in the summer of 1896 many Armenians were massacred here. (D. G. H.)

EGLANTINE (E. Frisian, *egeltiere*; Fr. *aiglantier*), a plant-name of which Dr R. C. A. Prior (*Popular Names of British Plants*, p. 70) says that it "has been the subject of much discussion, both as to its exact meaning and as to the shrub to which it properly belongs." The eglantine of the herbalists was the sweet-brier, *Rosa rubiginosa*. The signification of the word seems to be thorn-tree or thorn-bush, the first two syllables probably representing the Anglo-Saxon *egla*, *egle*, a prick or thorn, while the termination is the Dutch *tere*, *taere*, a tree. Eglantine is frequently alluded to in the writings of English poets, from Chaucer downwards. Milton, in *L'Allegro*, is thought by the term "twisted eglantine" to denote the honeysuckle, *Lonicera Periclymenum*, which is still known as eglantine in north-east Yorkshire.

EGLINTON, EARLS OF. The title of earl of Eglinton has been held by the famous Scottish family of Montgomerie since 1508. The attempts made to trace the descent of this house to Roger of Montgomery, earl of Shrewsbury (d. 1094), one of William the Conqueror's followers, will not bear examination, and the sure pedigree of the family only begins with Sir John Montgomerie, lord of Eaglesham, who fought at the battle of Otterbourne in

1388 and died about 1398. His grandson, Sir Alexander Montgomerie (d. c. 1460), was made a lord of the Scottish parliament about 1445 as Lord Montgomerie, and Sir Alexander's great-grandson Hugh, the 3rd lord (c. 1460–1545), was created earl of Eglinton, or Eglintoun, in 1508. Hugh, who was a person of importance during the minority of James V., was succeeded by his grandson Hugh (d. 1546), and then by the latter's son Hugh (c. 1531–1585), who became 3rd earl of Eglinton. This nobleman was a firm supporter of Mary queen of Scots, for whom he fought at Langside, and of the Roman Catholic Church; his son and successor, Hugh, was murdered in April 1586 by the Cunninghams, a family with which his own had an hereditary blood feud. In 1612, by the death of Hugh, the 5th earl, the male line of the Montgomeries became extinct.

Having no children Earl Hugh had settled his title and estates on his cousin, Sir Alexander Seton of Foulstruther (1588–1661), a younger son of Robert Seton, 1st earl of Wintoun (c. 1550–1603), and his wife Margaret, daughter of the 3rd earl of Eglinton. Alexander, who thus became the 6th earl of Eglinton and took the name of Montgomerie, was commonly called Greysteel, he was a prominent Covenanter and fought against Charles I. at Marston Moor. Later, however, he supported the cause of Charles II., and fell into the hands of Cromwell, who imprisoned him. His fifth son, Robert Montgomerie (d. 1684), a soldier of distinction, fought against Cromwell at Dunbar and at Worcester, afterwards escaping from the Tower of London and serving in Denmark. Robert's elder brother, Hugh, 7th earl of Eglinton (1613–1669), who also fought against Cromwell, was the grandfather of Alexander, the 9th earl (c. 1660–1729), who married, for his third wife, Susannah (1689–1780), daughter of Sir Archibald Kennedy, Bart., of Culzean, a lady celebrated for her wit and beauty. Alexander, the 10th earl (1723–1769), a son of the 9th earl, was one of the first of the Scottish landowners to carry out improvements on his estates. He was shot near Ardrossan by an excise officer named Mungo Campbell on the 24th of October 1769. His brother and successor, Archibald, the 11th earl (1726–1796), raised a regiment of Highlanders with which he served in America during the Seven Years' War. As he left no male issue he was succeeded in the earldom by his kinsman Hugh Montgomerie (1739–1819), a descendant of the 6th earl, who was created a peer of the United Kingdom as Baron Ardrossan in 1806. Before succeeding to the earldom Hugh had served in the American war and had been a member of parliament; after this event he began to rebuild Eglinton castle on a magnificent scale and to construct a harbour at Ardrossan.

This earl's successor was his grandson, Archibald William, the 13th earl (1812–1861), who was born at Palermo in the 29th of September 1812. His father was Archibald, Lord Montgomerie (1773–1814), the eldest son of the 12th earl, and his mother was Mary (d. 1848), a daughter of the 11th earl. Educated at Eton, the young earl's main object of interest for some years was the turf; he kept a large racing stud and won success and reputation in the sporting world. In 1839 his name became more widely known in connexion with the famous tournament which took place at Eglinton castle and is said to have cost him £30,000 or £40,000. This was made the subject of much ridicule and was partly spoiled by the unfavourable weather, the rain falling in torrents. Yet it was a real tournament and the "knights" broke their spears in the orthodox way. Prince Louis Napoleon (Napoleon III.) took part in it, and Lady Seymour, a daughter of Thomas Sheridan and the wife of Lord Seymour, afterwards 12th duke of Somerset, was the queen of beauty. A list of the challengers with an account of the jousts and the melée will be found in the volume on the tournament written by John Richardson, with drawings by J. H. Nixon. It is also described by Disraeli in *Endymion*. Eglinton was a staunch Tory, and in February 1852 he became lord-lieutenant of Ireland under the earl of Derby. He retired with the ministry in the following December, having by his princely hospitality made himself one of the most popular of Irish viceroys. When Derby returned to office in February 1858 he was again appointed lord-lieutenant, and he discharged the duties of this post until June 1859. In this year he was created earl of Winton, an earldom which had been held by his kinsfolk, the Setons, from 1600 until 1716, when George Seton, the 5th earl (c. 1678–1749), was deprived of his honours for high treason. The earl died on the 4th of October 1861, and was succeeded by his eldest son Archibald William (1841–1892). When this earl died in 1892 his younger brother George Arnulph (b. 1848) became 15th earl of Eglinton and 3rd earl of Winton.

See Sir W. Fraser, *Memorials of the Montgomeries, earls of Eglinton* (1859).

EGMONT, EARLS OF. John Perceval, 1st earl of Egmont (1683–1748), Irish politician, and partner with J. E. Oglethorpe in founding the American colony of Georgia, was created earl in 1733. He claimed descent from the Egmonts of Flanders, but his title was taken from the place in County Cork where the family residence stood. Its name of Burton House, and that of Burton manor which formed part of the family estates, were a reminiscence of Burton in Somerset, where was the earlier English family property of his great-great-grandfather Richard Perceval (1550–1620), Burghley's secret agent, and author of a Spanish dictionary published in 1591, whose son Sir Philip Perceval (1605–1647) acquired the Irish estates by judicious use of his opportunities as commissioner for land titles and of his interest at court. Sir Philip's son John, grandfather of the 1st earl, was made a baronet in 1661. The first earl of Egmont (who had been made Baron Perceval in 1715, and Viscount Perceval in 1723) is chiefly important for his connexion with the colonization of Georgia, and for his voluminous letters and writings on biography and genealogy.

John Perceval, 2nd earl of Egmont (1711–1770), his eldest son, was an active politician, first lord of the admiralty (1763–1766), and political pamphleteer, and like his father an ardent genealogist. He was twice married, and had eight sons and eight daughters. One of his younger sons was Spencer Perceval, prime minister of England. His eldest son succeeded as 3rd earl, and the eldest by his second marriage (with Catherine Compton, baroness of Arden in Ireland) was in 1802 created Baron Arden of the United Kingdom, a title which subsequently became merged in the Egmont earldom.

EGMONT (EGMOND), LAMORAL, COUNT OF, prince of Gavre (1522–1568), was born in Hainaut in 1522. He was the younger of the two sons of John IV., count of Egmont, by his wife Françoise of Luxemburg, princess of Gavre. On the death of his elder brother Charles, about 1541, he succeeded to his titles and estates. In this year he served his apprenticeship as a soldier in the expedition of the emperor Charles V. to Algiers, distinguishing himself in the command of a body of cavalry. In 1544 he married Sabina, sister of the elector palatine Frederick III., and the wedding was celebrated at Spires with great pomp in the presence of the emperor and his brother Ferdinand, afterwards emperor. Created knight of the Golden Fleece in 1546, he accompanied Philip of Spain in his tour through the Netherland towns, and in 1554 he went to England at the head of a special embassy to ask the hand of Mary of England for Philip, and was afterwards present at the wedding ceremony at Winchester. In the summer of 1557 Egmont was appointed commander of the Flemish cavalry in the war between Spain and France; and it was by his vehement persuasion that the battle of St Quentin was fought. The victory was determined by the brilliant charge that he led against the French. The reputation which he won at St Quentin was raised still higher in 1558, when he encountered the French army under de Thermes at Gravelines, on its march homewards after the invasion of Flanders, totally defeated it, and took Marshal de Thermes prisoner. The battle was fought against the advice of the duke of Alva, and the victory made Alva Egmont's enemy. But the count now became the idol of his countrymen, who looked upon him as the saviour of Flanders from the devastations of the French. He was nominated by Philip stadtholder of Flanders and Artois. At the conclusion of the war by the treaty of Cateau Cambrésis, Egmont was one of the four hostages selected by the king of France as pledges for its execution.

The attempt made by King Philip to convert the Netherlands into a Spanish dependency and to govern it by Spanish ministers excited the resentment of Egmont and other leading members of the Netherlands aristocracy. Between him and Cardinal Granvella, the all-powerful minister of the regent Margaret of Parma, there was no love lost. As a member of the council of state Egmont joined the prince of Orange in a vigorous protest addressed to Philip (1561) against the autocratic proceedings of the minister; and two years later he again protested in conjunction with the prince of Orange and Count Horn. In the spring of 1564 Granvella left the Netherlands, and the malcontent nobles once more took their places in the council of state. The resolve, however, of Philip to enforce the decrees of the council of Trent throughout the Netherlands once more aroused their resentment. Although himself a good Catholic, Egmont had no wish to see the Spanish Inquisition established in his native country. Orange, Egmont and others were convinced that the enforcement of the decrees in the Netherlands was impossible, and, in January 1665, Egmont accepted a special mission to Spain to make known to Philip the state of affairs and the disposition of the people. At Madrid the king gave him an ostentatiously cordial reception, and all the courtiers vied with one another in lavishing professions of respect upon him. They knew his vain and somewhat unstable character, and hoped to win him over without conceding anything to the wishes of the Netherlanders. The king gave him plenty of flatteries and promises, but steadily evaded any serious discussion of the object of his mission, and Egmont finally returned home without having accomplished anything. At the same time Philip sent further instructions to the regent to abate nothing of the severity of the persecution.

Egmont was naturally indignant at the treatment he had received, while the terrors of the Inquisition were steadily rousing the people to a state of frenzied excitement. In 1566 a confederacy of the lesser nobility was formed (*Les Gueux*) whose principles were set out in a document known as the Compromise. From this league Egmont held aloof; he declined to take any step savouring of actual disloyalty to his sovereign. He withdrew to his government of Flanders, and as stadtholder took active measures for the persecution of heretics. But in the eyes of Philip he had long been a marked man. The Spanish king had temporized only until the moment arrived when he could crush opposition by force. In the summer of 1567 the duke of Alva was despatched to the Netherlands at the head of an army of veterans to supersede the regent Margaret and restore order in the discontented provinces. Orange fled to Germany after having vainly warned Egmont and Horn of the dangers that threatened them. Alva was at pains to lull their suspicions, and then suddenly seized them both and threw them in the castle of Ghent. Their trial was a farce, for their fate had already been determined before Alva left Spain. After some months of imprisonment they were removed to Brussels, where sentence was pronounced upon them (June 4) by the infamous Council of Blood erected by Alva. They were condemned to death for high treason. It was in vain that the most earnest intercessions were made in behalf of Egmont by the emperor Maximilian, by the knights of the order of the Golden Fleece, by the states of Brabant, and by several of the German princes. Vain, too, was the pathetic pleading of his wife, who with her eleven children was reduced to want, and had taken refuge in a convent Egmont was beheaded at Brussels in the square before the town hall on the day after his sentence had been publicly pronounced (June 5, 1568). He met his fate with calm resignation; and in the storm of terror and exasperation to which this tragedy gave rise Egmont's failings were forgotten, and he and his fellow-victim to Spanish tyranny were glorified in the popular imagination as martyrs of Flemish freedom. From this memorable event, which Goethe made the theme of his play *Egmont* (1788), is usually dated the beginning of the famous revolt of the Netherlands. In 1865 a monument to Counts Egmont and Horn, by Fraiken, was erected on the spot where they were beheaded.

Bibliography.—T. Juste, *Le Comte d'Egmont et le comte de Hornes* (Brussels, 1862), *Les Pays-Bas sous Philippe II, 1555–1565* (2 vols., Brussels, 1855); J. L. Motley, *Rise of the Dutch Republic, 1555–1584* (3 vols., London, 1856); J. P. Blok, *History of the People of the Netherlands* (tr. from Dutch), vol. iii. (New York, 1900); R. Fruin, *Het voorspel van den tachtigjarigen oorlog* (Amsterdam, 1866); E. Marx, *Studien zur Geschichte des niederländischen Aufstandes* (Leipzig, 1902). (G. E.)

EGOISM (from Gr. and Lat. *ego*, I, the 1st personal pronoun), a modern philosophical term used generally, in opposition to "Altruism," for any ethical system in which the happiness or the good of the individual is the main criterion of moral action. Another form of the word, "Egotism," is really interchangeable, though in ordinary language it is often used specially (and similarly "egoism," as in George Meredith's *Egoist*) to describe the habit of magnifying one's self and one's achievements, or regarding all things from a selfish point of view. Both these ideas derive from the original meaning of *ego*, myself, as opposed to everything which is outside myself. This antithesis of ego and non-ego, self and not-self, may be understood in several senses according to the connexion in which it is used. Thus the self may be held to include one's family, property, business, and an indefinitely wider range of persons or objects in which the individual's interest is for the moment centred, *i.e.* everything which I can call "mine." In this, its widest, sense "a man's Self is the sum total of all that he *can* call his" (Wm. James, *Principles of Psychology*, chap x.). This self may be divided up in many ways according to the various forms in which it may be expressed. Thus James (*ibid.*) classifies the various "selves" as the material, the spiritual, the social and the "pure." Or again the self may be narrowed down to a man's own person, consisting of an individual mind and body. In the true philosophical sense, however, the conception of the ego is still further narrowed down to the individual consciousness as opposed to all that is outside it, *i.e.* can be its object. This conception of the self belongs mainly to metaphysics and involves the whole problem of the relation between subject and object, the nature of reality, and the possibility of knowledge of self and of object. The ordinary idea of the self as a physical entity, obviously separate from others, takes no account of the problem as to how and in what sense the individual is conscious of himself; what is the relation between subject and object in the phenomenon of self-consciousness, in which the mind reflects upon itself both past and present? The mind is in this case both subject and object, or, as William James puts it, both "I" and "me." The phenomenon has been described in various ways by different thinkers. Thus Kant distinguished the two selves as rational and empirical, just as he distinguished the two egos as the noumenal or real and the phenomenal from the metaphysical standpoint. A similar distinction is made by Herbart. Others have held that the self has a complex content, the subject self being, as it were, a fuller expression of the object-self (so Bradley); or again the subject self is the active content of the mind, and the object self the passive content which for the moment is exciting the attention. The most satisfactory and also the most general view is that consciousness is complex and unanalysable.

The relation of the self to the not-self need not to be treated here (see Metaphysics). It may, however, be pointed out that in so far as an object is cognized by the mind, it becomes in a sense part of the complex self-content. In this sense the individual is in himself his own universe, his whole existence being, in other words, the sum total of his psychic relations, and nothing else being *for him* in existence at all. A similar idea is prominent in many philosophico-religious systems wherein the idea of God or the Infinite is, as it were, the union of the ego and the non-ego, of subject and object. The self of man is regarded as having limitations, whereas the Godhead is infinite and all-inclusive. In many mystical Oriental religions the perfection of the human self is absorption in the infinite, as a ripple dies away on the surface of water. The problems of the self may be summed up as follows. The psychologist investigates the ideal construction of the self, *i.e.* the way in which the conception of the self arises, the different aspects or contents of the self and the relation of the subject to the object self. At this point the epistemologist takes up the question of empirical knowledge and considers the kind of validity, if any, which it can possess. What existence has the known object for the knowing subject? The result of this inquiry is generally intellectual scepticism in a greater or less degree, namely, that the object has no existence for the knower except a relative one, *i.e.* in so far as it is "known" (see RELATIVITY OF KNOWLEDGE). Finally the metaphysician, and in another sphere the theologian, consider the nature of the pure or transcendental self apart from its relations, *i.e.* the absolute self.

In ethics, egoistic doctrines disregard the ultimate problems of selfhood, and assume the self to consist of a man's person and those things in which he is or ought to be directly interested. The general statement that such doctrines refer all moral action to criteria of the individual's happiness, preservation, moral perfection, raises an obvious difficulty. Egoism merely asserts that the self is all-important in the application of moral principles, and does not in any way supply the material of these principles. It is a purely formal direction, and as such merely an adjunct to a substantive ethical criterion. A practical theory of ethics seeks to establish a particular moral ideal; if it is an absolute criterion, then the altruist would place first the attainment of that ideal by others, while the egoist would seek it for himself. The same is true of ethical theories which may be described as material. Of the second type are those, *e.g.* of Hobbes and Spinoza, which advocate self-preservation as the ideal, as contrasted with modern evolutionist moralists who advocate race-preservation. Again, we may contrast the early Greek hedonists, who bade each man seek the greatest happiness (of whatever kind), with modern utilitarian and social hedonists, who prefer the greatest good or the greatest happiness of the greatest number. It is with hedonistic and other empirical theories that egoism is generally associated. As a matter of fact, however, egoism has been no less prominent in intuitional ethics. Thus the man who seeks only or primarily his own moral perfection is an egoist par excellence. Such are ascetics, hermits and the like, whose whole object is the realization of their highest selves.

The distinction of egoistical and altruistic action is further complicated by two facts. In the first place, many systems combine the two. Thus Christian ethics may be said to insist equally on duty to self and duty to others, while crudely egoistic systems become unworkable if a man renders himself obnoxious to his fellows. On the other hand, every deliberate action based on an avowedly altruistic principle necessarily has a reference to the agent; if it is right that A should do a certain action for the benefit of B, then it tends to the moral self-realization of A that he should do it. Upon whatsoever principle the rightness of an action depends, its performance is right *for the agent*. The self-reference is inevitable in every action in so far as it is regarded as voluntary and chosen as being of a particular moral quality.

It is this latter fact which has led many students of human character to state that men do in fact aim at the gratification of their personal desires and impulses. The laws of the state and the various rules of conduct laid down by religion or morality are merely devices adopted for general convenience. The most remarkable statement of this point of view is that of Friedrich Nietzsche, who went so far as to denounce all forms of self-denial as cowardice:—let every one who is strong seek to make himself dominant at the expense of the weak.

EGORIEVSK, a town of Russia, in the government of Ryazan, 70 m. by rail E.S.E. of Moscow, by a branch line (15 m.) connecting with the Moscow to Ryazan main line. The cotton mills and other factories give occupation to 6000 persons. Egorievsk has important fairs for grain, hides, &c., which are exported. Pop. (1897) 23,932.

EGREMONT, EARLS OF. In 1740 Algernon Seymour, 7th duke of Somerset, was created earl of Egremont, and on his childless death in February 1750 this title passed by special remainder to his nephew, Sir Charles Wyndham or Windham, Bart. (1710–1763), a son of Sir William Wyndham of Orchard Wyndham, Somerset. Charles, who had succeeded to his father's baronetcy in 1740, inherited Somerset's estates in Cumberland and Sussex. He was a member of parliament from 1734 to 1750, and in October 1761 he was appointed secretary of state for the southern department in succession to William Pitt. His term of office, during which he acted in concert with his brother-in-law, George Grenville, was mainly occupied with the declaration of war on Spain and with the negotiations for peace with France and Spain, a peace the terms of which the earl seems to have disliked. He was also to the fore during the proceedings against Wilkes, and he died on the 21st of August 1763. Horace Walpole perhaps rates Egremont's talents too low when he says he "had neither knowledge of business, nor the smallest share of parliamentary abilities."

The 2nd earl's son and successor, George O'Brien Wyndham (1751–1837), was more famous as a patron of art and an agriculturist than as a politician, although he was not entirely indifferent to politics. For some time the painter Turner lived at his Sussex residence, Petworth House, and in addition to Turner, the painter Leslie, the sculptor Flaxman and other talented artists received commissions from Egremont, who filled his house with valuable works of art. Generous and hospitable, blunt and eccentric, the earl was in his day a very prominent figure in English society. Charles Greville says, "he was immensely rich and his munificence was equal to his wealth"; and again that in his time Petworth was "like a great inn." The earl died unmarried on the 11th of November 1837, and on the death of his nephew and successor, George Francis Wyndham, the 4th earl (1785–1845), the earldom of Egremont became extinct. Petworth, however, and the large estates had already passed to George Wyndham (1787–1869), a natural son of the 3rd earl, who was created Baron Leconfield in 1859.

EGREMONT, a market town in the Egremont parliamentary division of Cumberland, England, 5 m. S.S.E. of Whitehaven, on a joint line of the London & North Western and Furness railways. Pop. of urban district (1901) 5761. It is pleasantly situated in the valley of the Ehen. Ruins of a castle command the town from an eminence. It was founded *c.* 1120 by William de Meschines; it is moated, and retains a Norman doorway and some of the original masonry, as well as fragments of later date. The church of St Mary is a modern reconstruction embodying some of the Norman features of the old church. Iron ore and limestone are raised in the neighbourhood.

It seems impossible to find any history for Egremont until after the Norman Conquest, when Henry I. gave the barony of Coupland to William de Meschines, who erected a castle at Egremont around which the town grew into importance. The barony afterwards passed by marriage to the families of Lucy and Multon, and finally came to the Percys, earls of Northumberland, from whom are descended the present lords of the manor of Egremont. The earliest evidence that Egremont was a borough occurs in a charter, granted by Richard de Lucy in the reign of King John, which gave the burgesses right to choose their reeve, and set out the customs owing to the lord of the manor, among which was that of providing twelve armed men at his castle in the time of war. The borough was represented by two members in the parliament of 1295, but in the following year was disfranchised, on the petition of the burgesses, on account of the expense of sending members. In 1267 Henry III. granted Thomas de Multon a market every Wednesday at Egremont, and a fair every year on the eve, day and morrow of the Nativity of the Virgin Mary. In the *Quo Warranto* rolls he is found to have claimed by prescription another weekly market on Saturday. The market rights were purchased from Lord Leconfield in 1885, and the market on Saturday is still held. Richard de Lucy's charter shows that dyeing, weaving and fulling were carried on in the town in his time.

EGRESS (Lat. *egressus*, going out), in astronomy, the end of the apparent transit of a small body over the disk of a larger one; especially of a transit of a satellite of Jupiter over the disk of that planet. It designates the moment at which the smaller body is seen to leave the limb of the other.

EGYPT, a country forming the N.E. extremity of Africa.[1] In the following account a division is made into (I.) *Modern Egypt*, and (II.) *Ancient Egypt*; but the history from the earliest times is given as a separate section (III.).

Section I. includes Geography, Economics, Government, Inhabitants, Finance and Army. Section II. is subdivided into:—(A) Exploration and Research; (B) The Country in Ancient Times; (C) Religion; (D) Language and Writing; (E) Art and Archaeology; (F) Chronology. Section III. is divided into three main periods:—(1) Ancient History; (2) the Mahommedan Period; (3) Modern History (from Mehemet Ali).

I. MODERN EGYPT

Boundaries and Areas.—Egypt is bounded N. by the Mediterranean, S. by the Anglo-Egyptian Sudan, N.E. by Palestine, E. by the Red Sea, W. by Tripoli and the Sahara. The western frontier is ill-defined. The boundary line between Tripoli and Egypt is usually taken to start from a point in the Gulf of Sollum and to run S. by E. so as to leave the oasis of Siwa to Egypt. South of Siwa the frontier, according to the Turkish firman of 1841, bends eastward, approaching the cultivated Nile-land near Wadi Halfa, *i.e.* the southern frontier. This southern frontier is fixed by agreement between Great Britain and Egypt at the 22° N. The N.E. frontier is an almost direct line drawn from Taba, near the head of the Gulf of Akaba, the eastern of the two gulfs into which the Red Sea divides, to the Mediterranean at Rafa in 34° 15′ E. The peninsula of Sinai, geographically part of Asia, is thus included in the Egyptian dominions. The total area of the country is about 400,000 sq. m., or more than three times the size of the British Isles. Of this area $\frac{12}{13}$ths is desert. Canals, roads, date plantations, &c., cover 1900 sq. m.; 2850 sq. m are comprised in the surface of the Nile, marshes, lakes, &c. A line corresponding with the 30° N., drawn just S. of Cairo, divides the country into Lower and Upper Egypt, natural designations in common use, Lower Egypt being the Delta and Upper Egypt the Nile valley. By the Arabs Lower Egypt is called Er-Rif, the cultivated or fertile; Upper Egypt Es Sa'id, the happy or fortunate. Another division of the country is into Lower, Middle and Upper Egypt, Middle Egypt in this classification being the district between Cairo and Assiut.

General Character.—The distinguishing features of Egypt are the Nile and the desert. But for the river there would be nothing to differentiate the country from other parts of the Sahara. The Nile, however, has transformed the land through which it passes. Piercing the desert, and at its annual overflow depositing rich sediment brought from the Abyssinian highlands, the river has created the Delta and the fertile strip in Upper Egypt. This cultivable land is Egypt proper; to it alone is applicable the ancient name—"the black land." The *Misr* of the Arabs is restricted to the same territory. Beyond the Nile valley east and west stretch great deserts, containing here and there fertile oases. The general appearance of the country is remarkably uniform. The Delta is a level plain, richly cultivated, and varied alone by the lofty dark-brown mounds of ancient cities, and the villages set in groves of palm-trees, standing on mounds often, if not always, ancient. Groves of palm-trees are occasionally seen besides those around the villages, but other trees are rare. In Upper Egypt the Nile valley is very narrow and is bounded by mountains of no great height. They form the edge of the desert on either side of the valley, of which the bottom is level rock. The mountains rarely take the form of peaks. Sometimes they approach the river in bold promontories, and at others are divided by the dry beds of ancient watercourses. The bright green of the fields, the reddish-brown or dull green of the great river, contrasting with the bare yellow rocks, seen beneath a brilliant sun and a deep-blue sky, present views of great beauty. In form the landscape varies little and is not remarkable; in colour its qualities are always splendid, and under a general uniformity show a continual variety.

The Coast Region.—Egypt has a coast-line of over 600 m. on the Mediterranean and about 1200 m. on the Red Sea. The Mediterranean coast extends from the Gulf of Sollum on the west to Rafa on the east. From the gulf to the beginning of the Delta the coast is rock-bound, but slightly indented, and possesses no good harbourage. The cliffs attain in places a height of 1000 ft. They are the termination of a stony plateau, containing several small oases, which southward joins the more arid and uninhabitable wastes of the Libyan Desert. The Delta coast-line, composed of sandhills and, occasionally, limestone rocks, is low, with cape-like projections at the Nile mouths formed by the river silt. Two bays are thus formed, the western being the famous Bay of Aboukir. It is bounded W. by a point near the ancient Canopic mouth, eastward by the Rosetta mouth. Beyond the Delta eastward the coast is again barren and without harbours. It rises gradually southward, merging into the plateau of the Sinai peninsula. The Red Sea coast is everywhere mountainous. The mountains are the northern continuation of the Abyssinian table-land, and some of the peaks are over 6000 ft. above the sea. The highest peaks, going from north to south, are Jebels Gharib, Dukhan, Es Shayib, Fatira, Abu Tiur, Zubara and Hammada (Hamata). The coast has a general N.N.W. and S.S.E. trend, and, save for the two gulfs into which it is divided by the massif of Sinai, is not deeply indented. Where the frontier between Egypt and the Sudan reaches the sea is Ras Elba (see further RED SEA).

The Nile Valley (see also NILE).—Entering Egypt proper, a little north of the Second Cataract, the Nile flows through a valley in sandstone beds of Cretaceous age as far as 25° N., and throughout this part of its course the valley is extremely narrow, rarely exceeding 2 m. in width. At two points, namely, Kalabsha—the valley here being only 170 yds. wide and the river over 100 ft. deep—and Assuan (First Cataract), the course of the river is interrupted by outcrops of granites and other crystalline rocks, which have been uncovered by the erosion of the overlying sandstone, and to-day form the mass of islands, with numerous small rapids, which are described not very accurately as cataracts; no good evidence exists in support of the view that they are the remains of a massive barrier, broken down and carried away by some sudden convulsion. From 25° N. northwards for 518 m. the valley is of the "rift-valley" type, a level depression in a limestone plateau, enclosed usually by steep cliffs, except where the tributary valleys drained into the main valley in early times, when there was a larger rainfall, and now carry off the occasional rainstorms that burst on the desert. The cliffs are highest between Esna and Kena, where they reach 1800 ft. above sea-level. The average width of the cultivated land is about 10 m., of which the greater part lies on the left (western) bank of the river; and outside this is a belt, varying from a few hundred yards to 3 or 4 m., of stony and sandy ground, reaching up to the foot of the limestone cliffs, which rise in places to as much as 1000 ft. above the valley. This continues as far as 29° N., after which the hills that close in the valley become lower, and the higher plateaus lie at a distance of 10 or 15 m. back in the desert.

The Fayum.—The fertile province of the Fayum, west of the Nile and separated from it by some 6 m. of desert, seems to owe its existence to movements similar to those which determined the valley itself. Lying in a basin sloping in a series of terraces from an altitude of 65 ft. above sea-level in the east to about 140 ft. *below* sea-level on the north-west, at the margin of the Birket-el-Kerun, this province is wholly irrigated by a canalized channel, the Bahr Yusuf, which, leaving the Nile at Derut esh Sherif in Upper Egypt, follows the western margin of the cultivation in the Nile valley, and at length enters the Fayum through a gap in the desert hills by the XIIth Dynasty pyramids of Lahun and Hawara (see FAYUM).

The Delta.—About 30° N., where the city of Cairo stands, the hills which have hitherto run parallel with the Nile turn W.N.W., and E.N.E., and the triangular area between them is wholly deltaic. The Delta measures 100 m. from S. to N., having a width of 155 m. on the shore of the Mediterranean between Alexandria on the west and Port Said on the east. The low sandy shore of the Delta, slowly increasing by the annual deposit of silt by the river, is mostly a barren area of sand-hills and salty waste land. This is the region of the lagoons and marshes immediately behind the coast-line. Southwards the quality of the soil rapidly improves, and becomes the most fertile part of Egypt. This area is watered by the Damietta and the Rosetta branches of the Nile, and by a network of canals. The soil of the Delta is a dark grey fine sandy soil, becoming at times almost a stiff clay by reason of the fineness of its particles, which consist almost wholly of extremely small grains of quartz with a few other minerals, and often numerous flakes of mica. This deposit varies in thickness, as a rule, from 55 to 70 ft., at which depth it is underlain by a series of coarse and fine yellow quartz sands, with occasional pebbles, or even banks of gravel, while here and there thin beds of clay occur. These sand-beds are sharply distinguished by their colour from the overlying Nile deposit, and are of considerable thickness. A boring made in 1886 for the Royal Society at Zagazig attained a depth of 375 ft. without reaching rock, and another, subsequently sunk near Lake Aboukir (close to Alexandria), reached a depth of 405 ft. with the same result. Numerous other borings to depths of 100 to 200 ft. have given similar results, showing the Nile deposit to rest generally on these yellow sands, which provide a constant though not a very large supply of good water; near the northern limits of the Delta this cannot, however, be depended on, since the well water at these depths has proved on several occasions to be salt. The surface of the Delta is a wide alluvial plain sloping gently towards the sea, and having an altitude of 29 ft. above it at its southern extremity. Its limits east and west are determined by the higher ground of the deserts, to which the silt-laden waters of the Nile in flood time cannot reach. This silt consists largely of alumina (about 48%) and calcium carbonate (18%) with smaller quantities of silica, oxide of iron and carbon. Although the Nile water is abundantly charged with alluvium, the annual deposit by the river, except under extraordinary circumstances, is smaller than might be supposed. The mean ordinary rate of the increase of the soil of Egypt is calculated as about 4½ in. in a century.

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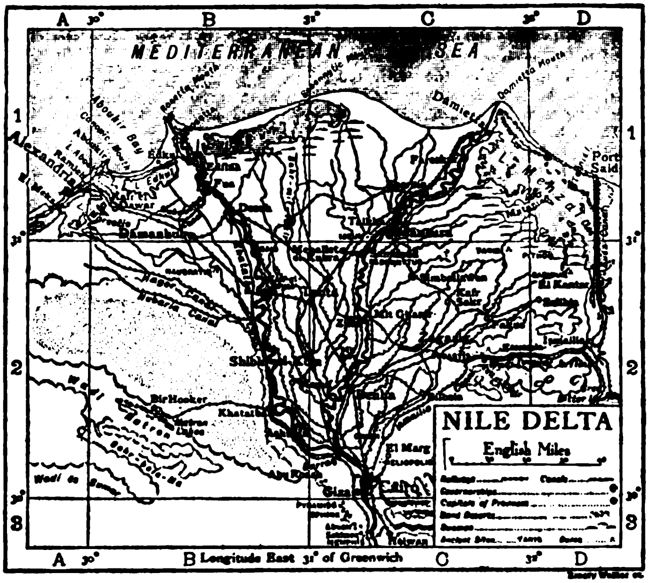
[1] By the Greek and Roman geographers Egypt was usually assigned to Libya (Africa), but by some early writers the Nile was thought to mark the division between Libya and Asia. The name occurs in Homer as *Αἴγυπτος*, but is of doubtful origin.

The Lakes.—The lagoons or lakes of the Delta, going from west to east, are Mareotis (Mariut), Edku, Burlus and Menzala. The land separating them from the Mediterranean is nowhere more than 10 m. wide. East of the Damietta mouth of the Nile this strip is in places not more than 200 yds. broad. All the lakes are shallow and the water in them salt or brackish. Mareotis, which bounds Alexandria on the south side, varies considerably in area according to the rise or fall of the Nile; when the Nile is low there is a wide expanse of marsh, when at its highest the lake covers about 100 sq. m. In ancient times Mareotis was navigable and was joined by various canals to the Nile. The country around was cultivated and produced the famous Mareotic wine. The canals being neglected, the lake decreased in size, though it was still of considerable area in the 15th and 16th centuries, and was then noted for the value of its fisheries. When the French army occupied Egypt in 1798, Mareotis was found to be largely a sandy plain. In April 1801 the British army besieging Alexandria cut through the land between Aboukir and the lake, admitting the waters of the sea into the ancient bed of Mareotis and laying under water a large area then in cultivation. This precedent was twice imitated, first by the Turks in 1803 and a second time by the British in 1807. Mareotis has no outlet, and the water is kept at a uniform level by means of powerful pumps which neutralize the effect of the Nile flood. A western arm has been cut off from the lake by a dyke, and in this arm a thick crust of salt is formed each year after the evaporation of the flood water. Near the shores of the lake wild flowers grow in rich profusion. Like all the Delta lakes, Mareotis abounds in wild-fowl. North-east of Mareotis was Lake Aboukir, a small sheet of water, now dry, lying S.W. of Aboukir Bay. East of this reclaimed marsh and reaching to within 4 m. of the Rosetta branch of the Nile, lies Edku, 22 m. long and in places 16 wide, with an opening, supposed to be the ancient Canopic mouth of the Nile, into Aboukir Bay. Burlus begins a little eastward of the Rosetta channel, and stretches bow-shaped for 64 m. Its greatest width is about 16 m. Adjoining it S.E. is an expanse of sandy marsh. Several canals or canalized channels enter the lake. Opposite the spot where the Bahr-mit Yezir enters is an opening into the Mediterranean. Canal and opening indicate the course of the ancient Sebennytic branch of the Nile. Burlus is noted for its water-melons, which are yellow within and come into season after those grown on the banks of the Nile.



Menzala greatly exceeds the other Delta lakes in size, covering over 780 sq. m. It extends from very near the Damietta branch of the Nile to Port Said. It receives the waters of the canalized channels which were once the Tanitic, Mendesian and Pelusiac branches. The northern shore is separated from the sea by an extremely narrow strip of land, across which, when the Mediterranean is stormy and the lake full, the waters meet. Its average length is about 40 m., and its average breadth about 15. The depth is greater than that of the other lakes, and the water is salt, though mixed with fresh. It contains a large number of islands, and the whole lake abounds in reeds of various kinds. Of the islands Tennis (anciently Tennesus) contains ruins of the Roman period. The lake supports a considerable population of fishermen, who dwell in villages on the shore and islands and live upon the fish of the lake. The reeds are cover for waterfowl of various kinds, which the traveller sees in great numbers, and wild boars are found in the marshes to the south. The Suez Canal runs in a straight line for 20 m. along the eastern edge of the lake. That part of the lake east of where the canal was excavated is now marshy plain, and the Tanitic and Pelusiac mouths of the Nile are dry. East of Menzala is the site of Serbonis, another dried-up lake, which had the general characteristics of the Delta lagoons. In the Isthmus of Suez are Lake Timsa and the Great and Little Bitter Lakes, occupying part of the ancient bed of the Red Sea. All three were dry or marshy depressions previously to the cutting of the Suez Canal, at which time the waters of the Mediterranean and Red Sea were let into them (see Suez Canal).

A chain of natron lakes (seven in number) lies in a valley in the western desert, 70 to 90 m. W.N.W. of Cairo. In the Fayum province farther south is the Birket-el-Kerun, a lake, lying below the level of the Nile, some 30 m. long and 5 wide at its broadest part. Kerun is all that is left of the Lake of Moeris, an ancient artificial sheet of water which played an important part in the irrigation schemes of the Pharaohs. The water of el-Kerun is brackish, though derived from the Nile, which has at all seasons a much higher level. It is bounded on the north by the Libyan Desert, above which rises a bold range of mountains; and it has a strange and picturesque wildness. Near the lake are several sites of ancient towns, and the temple called Kasr-Karun, dating from Roman times, distinguishes the most important of these. South-west of the Fayum is the Wadi Rayan, a large and deep depression, utilizable in modern schemes for re-creating the Lake of Moeris (*q.v.*).

The Desert Plateaus.—From the southern borders of Egypt to the Delta in the north, the desert plateaus extend on either side of the Nile valley. The eastern region, between the Nile and the Red Sea, varies in width from 90 to 350 m. and is known in its northern part as the Arabian Desert. The western region has no natural barrier for many hundreds of miles; it is part of the vast Sahara. On its eastern edge, a few miles west of Cairo, stand the great pyramids (*q.v.*) of Gizeh or Giza. North of Assuan it is called the Libyan Desert. In the north the desert plateaus are comparatively low, but from Cairo southwards they rise to 1000 and even 1500 ft. above sea-level. Formed mostly of horizontal strata of varying hardness, they present a series of terraces of minor plateaus, rising one above the other, and intersected by small ravines worn by the occasional rainstorms which burst in their neighbourhood. The weathering of this desert area is probably fairly rapid, and the agents at work are principally the rapid heating and cooling of the rocks by day and night, and the erosive action of sand-laden wind on the softer layers; these, aided by the occasional rain, are ceaselessly at work, and produce the successive plateaus, dotted with small isolated hills and cut up by valleys (wadis) which occasionally become deep ravines, thus forming the principal type of scenery of these deserts. From this it will be seen that the desert in Egypt is mainly a rock desert, where the surface is formed of disintegrated rock, the finer particles of which have been carried away by the wind; and east of the Nile this is almost exclusively the case. Here the desert meets the line of mountains which runs parallel to the Red Sea and the Gulf of Suez. In the western desert, however, those large sand accumulations which are usually associated with a desert are met with. They occur as lines of dunes formed of rounded grains of quartz, and lie in the direction of the prevalent wind, usually being of small breadth as compared with their length; but in certain areas, such as that lying S.W. and W. of the oases of Farafra and Dakhla, these lines of dunes, lying parallel to each other and about half a mile apart, cover immense areas, rendering them absolutely impassable except in a direction parallel to the lines themselves. East of the oases of Baharia and Farafra is a very striking line of these sand dunes; rarely more than 3 miles wide, it extends almost continuously from Moghara in the north, passing along the west side of Kharga Oasis to a point near the Nile in the neighbourhood of Abu Simbel—having thus a length of nearly 550 m. In the northern part of this desert the dunes lie about N.W.-S.E., but farther south incline more towards the meridian, becoming at last very nearly north and south.

Oases.—In the western desert lie the five large oases of Egypt, namely, Siwa, Baharia, Farafra, Dakhla and Kharga or Great Oasis, occupying depressions in the plateau or, in the case of the last three, large indentations in the face of limestone escarpments which form the western versant of the Nile valley hills. Their fertility is due to a plentiful supply of water furnished by a sandstone bed 300 to 500 ft. below the surface, whence the water rises through natural fissures or artificial boreholes to the surface, and sometimes to several feet above it. These oases were known and occupied by the Egyptians as early as 1600 B.C., and Kharga (*q.v.*) rose to special importance at the time of the Persian occupation. Here, near the town of Kharga, the ancient Hebi, is a temple of Ammon built by Darius I., and in the same oasis are other ruins of the period of the Ptolemies and Caesars. The oasis of Siwa (Jupiter Ammon) is about 150 m. S. of the Mediterranean at the Gulf of Sollum and about 300 m. W. of the Nile (see SIWA). The other four oases lie parallel to and distant 100 to 150 m. from the Nile, between 25° and 29° N., Baharia being the most northerly and Kharga the most southerly.

Besides the oases the desert is remarkable for two other valleys. The first is that of the natron lakes already mentioned. It contains four monasteries, the remains of the famous anchorite settlement of Nitriae. South of the Wadi Natron, and parallel to it, is a sterile valley called the Bahr-bela-Ma, or "River without Water."

The Sinai Peninsula.—The triangular-shaped Sinai peninsula has its base on the Mediterranean, the northern part being an arid plateau, the desert of Tih. The apex is occupied by a massif of crystalline rocks. The principal peaks rise over 8500 ft. Owing to the slight rainfall, and the rapid weathering of the rocks by the great range of temperature, these hills rise steeply from the valleys at their feet as almost bare rock, supporting hardly any vegetation. In some of the valleys wells or rock-pools filled by rain occur, and furnish drinking-water to the few Arabs who wander in these hills (see also SINAI).

[*Geology.*—Just as the Nile valley forms the chief geographical feature of Egypt, so the geology of the country is intimately related to it. The north and south direction of the river has been largely determined by faults, though the geologists of the Egyptian Survey are finding that the influence of faulting in determining physical outline has, in some cases, been overestimated. The oldest rocks, consisting of crystalline schists with numerous intrusions of granite, porphyry and diorite, occupy the eastern portion of the country between the Nile south of Assuan and the Red Sea. The intrusive rocks predominate over the schists in extent of area covered. They furnished the chief material for the ancient monuments. At Assuan (Syene) the well-known syenite of Werner occurs It is, however, a hornblende granite and does not possess the mineralogical composition of the syenites of modern petrology. Between Thebes and Khartum the western banks of the Nile are composed of Nubian Sandstone, which extends westward from the river to the edge of the great Libyan Desert, where it forms the bed rock. The age of this sandstone has given rise to much dispute. The upper part certainly belongs to the Cretaceous formation; the lower part has been considered to be of Karroo age by some geologists, while others regard the whole formation to be of Cretaceous age. In the Kharga Oasis the upper portion consists of variously coloured unfossiliferous clays with intercalated bands of sandstone containing fossil silicified woods (*Nicolia Aegyptiaca* and *Araucarioxylon Aegypticum*). They are conformably overlain by clays and limestones with *Exogyra Overwegi* belonging to the Lower Danian, and these by clays and white chalk with *Ananchytes ovata* of the Upper Danian. In many instances the Tertiary formation, which occurs between Esna and Cairo, unconformably overlies the Cretaceous, the Lower Eocene being absent. The fluvio-marine deposits of the Upper Eocene and Oligocene formations contain an interesting mammalian fauna, proving that the African continent formed a centre of radiation for the mammalia in early Tertiary times. *Arsinoitherium* is the precursor of the horned Ungulata; while *Moeritherium* and *Palaeomastodon* undoubtedly include the oldest known elephants. Miocene strata are absent in the southern Tertiary areas, but are present at Moghara and in the north. Marine Pliocene strata occur to the south of the pyramids of Giza and in the Fayum province, where, in addition, some gravel terraces, at a height of 500 ft. above sea-level, are attributed to the Pliocene period. The Lake of Moeris, as a large body of fresh water, appears to have come into existence in Pleistocene times. It is represented now by the brackish-water lake of the Birket-el-Kerun. The superficial sands of the deserts and the Nile mud form the chief recent formations. The Nile deposits its mud over the valley before reaching the sea, and consequently the Delta receives little additional material. At Memphis the alluvial deposits are over 50 ft. thick. The superficial sands of the desert region, derived in large part from the disintegration of the Nubian Sandstone, occupy the most extensive areas in the Libyan Desert. The other desert regions of Egypt are elevated stony plateaus, which are diversified by extensively excavated valleys and oases, and in which sand frequently plays quite a subordinate part. These regions present magnificent examples of dry erosion by wind-borne sand, which acts as a powerful sand blast etching away the rocks and producing most beautiful sculpturing. The rate of denudation in exposed positions is exceedingly rapid; while spots sheltered from the sand blast suffer a minimum of erosion, as shown by the preservation of ancient inscriptions. Many of the Egyptian rocks in the desert areas and at the cataracts are coated with a highly polished film, of almost microscopic thinness, consisting chiefly of oxides of iron and manganese with salts of magnesia and lime. It is supposed to be due to a chemical change within the rock and not to deposition on the surface.]

Minerals.—Egypt possesses considerable mineral wealth. In ancient times gold and precious stones were mined in the Red Sea hills. During the Moslem period mining was abandoned, and it was not until the beginning of the 20th century that renewed efforts were made to develop the mining industry. The salt obtained from Lake Mareotis at Meks, a western suburb of Alexandria, supplies the salt needed for the country, except a small quantity used for curing fish at Lake Menzala; while the lakes in the Wadi Natron, 45 m. N.W. of the pyramids of Giza, furnish carbonate of soda in large quantities Alum is found in the western oases. Nitrates and phosphates are also found in various parts of the desert and are used as manures. The turquoise mines of Sinai, in the Wadi Maghara, are worked regularly by the Arabs of the peninsula, who sell the stones in Suez; while there are emerald mines at Jebel Zubara, south of Kosseir. Petroleum occurs at Jebel Zeit, on the west shore of the Gulf of Suez. Considerable veins of haematite of good quality occur both in the Red Sea hills and in Sinai. At Jebel ed-Dukhan are porphyry quarries, extensively worked under the Romans, and at Jebel el-Fatira are granite quarries. At El-Hammâmât, on the old way from Coptos to Philoteras Portus, are the breccia verde quarries, worked from very early times, and having interesting hieroglyphic inscriptions. At the various mines, and on the routes to them and to the Red Sea, are some small temples and stations, ranging from the Pharaonic to the Roman period. The quarries of Syene (Assuan) are famous for extremely hard and durable red granite (syenite), and have been worked since the days of the earliest Pharaohs. Large quantities of this syenite were used in building the Assuan dam (1898–1902). The cliffs bordering the Nile are largely quarried for limestone and sandstone.

Gold-mining recommenced in 1905 at Um Rus, a short distance inland from the Red Sea and some 50 m. S. of Kosseir, where milling operations were started in March of that year. Another mine opened in 1905 was that of Um Garaiat, E.N.E. of Korosko, and 65 m. distant from the Nile.

Climate.—Part of Upper Egypt is within the tropics, but the greater part of the country is north of the Tropic of Cancer. Except a narrow belt on the north along the Mediterranean shore, Egypt lies in an almost rainless area, where the temperature is high by day and sinks quickly at night in consequence of the rapid radiation under the cloudless sky. The mean temperature at Alexandria and Port Said varies between 57° F. in January and 81° F. in July; while at Cairo, where the proximity of the desert begins to be felt, it is 53° F. in January, rising to 84° F. in July. January is the coldest month, when occasionally in the Nile valley, and more frequently in the open desert, the temperature sinks to 32° F., or even a degree or two below. The mean maximum temperatures are 99° F. for Alexandria and 110° F. for Cairo. Farther south the range of temperature becomes greater as pure desert conditions are reached. Thus at Assuan the mean maximum is 118° F., the mean minimum 42° F. At Wadi Halfa the figures in each case are one degree lower.

The relative humidity varies greatly. At Assuan the mean value for the year is only 38%, that for the summer being 29%, and for the winter 51%; while for Wadi Halfa the mean is 32%, and 20% and 42% are the mean values for summer and winter respectively. A white fog, dense and cold, sometimes rises from the Nile in the morning, but it is of short duration and rare occurrence. In Alexandria and on all the Mediterranean coast of Egypt rain falls abundantly in the winter months, amounting to 8 in. in the year; but southwards it rapidly decreases, and south of 31° N. little rain falls.

Records at Cairo show that the rainfall is very irregular, and is furnished by occasional storms rather than by any regular rainy season; still, most falls in the winter months, especially December and January, while, on the other hand, none has been recorded in June and July. The average annual rainfall does not exceed 1·50 in. In the open desert rain falls even more rarely, but it is by no means unknown, and from time to time heavy storms burst, causing sudden floods in the narrow ravines, and drowning both men and animals. These are more common in the mountainous region of the Sinai peninsula, where they are much dreaded by the Arabs. Snow is unknown in the Nile valley, but on the mountains of Sinai and the Red Sea hills it is not uncommon, and a temperature of 18° F. at an altitude of 2000 ft. has been recorded in January.

The atmospheric pressure varies between a maximum in January and a minimum in July, the mean difference being about 0·29 in.

In a series of records extending over 14 years the mean pressure varied between 29·84 and 29·90 in.

The most striking meteorological factor in Egypt is the persistence of the north wind throughout the year, without which the climate would be very trying. It is this "Etesian" wind which enables sailing boats constantly to ascend the Nile, against its strong and rapid current. In December, January and February, at Cairo, the north wind slightly predominates, though those from the south and west often nearly equal it, but after this the north blows almost continuously for the rest of the year. In May and June the prevailing direction is north and north-north-east, and for July, August, September and October north and north-west. From the few observations that exist, it seems that farther south the southern winter winds decrease rapidly, becoming westerly, until at Assuan and Wadi Halfa the northerly winds are almost invariable throughout the year. The *khamsin*, hot sand-laden winds of the spring months, come invariably from the south. They are preceded by a rapid fall of the barometer for about a day, until a gradient from south to north is formed, then the wind commences to blow, at first gently, from the south-east; rapidly increasing in violence, it shifts through south to south-west, finally dropping about sunset. The same thing is repeated on the second and sometimes the third day, by which time the wind has worked round to the north again. During a khamsin the temperature is high and the air extremely dry, while the dust and sand carried by the wind form a thick yellow fog obscuring the sun. Another remarkable phenomenon is the *zobaa*, a lofty whirlwind of sand resembling a pillar, which moves with great velocity. The southern winds of the summer months which occur in the low latitudes north of the equator are not felt much north of Khartum.

One of the most interesting phenomena of Egypt is the mirage, which is frequently seen both in the desert and in the waste tracts of uncultivated land near the Mediterranean; and it is often so truthful in its appearance that one finds it difficult to admit the illusion.

Flora.—Egypt possesses neither forests nor woods and, as practically the whole of the country which will support vegetation is devoted to agriculture, the flora is limited. The most important tree is the date-palm, which grows all over Egypt and in the oases. The lower branches being regularly cut, this tree grows high and assumes a much more elegant form than in its natural state. The dom-palm is first seen a little north of 26° N., and extends southwards. The vine grows well, and in ancient times was largely cultivated for wine; oranges, lemons and pomegranates also abound. Mulberry trees are common in Lower Egypt The sunt tree (*Acacia nilotica*) grows everywhere, as well as the tamarisk and the sycamore. In the deserts halfa grass and several kinds of thorn bushes grow; and wherever rain or springs have moistened the ground, numerous wild flowers thrive. This is especially the case where there is also shade to protect them from the midday sun, as in some of the narrow ravines in the eastern desert and in the palm groves of the oases, where various ferns and flowers grow luxuriantly round the springs. Among many trees which have been imported, the "lebbek" (*Albizzia lebbek*), a thick-foliaged mimosa, thrives especially, and has been very largely employed. The weeping-willow, myrtle, elm, cypress and eucalyptus are also used in the gardens and plantations.

The most common of the fruits are dates, of which there are nearly thirty varieties, which are sold half-ripe, ripe, dried, and pressed in their fresh moist state in mats or skins. The pressed dates of Siwa are among the most esteemed. The Fayum is celebrated for its grapes, and chiefly supplies the market of Cairo. The most common grape is white, of which there is a small kind far superior to the ordinary sort. The black grapes are large, but comparatively tasteless. The vines are trailed on trelliswork, and form agreeable avenues in the gardens of Cairo. The best-known fruits, besides dates and grapes, are figs, sycamore-figs and pomegranates, apricots and peaches, oranges and citrons, lemons and limes, bananas, which are believed to be of the fruits of Paradise (being always in season), different kinds of melons (including some of aromatic flavour, and the refreshing water-melon), mulberries, Indian figs or prickly pears, the fruit of the lotus and olives. Among the more usual cultivated flowers are the rose (which has ever been a favourite among the Arabs), the jasmine, narcissus, lily, oleander, chrysanthemum, convolvulus, geranium, dahlia, basil, the henna plant (*Lawsonia alba*, or Egyptian privet, which is said to be a flower of Paradise), the helianthus and the violet. Of wild flowers the most common are yellow daisies, poppies, irises, asphodels and ranunculuses. The *Poinsettia pulcherrima* is a bushy tree with leaves of brilliant red.

Many kinds of reeds are found in Egypt, though they were formerly much more common. The famous byblus or papyrus no longer exists in the country, but other kinds of *cyperi* are found. The lotus, greatly prized for its flowers by the ancient inhabitants, is still found in the Delta, though never in the Nile itself. There are two varieties of this water-lily, one with white flowers, the other with blue.

Fauna.—The chief quadrupeds are all domestic animals. Of these the camel and the ass are the most common. The ass, often a tall and handsome creature, is indigenous. When the camel was first introduced into Egypt is uncertain—it is not pictured on the ancient monuments. Neither is the buffalo, which with the sheep is very numerous in Egypt. The horses are of indifferent breed, apparently of a type much inferior to that possessed by the ancient Egyptians. Wild animals are few. The principal are the hyena, jackal and fox. The wild boar is found in the Delta. Wolves are rare. Numerous gazelles inhabit the deserts. The ibex is found in the Sinaitic peninsula and the hills between the Nile and the Red Sea, and the moufion, or maned sheep, is occasionally seen in the same regions. The desert hare is abundant in parts of the Fayum, and a wild cat, or lynx, frequents the marshy regions of the Delta. The ichneumon (Pharaoh's rat) is common and often tame; the coney and jerboa are found in the eastern mountains. Bats are very numerous. The crocodile is no longer found in Egypt, nor the hippopotamus, in ancient days a frequenter of the Nile. The common or pariah dog is generally of sandy colour; in Upper Egypt there is a breed of wiry rough-haired black dogs, noted for their fierceness. Among reptiles are several kinds of venomous snakes—the horned viper, the hooded snake and the echis. Lizards of many kinds are found, including the monitor. There are many varieties of beetle, including a number of species representing the scarabaeus of the ancients. Locusts are comparatively rare. The scorpion, whose sting is sometimes fatal, is common. There are many large and poisonous spiders and flies; fleas and mosquitoes abound. Fish are plentiful in the Nile, both scaled and without scales. The scaly fish include members of the carp and perch kind. The *bayad*, a scaleless fish commonly eaten, reaches sometimes 3½ ft. in length. A somewhat rare fish is the *Polypterus*, which has thick bony scales and 16 to 18 long dorsal fins. The *Tetrodon*, or ball fish, is found in the Red Sea, as well as in the Nile.

Some 300 species of birds are found in Egypt, and one of the most striking features of a journey up the Nile is the abundance of bird life. Many of the species are sedentary, others are winter visitants, while others again simply pass through Egypt on their way to or from warmer or colder regions. Birds of prey are very numerous, including several varieties of eagles—the osprey, the spotted, the golden and the imperial. Of vultures the black and white Egyptian variety (*Neophron percnopterus*) is most common. The griffon and the black vulture are also frequently seen. There are many kinds of kites, falcons and hawks, kestrel being numerous. The long-legged buzzard is found throughout Egypt, as are owls. The so-called Egyptian eagle owl (*Bubo ascalaphus*) is rather rare, but the barn owl is common. The kingfisher is found beside every watercourse, a black and white species (*Ceryle rudis*) being much more numerous than the common kingfisher. Pigeons and hoopoes abound in every village. There are various kinds of plovers—the black-headed species (*Pluvianus Aegyptius*) is most numerous in Upper Egypt; the golden plover and the white-tailed species are found chiefly in the Delta. The spurwing is supposed to be the bird mentioned by Herodotus as eating the parasites covering the inside of the mouth of the crocodile. Of game-birds the most plentiful are sandgrouse, quail (a bird of passage) and snipe. Red-legged and other partridges are found in the eastern desert and the Sinai hills. Of aquatic birds there is a great variety. Three species of pelican exist, including the large Dalmatian pelican. Storks, cranes, herons and spoonbills are common. The sacred ibis is not found in Egypt, but the buff-backed heron, the constant companion of the buffalo, is usually called an ibis. The glossy ibis is occasionally seen. The flamingo, common in the lakes of Lower Egypt, is not found on the Nile. Geese, duck and teal are abundant. The most common goose is the white-fronted variety; the Egyptian goose is more rare. Both varieties are depicted on the ancient monuments; the white-fronted goose being commonly shown. Several birds of gorgeous plumage come north into Egypt in the spring, among others the golden oriole, the sun-bird, the roller and the blue-cheeked bee-eater.

Egypt as a Health Resort.—The country is largely resorted to during the winter months by Europeans in search of health as well as pleasure. Upper Egypt is healthier than Lower Egypt, where, especially near the coast, malarial fevers and diseases of the respiratory organs are not uncommon. The least healthy time of the year is the latter part of autumn, when the inundated soil is drying. In the desert, at a very short distance from the cultivable land, the climate is uniformly dry and unvaryingly healthy. The most suitable places for the residence of invalids are Helwan, where there are natural mineral springs, in the desert, 14 m. S. of Cairo, and Luxor and Assuan in Upper Egypt.

The diseases from which Egyptians suffer are very largely the result of insanitary surroundings. In this respect a great improvement has taken place since the British occupation in 1882. Plague, formerly one of the great scourges of the country, seems to have been stamped out, the last visitation having been in 1844, but cholera epidemics occasionally occur.[1] Cholera rarely extends south of Cairo. In 1848 it is believed that over 200,000 persons died from cholera, but later epidemics have been much less fatal. Smallpox is not uncommon, and skin diseases are numerous, but the two most prevalent diseases among the Egyptians are dysentery and ophthalmia. The objection entertained by many natives to entering hospitals or to altering their traditional methods of "cure" renders these diseases much more malignant and fatal than they would be in other circumstances. The government, however, enforces certain health regulations, and the sanitary service is under the direction of a European official.

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[1] A vivid description of Cairo during the prevalence of plague in 1835 will be found in A. W. Kinglake's *Eothen*.

Chief Towns.—Cairo (*q.v.*) the capital, a city of Arab foundation, is built on the east bank of the Nile, about 12 m. above the point where the river divides, and in reference to its situation at the head of the Delta has been called by the Arabs "the diamond stud in the handle of the fan of Egypt." It has a population (1907) of 654,476 and is the largest city in Africa. Next in importance of the cities of Egypt and the chief seaport is Alexandria (*q.v.*), pop. (with Ramleh) 370,009, on the shore of the Mediterranean at the western end of the Delta. Port Said (*q.v.*), pop. 49,884, at the eastern end of the Delta, and at the north entrance to the Suez Canal, is the second seaport. Between Alexandria and Port Said are the towns of Rosetta (*q.v.*), pop. 16,810, and Damietta (*q.v.*), pop. 29,354, each built a few miles above the mouth of the branch of the Nile of the same name. In the middle ages, when Alexandria was in decay, these two towns were busy ports; with the revival of Alexandria under Mehemet Ali and the foundation of Port Said (*c.* 1860), their trade declined. The other ports of Egypt are Suez (*q.v.*), pop. 18,347, at the south entrance of the canal, Kosseir (794) on the Red Sea, the seat of the trade carried on between Upper Egypt and Arabia, Mersa Matruh, near the Tripolitan frontier, and El-Arish, pop. 5897, on the Mediterranean, near the frontier of Palestine, and a halting-place on the caravan route from Egypt to Syria. In the interior of the Delta are many flourishing towns, the largest being Tanta, pop. 54,437, which occupies a central position. Damanhur (38,752) lies on the railway between Tanta and Alexandria; Mansura (40,279) is on the Damietta branch of the Nile, to the N.E. of Tanta; Zagazig (34,999) is the largest town in the Delta east of the Damietta branch; Bilbeis (13,485) lies N.N.E. of Cairo, on the edge of the desert and in the ancient Land of Goshen. Ismailia (10,373) is situated midway on the Suez Canal. All these towns, which depend largely on the cotton industry, are separately noticed.

Other towns in Lower Egypt are: Mehallet el-Kubra, pop. 47,955, 16 m. by rail N.E. of Tanta, with manufactories of silk and cottons; Salihia (6100), E.N.E. of and terminus of a railway from Zagazig, on the edge of the desert south of Lake Menzala, and the starting-point of the caravans to Syria; Mataria (15,142) on Lake Menzala and headquarters of the fishing industry; Zifta (15,850) on the Damietta branch and the site of a barrage; Samanud (14,408), also on the Damietta branch, noted for its pottery, and Fua (14,515), where large quantities of tarbushes are made, on the Rosetta branch. Shibin el-Kom (21,576), 16 m. S. of Tanta, is a cotton centre, and Menuf (22,316), 8 m. S.W. of Shibin, in the fork between the branches of the Nile, is the chief town of a rich agricultural district. There are many other towns in the Delta with populations between 10,000 and 20,000.

In Upper Egypt the chief towns are nearly all in the narrow valley of the Nile. The exceptions are the towns in the oases comparatively unimportant, and those in the Fayum province. The capital of the Fayum, Medinet el-Fayum, has a population (1907) of 37,320. The chief towns on the Nile, taking them in their order in ascending the river from Cairo, are Beni Suef, Minia, Assiut, Akhmim, Suhag, Girga, Kena, Luxor, Esna, Edfu, Assuan and Korosko. Beni Suef (23,357) is 77 m. from Cairo by rail. It is on the west bank of the river, is the capital of a *mudiria* and a centre for the manufacture of woollen goods. Minia (27,221) is 77 m. by rail farther south. It is also the capital of a mudiria, has a considerable European colony, possesses a large sugar factory and some cotton mills. It is the starting-point of a road to the Baharia oasis. Assiut (*q.v.*), pop. 39,442, is 235 m. S. of Cairo by rail, and is the most important commercial centre in Upper Egypt. At this point a barrage is built across the river. Suhag (17,514) is 56 m. by rail S. of Assiut and is the headquarters of Girga mudiria. The ancient and celebrated Coptic monasteries El Abiad (the white) and El Ahmar (the red) are 3 to 4 m. W. and N.W. respectively of Suhag. A few miles above Suhag, on the opposite (east) side of the Nile is Akhmim (*q.v.*) or Ekhmim (23,795), where silk and cotton goods are made. Girga (*q.v.*), pop. 19,893, is 22 m. S. by rail of Suhag, and on the same (the west) side of the river. It is noted for its pottery. Kena (*q.v.*), pop. 20,069, is on the east bank of the Nile, 145 m. by rail from Assiut. It is the chief seat of the manufacture of the porous earthenware water-bottles used all over Egypt. Luxor (*q.v.*), pop. (with Karnak) 25,229, marks the site of Thebes. It is 418 m. from Cairo, and here the gauge of the railway is altered from broad to narrow. Esna (*q.v.*), pop. 19,103, is another place where pottery is made in large quantities. It is on the west bank of the Nile, 36 m. by rail S. of Luxor. Edfu (*q.v.*), pop. 19,262, is also on the west side of the river, 30 m. farther south. It is chiefly famous for its ancient temple. Assuan (*q.v.*), pop. 12,618, is at the foot of the First Cataract and 551 m. S. of Cairo by rail. Three miles farther south, at Shellal, the Egyptian railway terminates. Korosko, 118 m. by river above Assuan, is a small place notable as the northern terminus of the caravan route from the Sudan across the Nubian desert. Since the building of the railway—which starts 96 m. higher up, at Wadi Halfa—to Khartum, this route is little used, and Korosko has lost what importance it had.

Ancient Cities and Monuments.—Many of the modern cities of Egypt are built on the sites of ancient cities, and they generally contain some monuments of the time of the Pharaohs, Greeks or Romans. The sites of other ancient cities now in complete ruin may be indicated. Memphis, the Pharaonic capital, was on the west bank of the Nile, some 14 m. above Cairo, and Heliopolis lay some 5 m. N.N.E. of Cairo. The pyramids of Giza or Gizeh, on the edge of the desert, 8 m. west of Cairo, are the largest of the many pyramids and other monuments, including the famous Sphinx, built in the neighbourhood of Memphis. The site of Thebes has already been indicated. Syene stood near to where the town of Assuan now is; opposite, on an island in the Nile, are scanty ruins of the city of Elephantine, and a little above, on another island, is the temple of Philae. The ancient Coptos (Keft) is represented by the village of Kuft, between Luxor and Kena. A few miles north of Kena is Dendera, with a famous temple. The ruins of Abydos, one of the oldest places in Egypt, are 8 m. S.W. of Balliana, a small town in Girga mudiria. The ruined temples of Abu Simbel are on the west side of the Nile, 56 m. above Korosko. On the Red Sea, south of Kosseir, are the ruins of Myos Hormos and Berenice. Of the ancient cities in the Delta there are remains, among others, of Sais, Iseum, Tanis, Bubastis, Onion, Sebennytus, Pithom, Pelusium, and of the Greek cities Naucratis and Daphnae. There are, besides the more ancient cities and monuments, a number of Coptic towns, monasteries and churches in almost every part of Egypt, dating from the early centuries of Christianity. The monasteries, or *ders*, are generally fort-like buildings and are often built in the desert. Tombs of Mahommedan saints are also numerous, and are often placed on the summit of the cliffs overlooking the Nile. The traveller in Egypt thus views, side by side with the activities of the present day, where occident and orient meet and clash, memorials of every race and civilization which has flourished in the valley of the Nile.

Trade Routes and Communications.—Its geographical position gives Egypt command of one of the most important trade routes in the world. It is, as it were, the fort which commands the way from Europe to the East. This has been the case from time immemorial, and the provision, in 1869, of direct maritime communication between the Mediterranean and the Red Sea, by the completion of the Suez Canal, ensured for the Egyptian route the supremacy in sea-borne traffic to Asia, which the discovery of the passage to India by way of the Cape of Good Hope had menaced for three and a half centuries. The Suez Canal is 87 m. long, 66 actual canal and 21 lakes. It has sufficient depth to allow vessels drawing 27 ft. of water to pass through. It is administered by a company whose headquarters are in Paris, and no part of its revenue reaches the Egyptian exchequer (see Suez Canal). Besides the many steamship lines which use the Suez Canal, other steamers run direct from European ports to Alexandria. There is also a direct mail service between Suez and Port Sudan.

The chief means of internal communication are, in the Delta the railways, in Upper Egypt the railway and the river. The railways are of two kinds: (1) those state-owned and state-worked, (2) agricultural light railways owned and worked by private companies. Railway construction dates from 1852, when the line from Alexandria to Cairo was begun, by order of Abbas I. The state railways, unless otherwise indicated, have a gauge of 4 ft. 8½ in. The main system is extremely simple. Trunk lines from Alexandria (via Damanhur and Tanta) and from Port Said (via Ismailia) traverse the Delta and join at Cairo. From Cairo the railway is continued south up the valley of the Nile and close to the river. At first it follows the west bank, crossing the stream at Nag Hamadi, 354 m. from Cairo, by an iron bridge 437 yds. long. Thence it continues on the east bank to Luxor, where the broad gauge ceases. From Luxor the line continues on the standard African gauge (3 ft. 6 in.) to Shellal, 3 m. above Assuan and 685 m. from Alexandria. This main line service is supplemented by a steamer service on the Nile from Shellal to Wadi Halfa, on the northern frontier of the Anglo-Egyptian Sudan, whence there is direct railway communication with Khartum and the Red Sea (see SUDAN).

Branch lines connect Cairo and Alexandria with Suez and with almost every town in the Delta. From Cairo to Suez via Ismailia is a distance of 160 m. Before the Suez Canal was opened passengers and goods were taken to Suez from Cairo by a railway 84 m. long which ran across the desert. This line, now disused, had itself superseded the "overland route" organized by Lieut. Thomas Waghorn, R.N., *c.* 1830, for the conveyance of passengers and mails to India. In Upper Egypt a line, 40 m. long, runs west from Wasta, a station 56 m. S. of Cairo, to Abuksa in the Fayum mudiria. Another railway goes from Kharga Junction, a station on the main line 24 m. S. of Girga, to the oasis of Kharga. These lines are privately owned.

In the Delta the light railways supplement the ordinary lines and connect the villages with the towns and seaports. There are over 700 m. of these lines. The railway development of Egypt has not been very rapid. In 1880 944 m. of state lines were open; in 1900 the figure was 1393, and in 1905, 1688. For several years before 1904 the administration of the railways was carried on by an international or mixed board for the security of foreign creditors. In the year named the railways came directly under the control of the Egyptian government, which during the next four years spent £E.3,000,000 on improving and developing the lines. In the five years 1902–1906 the capital value of the state railways increased from £E.20,383,000 to £E.23,200,000 and the net earnings from £E.1,059,000 to £E.1,475,000. The number of passengers carried in the same period rose from 12½ to over 22 millions, and the weight of goods from slightly under 3,000,000 to nearly 6,750,000 tons. In 1906 the light railways carried nearly a million tons of goods and over 6,800,000 passengers.

Westward from Alexandria a railway, begun in 1904 by the khedive, Abbas II., runs parallel with the coast, and is intended to be continued to Tripoli. The line forms the eastern end of the great railway system which will eventually extend from Tangier to Alexandria.

The Nile is navigable throughout its course in Egypt, and is largely used as a means of cheap transit of heavy goods. Lock and bridge tolls were abolished in 1899 and 1901 respectively. As a result, river traffic greatly increased. Above Cairo the Nile is the favourite tourist route, while between Shellal (Assuan) and the Sudan frontier it is the only means of communication. Among the craft using the river the dahabiya is a characteristic native sailing vessel, somewhat resembling a house-boat. From the Nile, caravan routes lead westward to the various oases and eastward to the Red Sea, the shortest (120 m.) and most used of the eastern routes being that from Kena to Kosseir. Roads suitable for wheeled vehicles are found in Lower Egypt, but the majority of the tracks are bridle-paths, goods being conveyed on the backs of donkeys, mules and camels.

Posts and Telegraphs.—The Egyptian postal system is highly organized and efficient, and in striking contrast with its condition in 1870, when there were but nineteen post-offices in the country. All the branches of business transacted in European post-offices are carried on by the Egyptian service, Egypt being a member of the Postal Union. It was the first foreign country to establish a penny postage with Great Britain, the reduction from 2½d. being made in 1905. The inland letters and packages carried yearly exceed 20,000,000 and foreign letters (30% to England) number over 4,000,000. Over £17,000,000 passes yearly through the post. A feature of the service are the travelling post-offices, of which there are some 200.

All the important towns are connected by telegraph, the telegraphs being state-owned and worked by the railway administration. Egypt is also connected by cables and land-lines with the outside world. One land-line connects at El-Arish with the line through Syria and Asia Minor to Constantinople. Another line connects at Wadi Halfa with the Sudan system, affording direct telegraphic communication via Khartum and Gondokoro with Uganda and Mombasa. The Eastern Telegraph Company, by concessions, have telegraph lines across Egypt from Alexandria via Cairo to Suez, and from Port Said to Suez, connecting their cables to Europe and the East. The principal cables are from Alexandria to Malta, Gibraltar and England; from Alexandria to Crete and Brindisi; from Suez to Aden, Bombay, China and Australia.

The telephone is largely used in the big towns, and there is a trunk telephone line connecting Alexandria and Cairo.

Standard Time.—The standard time adopted in Egypt is that of the longitude of Alexandria, 30° E., *i.e.* two hours earlier than Greenwich time. It thus corresponds with the standard time of British South Africa.

Agriculture and Land Tenure.—The chief industry of Egypt is agriculture. The proportions of the industry depend upon the area of land capable of cultivation. This again depends upon the fertilizing sediment brought down by the Nile and the measure in which lands beyond the natural reach of the flood water can be rendered productive by irrigation. By means of canals, "basins," dams and barrages, the Nile flood is now utilized to a greater extent than ever before (see IRRIGATION: *Egypt*). The result has been a great increase in the area of cultivated or cultivable land.

At the time of the French occupation of Egypt in 1798, it was found that the cultivable soil covered 4,429,400 acres, but the quantity actually under cultivation did not exceed 3,520,000 acres, or six-elevenths of the entire surface. Under improved conditions the area of cultivated land, or land in process of reclamation, had risen in 1906 to 5,750,000 acres, while another 500,000 acres of waste land awaited reclamation.

Throughout Egypt the cultivable soil does not present any very great difference, being always the deposit of the river; it contains, however, more sand near the river than at a distance from it. Towards the Mediterranean its quality is injured by the salt with which the air is impregnated, and therefore it is not so favourable to vegetation. Of the cultivated land, some three-fourths is held, theoretically, in life tenancy. The state, as ultimate proprietor, imposes a tax which is the equivalent of rent. These lands are *Kharaji* lands, in distinction from the *Ushuri* or tithe-paying lands. The *Ushuri* lands were originally granted in fee, and are subject to a quit-rent. All tenants are under obligation to guard or repair the banks of the Nile in times of flood, or in any case of sudden emergency. Only to this extent does the *corvée* now prevail. The land-tax is proportionate, *i.e.* land under perennial irrigation pays higher taxes than land not so irrigated (see below, *Finance*). The unit of land is the *feddan*, which equals 1·03 acre. Out of 1,153,759 proprietors of land in 1905, 1,005,705 owned less than 5 *feddans*. The number of proprietors owning over 50 *feddans* was 12,475. The acreage held by the first class was 1,264,084, that by the second class, 2,356,602. Over 1,600,000 *feddans* were held in holdings of from 5 to 50 *feddans*. The state domains cover over 240,000 *feddans*, and about 600,000 *feddans* are owned by foreigners. The policy of the government is to maintain the small proprietors, and to do nothing tending to oust the native in favour of European landowners.

The kind of crops cultivated depends largely on whether the land is under perennial, flood or "basin" irrigation. Perennial irrigation is possible where there are canals which can be supplied with water all the year round from the Nile. This condition exists throughout the Delta and Middle Egypt, but only in parts of Upper Egypt. Altogether some 4,000,000 acres are under perennial irrigation. In these regions two and sometimes three crops can be harvested yearly. In places where perennial irrigation is impossible, the land is divided by rectangular dikes into "basins." Into these basins—which vary in area from 600 to 50,000 acres—water is led by shallow canals when the Nile is in flood. The water is let in about the middle of August and the basins are begun to be emptied about the 1st of October. The land under basin irrigation covers about 1,750,000 acres. In the basins only one crop can be grown in the year. This basin system is of immemorial use in Egypt, and it was not until the time of Mehemet Ali (*c.* 1820) that perennial irrigation began. High land near the banks of the Nile which cannot be reached by canals is irrigated by raising water from the Nile by steam-pumps, water-wheels (*sakias*) worked by buffaloes, or water-lifts (*shadufs*) worked by hand. There are several thousand steam-pumps and over 100,000 *sakias* or *shadufs* in Egypt. The *fellah* divides his land into little square plots by ridges of earth, and from the small canal which serves his holding he lets the water into each plot as needed. The same system obtains on large estates (see further IRRIGATION: *Egypt*).

There are three agricultural seasons: (1) summer (*sefi*), 1st of April to 31st of July, when crops are grown only on land under perennial irrigation; (2) flood (*Nili*), 1st of August to 30th of November; and (3) winter (*shetwi*), 1st of December to 31st of March. Cotton, sugar and rice are the chief summer crops; wheat, barley, flax and vegetables are chiefly winter crops; maize, millet and "flood" rice are *Nili* crops; millet and vegetables are also, but in a less degree, summer crops. The approximate areas under cultivation in the various seasons are, in summer, 2,050,000 acres; in flood, 1,500,000 acres; in winter, 4,300,000 acres. The double-cropped area is over 2,000,000 acres. Although on the large farms iron ploughs, and threshing and grain-cleaning machines, have been introduced, the small cultivator prefers the simple native plough made of wood. Corn is threshed by a *norag*, a machine resembling a chair, which moves on small iron wheels or thin circular plates fixed to axle-trees, and is drawn in a circle by oxen.

Crops.—Egypt is third among the cotton-producing countries of the world. Its production per acre is the greatest of any country but, owing to the restricted area available, the bulk raised is not more than one-tenth of that of the United States and about half that of India. Some 1,600,000 acres of land, five-sixths being in Lower Egypt, are devoted to cotton growing. The climate of Lower Egypt being very suitable to the growth of the plant, the cotton produced there is of excellent quality. The seed is sown at the end of February or beginning of March and the crop is picked in September and October. The cotton crop increased from 1,700,000 *kantars*[1] in 1878 to 4,100,000 in 1890, had reached 5,434,000 in 1900, and was 6,750,000 in 1905. Its average value, 1897–1905, was over £14,000,000 a year. The cotton exported was valued in 1907 at £E.23,598,000, in 1908 at £E.17,091,612.

While cotton is grown chiefly in the Delta, the sugar plantations, which cover about 100,000 acres, are mainly in Upper Egypt. The canes are planted in March and are cut in the following January or February. Although since 1884 the production of sugar has largely increased, there has not been a corresponding increase in its value, owing to the low price obtained in the markets of the world. Beetroot is also grown to a limited extent for the manufacture of sugar. The sugar exported varied in annual value in the period 1884–1905 from £400,000 to £765,000.

A coarse and strong tobacco was formerly extensively grown, but its cultivation was prohibited in 1890. Flax and hemp are grown in a few places.

Maize in Lower Egypt and millet (of which there are several varieties) in Upper Egypt are largely grown for home consumption, these grains forming a staple food of the peasantry. The stalk of the maize is also a very useful article. It is used in the building of the houses of the fellahin, as fuel, and, when green, as food for cattle. Wheat and barley are important crops, and some 2,000,000 acres are sown with them yearly. The barley in general is not of good quality, but the desert or "Mariut" barley, grown by the Bedouins in the coast region west of Alexandria, is highly prized for the making of beer. Beans and lentils are extensively sown, and form an important article of export. The annual value of the crops is over £3,000,000. Rice is largely grown in the northern part of the Delta, where the soil is very wet. Two kinds are cultivated: *Sultani*, a summer crop, and *Sabaini*, a flood crop. *Sabaini* is a favourite food of the fellahin, while *Sultani* rice is largely exported. In the absence of grass, the chief green food for cattle and horses is clover, grown largely in the basin lands of Upper Egypt. To a less extent vetches are grown for the same purpose.

Vegetables and Fruit.—Vegetables grow readily, and their cultivation is an important part of the work of the fellahin. The onion is grown in great quantities along the Nile banks in Upper Egypt, largely for export. Among other vegetables commonly raised are tomatoes (the bulk of which are exported), potatoes (of poor quality), leeks, marrows, cucumbers, cauliflowers, lettuce, asparagus and spinach.

The common fruits are the date, orange, citron, fig, grape, apricot, peach and banana. Olives, melons, mulberries and strawberries are also grown, though not in very large numbers. The olive tree flourishes only in the Fayum and the oases. The Fayum also possesses extensive vineyards. The date is a valuable economic asset. There are some 6,000,000 date-palms in the country, 4,000,000 being in Upper Egypt. The fruit is one of the chief foods of the people. The value of the crop is about £1,500,000 a year.

Roses and Dyes.—There are fields of roses in the Fayum, which supply the market with rose-water. Of plants used for dyeing, the principal are bastard saffron, madder, woad and the indigo plant. The leaves of the henna plant are used to impart a bright red colour to the palms of the hands, the soles of the feet, and the nails of both hands and feet, of women and children, the hair of old ladies and the tails of horses. Indigo is very extensively employed to dye the shirts of the natives of the poorer classes, and is, when very dark, the colour of mourning; therefore, women at funerals, and generally after a death, smear themselves with it.

Domestic Animals.—The Egyptians are not particularly a pastoral people, though the wealth of the Bedouin in the Eastern or Arabian Desert consists in their camels, horses, sheep and goats. In the Nile valley the chief domestic animals are the camel, donkey, mule, ox, buffalo, sheep and goat. Horses are comparatively few, and are seldom seen outside the large towns, the camel and donkey being the principal beasts of burden. The cattle are short-horned, rather small and well formed. They are quiet in disposition, and much valued for agricultural labour by the people, who therefore very rarely slaughter them for meat. Buffaloes of an uncouth appearance and of a dark slaty colour, strikingly contrasting with the neat cattle, abound in Egypt. They are very docile, and the little children of the villagers often ride them to or from the river. The buffaloes are largely employed for turning the *sakias*. Sheep (of which the greater number are black) and goats are abundant, and mutton is the ordinary butcher's meat. The wool is coarse and short. Swine are very rarely kept, and then almost wholly for the European inhabitants, the Copts generally abstaining from eating their meat. Poultry is plentiful and eggs form a considerable item in the exports. Pigeons are kept in every village and their flesh is a common article of food.

Fishing.—The chief fishing-ground is Lake Menzala, where some 4000 persons are engaged in the industry, but fish abound in the Nile also, and are caught in large quantities along the coast of the Delta. The salting and curing of the fish is done chiefly at Mataria, on Lake Menzala, and at Damietta. Dried and salted fish eggs, called *batarekh*, command a ready market. The average annual value of the fisheries is about £200,000.

Canals.—The irrigation canals, which are also navigable by small craft, are of especial importance in a country where the rainfall is very slight. The Delta is intersected by numerous canals which derive their supply from four main channels. The Rayya Behera, known in its lower courses first as the Khatatba and afterwards as the Rosetta canal, follows the west bank of the Rosetta branch of the Nile and has numerous offshoots. The most important is the Mahmudia (50 m. long), which connects Alexandria with the Rosetta branch, taking a similar direction to that of the ancient canal which it succeeded. This canal supplies Alexandria with fresh water.

The Rayya Menufia, or Menuf canal, connects the two branches of the Nile and supplies water to the large number of canals in the central part of the Delta. Following the right (eastern) bank of the Damietta branch is the Rayya Tewfiki, known below Benha as the Mansuria, and below Mansura as the Fareskur, canal. This canal has many branches. Farther east are other canals, of which the most remarkable occupy in part the beds of the Tanitic and Pelusiac branches. That following the old Tanitic channel is called the canal of Al-Mo‘izz, the first Fatimite caliph who ruled in Egypt, having been dug by his orders, and the latter bears the name of the canal of Abu-l-Muneggi, a Jew who executed this work, under the caliph Al-Amir, in order to water the province called the Sharkia. From this circumstance this canal is also known as the Sharkawia. From a town on its bank it is called in its lower course the Shibini canal. The superfluous water from all the Delta canals is drained off by *bahrs* (rivers) into the coast lakes. The Ismailia or Fresh-water canal branches from the Nile at Cairo and follows, in the main, the course of the canal which anciently joined the Nile and the Red Sea. It dates from Pharaonic times, having been begun by "Sesostris," continued by Necho II. and by Darius Hystaspes, and at length finished by Ptolemy Philadelphus. This canal, having fallen into disrepair, was restored in the 7th century A.D. by the Arabs who conquered Egypt, but appears not long afterwards to have again become unserviceable. The existing canal was dug in 1863 to supply fresh water to the towns on the Suez Canal. Although designed for irrigation purposes, the Delta canals are also used for the transport of passengers and goods.

In Upper Egypt the most important canals are the Ibrahimia and the Bahr Yusuf (the River of Joseph). They are both on the west side of the Nile. The Ibrahimia takes its water from the Nile at Assiut, and runs south to below Beni Suef. It now supplies the Bahr Yusuf, which runs parallel with and west of the Ibrahimia, until it diverges to supply the Fayum—a distance of some 350 m. It leaves the Ibrahimia at Derut near its original point of departure from the Nile. Although the Joseph whence it takes its name is the celebrated Saladin, it is related that he merely repaired it, and it is not doubted to be of a much earlier period. Most probably it was executed under the Pharaohs. By some authorities it is believed to be a natural channel canalized. Besides supplying the canals of the Fayum with summer water, it fills many of the "basins" of Upper Egypt with water in flood time.

Manufactures and Native Industries.—Although essentially an agricultural country, Egypt possesses several manufactures. In connexion with the cotton industry there are a few mills where calico is made or oil crushed, and ginning-mills are numerous. In Upper Egypt there are a number of factories for sugar-crushing and refining, and one or two towns of the Delta possess rice mills. Flour mills are found in every part of the country, the maize and other grains being ground for home consumption. Soap-making and leather-tanning are carried on, and there are breweries at Alexandria and Cairo. The manufacture of tobacco into cigarettes, carried on largely at Alexandria and Cairo, is another important industry. Native industries include the weaving of silk, woollen, linen and cotton goods, the hand-woven silk shawls and draperies being often rich and elegant. The silk looms are chiefly at Mehallet el-Kubra, Cairo and Damietta. The Egyptians are noted for the making of pottery of the commoner kinds, especially water-jars. There is at Cairo and in other towns a considerable industry in ornamental wood and metal work, inlaying with ivory and pearl, brass trays, copper vessels, gold and silver ornaments, &c. At Cairo and in the Fayum, attar of roses and other perfumes are manufactured. Boat-building is an important trade.

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[1] A *kantar* equals 99 lb.

Commerce.—The trade of Egypt has developed enormously since the British occupation in 1882 ensured to all classes of the community the enjoyment of the profit of their labour. The total value of the exterior trade increased in the 20 years 1882 to 1902 from £19,000,000 to £32,400,000. The wealth of Egypt lying in the cultivation of its soil, almost all the exports are agricultural produce, while the imports are mostly manufactured goods, minerals and hardware. The chief exports in order of importance are: raw cotton, cotton seed, sugar, beans, cigarettes, onions, rice and gum-arabic. The gum is not of native produce, being in transit from the Sudan. Of less importance are the exports of hides and skins, eggs, wheat and other grains, wool, quails, lentils, dates and Sudan produce in transit. The principal articles imported are: cotton goods and other textiles, coal, iron and steel, timber, tobacco, machinery, flour alcoholic liquors, petroleum, fruits, coffee and live animals. There is an *ad valorem* duty of 8% on imports and of about 1% on exports. Tobacco and precious stones and metals pay heavier duties. The tobacco is imported chiefly from Turkey and Greece, is made into cigarettes in Egypt, and in this form exported to the value of about £500,000 yearly.

In comparison with cotton, all other exports are of minor account. The cotton exported, of which Great Britain takes more than half, is worth over three-fourths of the total value of goods sent abroad. Next to cotton, sugar is the most important article exported. A large proportion of the sugar manufactured is, however, consumed in the country and does not figure in the trade returns. Of the imports the largest single item is cotton goods, nearly all being sent from England. Woollen goods come chiefly from England, Austria and Germany, silk goods from France. Large quantities of ready-made clothes and fezes are imported from Austria. Iron and steel goods, machinery, locomotives, &c., come chiefly from England, Belgium and Germany, coal from England, live stock from Turkey and the Red Sea ports, coffee from Brazil, timber from Russia, Turkey and Sweden.

A British consular report (No. 3121, annual series), issued in 1904, shows that in the period 1887-1902 the import trade of Egypt nearly doubled. In the same period the proportion of imports from the United Kingdom fell from 39·63 to 36·76%. Though the percentage decreased, the value of imports from Great Britain increased in the same period from £2,500,000 to £4,500,000. In addition to imports from the United Kingdom, British possessions took 6·0% of the import trade. Next to Great Britain, Turkey had the largest share of the import trade, but it had declined in the sixteen years from 19 to 15%. France about 10%, and Austria 6·72%, came next, but their import trade was declining, while that of Germany had risen from less than 1 to over 3%, and Belgium imports from 1·74 to 4·27%.

In the same period (1887–1902) Egyptian exports to Great Britain decreased from 63·25 to 52·30%, Germany and the United States showing each an increase of over 6·0%. Exports to Germany had increased from 0·13 to 6·75%, to the United States from 0·26 to 6·70%. Exports to France had remained practically stationary at 8·0%; those to Austria had dropped from 6·30 to 4·0%, to Russia from 9·11 to 8·43%.

For the quinquennial period 1901–1905, the average annual value of the exterior trade was:—imports £17,787,296; exports £18,811,588; total £36,598,884. In 1907 the total value of the merchandise imported and exported, exclusive of transit, re-exportation and specie, was £E.54,134,000—constituting a record trade return. The value of the imports was £E.26,121,000, of the exports £E.28,013,000.

Shipping.—More than 90% of the external trade passes through the port of Alexandria. Port Said, which in consequence of its position at the northern entrance of the Suez Canal has more frequent and regular communication with Europe, is increasing in importance and is the port where mails and passengers are landed. Over 3000 ships enter and clear harbour at Alexandria every year. The total tonnage entering the port increased in the five years 1901–1905 from 2,555,259 to 3,591,281. In the same period the percentage of British shipping, which before 1900 was nearly 50, varied from 40 to 45 No other nation had more than 12% of the tonnage, Italy, France, Austria and Turkey each having 9 to 12%. The tonnage of German ships increased in the five years mentioned from 3 to 7%. In number of steamships entering the harbour Great Britain is first, with some 800 yearly, or about 50% of all steamers entering. The sailing boats entering the harbour are almost entirely Turkish. They are vessels of small tonnage.

The transit trade with the East, which formerly passed overland through Egypt, has been diverted to the Suez Canal, the traffic through which has little to do with the trade or shipping of Egypt. The number of ships using the canal increased in the 20 years 1880–1900 from 2000 to 4000, while in the same period the tonnage rose from 4,300,000 to 14,000,000. In 1905 the figures were:—Number of ships that passed through the canal, 4116 (2484 being British and 600 German), net tonnage 13,134,105 (8,356,940 British and 2,113,484 German). Next to British and German the nationality of ships using the canal in order of importance is French, Dutch, Austrian, Italian and Russian. About 250,000 passengers (including some 40,000 pilgrims to Mecca) pass through the canal in a year (see further SUEZ).

Currency.—The monetary system in force dates from 1885, when through the efforts of Sir Edgar Vincent the currency was placed on a sound basis. The system is based on the single gold standard. The unit is a gold coin called a pound and equal to £1, 0s. 6d. in English currency. The Egyptian pound (£E.) is divided into 100 piastres, of which there are coins in silver of 20,10,5 and 2 piastres. One, ½, ¼ and 1/10 piastre pieces are coined in nickel and 1/20 and 1/40 piastre pieces in bronze. The one piastre piece is worth a fraction over 2½d. The 1/40 of a piastre is popularly called a para and the native population generally reckon in paras. The legal piastre is called the piastre tariff (P.T.), to distinguish it from the ½ piastre, which in local usage in Cairo and Alexandria is called a piastre. Officially the ½ piastre is known as 5 milliemes, and so with the coins of lower denomination, the para being ¼ millieme. The old terms *kis* or "purse" (500 piastres) and *khazna* or "treasury" (1000 purses) are still occasionally used. Formerly European coins of all kinds were in general circulation, now the only foreign coins current are the English sovereign, the French 20 franc piece and the Turkish mejidie, a gold coin worth 18 shillings. For several years no Egyptian gold pieces have been coined. Egyptian silver money is minted at Birmingham, and nickel and bronze money at Vienna. Bank-notes, of the National Bank, are issued for £E.100, £E.50, £E.10, £E.5 and £E.1, and for 50 piastres. The notes are not legal tender, but are accepted by the government in payment of taxes.

The history of the currency reform in Egypt is interesting as affording a practical example of a system much discussed in connexion with the currency question in India, namely, a gold standard without a gold coinage. The Egyptian pound is practically non-existent, nearly all that were coined having been withdrawn from circulation. Their place has been taken by foreign gold, principally the English sovereign, which circulates at a value of 97½ piastres. In practice the system works perfectly smoothly, the gold flowing in and out of the country through the agency of private banking establishments in proportion to the requirements of the circulation. It is, moreover, very economical for the government. As in most agricultural countries, there is a great expansion of the circulation in the autumn and winter months in order to move the crops, followed by a long period of contracted circulation throughout the rest of the year. Under the existing system the fluctuating requirements of the currency are met without the expense of alternately minting and melting down.

Weights and Measures.—The metrical system of weights and measures is in official but not in popular use, except in the foreign quarters of Cairo, Alexandria, &c. The most common Egyptian measures are the *fitr*, or space measured by the extension of the thumb and first finger; the *shibr*, or span; and the cubit (of three kinds = 22⅔, 25 and 26⅔ in.). The measure of land is the *feddan*, equal to 1·03 acres, subdivided into 24 *kirats*. The *ardeb* is equal to about 5 bushels, and is divided into 6 *waybas*, and each *wayba* into 24 *rubas*. The *okieh* equals 1·32 oz., the *rotl* ·99 ℔, the *oke* 2·75 ℔, the *kantar* (or 100 *rotls* or 36 *okes*) 99·04 ℔.

Constitution and Administration.—Egypt is a tributary state of the Turkish empire, and is ruled by an hereditary prince with the style of khedive, a Persian title regarded as the equivalent of king. The succession to the throne is by primogeniture. The central administration is carried on by a council of ministers, appointed by the khedive, one of whom acts as prime minister. To these is added a British financial adviser, who attends all meetings of the council of ministers, but has not a vote; on the other hand, no financial decision may be taken without his consent. The ministries are those of the interior, finance, public works, justice, war, foreign affairs and public instruction,[1] and in each of these are prepared the drafts of decrees, which are then submitted to the council of ministers for approval, and on being signed by the khedive become law. No important decision, however, has been taken since 1882 without the concurrence of the British minister plenipotentiary. With a few exceptions, laws cannot, owing to the Capitulations, be enforced against foreigners except with the consent of the powers.

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[1] To the ministry of public instruction was added in 1906 a department of agriculture and technical instruction.

While the council of ministers with the khedive forms the legislative authority, there are various representative bodies with strictly limited powers. The legislative council is a consultative body, partly elective, partly nominative. It examines the budget and all proposed administrative laws, but cannot initiate legislation, nor is the government bound to adopt its suggestions. The general assembly consists of the legislative council and the ministers of state, together with popularly elected members, who form a majority of the whole assembly. It has no legislative functions, but no new direct personal tax nor land tax can be imposed without its consent. It must meet at least once in every two years.

For purposes of local government the chief towns constitute governorships (*moafsas*), the rest of the country being divided into *mudirias* or provinces. The governors and *mudirs* (heads of provinces) are responsible to the ministry of the interior. The provinces are further divided into districts, each of which is under a *mamur*, who in his turn supervises and controls the *omda*, mayor or head-man, of each village in his district.

The governorships are: Cairo; Alexandria, which includes an area of 70 sq. m.; Suez Canal, including Port Said and Ismailia; Suez and El-Arish. Lower Egypt is divided into the provinces of: Behera, Gharbia, Menufia, Dakahlia, Kaliubia, Sharkia. The oasis of Siwa and the country to the Tripolitan frontier are dependent on the province of Behera. Upper Egypt: Giza, Beni Suef, Fayum, Minia, Assiut, Girga, Kena, Assuan. The peninsula of Sinai is administered by the war office.

Justice.—There are four judicial systems in Egypt: two applicable to Egyptian subjects only, one applicable to foreigners only, and one applicable to foreigners and, to a certain extent, natives also. This multiplicity of tribunals arises from the fact that, owing to the Capitulations, which apply to Egypt as part of the Turkish empire, foreigners are almost entirely exempt from the jurisdiction of the native courts. It will be convenient to state first the law as regards foreigners, and secondly the law which concerns Egyptians. Criminal jurisdiction over foreigners is exercised by the consuls of the fifteen powers possessing such right by treaty, according to the law of the country of the offender. These consular courts also judge civil cases between foreigners of the same nationality.

Jurisdiction in civil matters between natives and foreigners and between foreigners of different nationalities is no longer exercised by the consular courts. The grave abuse to which the consular system was subject led to the establishment, in February 1876, at the instance of Nubar Pasha and after eight years of negotiation, of International or "Mixed" Tribunals to supersede consular jurisdiction to the extent indicated. The Mixed Tribunals employ a code based on the *Code Napoléon* with such additions from Mahommedan law as are applicable. There are three tribunals of first instance, and an appeal court at Alexandria. These courts have both foreign and Egyptian judges—the foreign judges forming the majority of the bench. In certain designated matters they enjoy criminal jurisdiction, including, since 1900, offences against the bankruptcy laws. Cases have to be conducted in Arabic, French, Italian and English, English having been admitted as a "judicial language" by khedivial decree of the 17th of April 1905. Besides their judicial duties, the courts practically exercise legislative functions, as no important law can be made applicable to Europeans without the consent of the powers, and the powers are mainly guided by the opinions of the judges of the Mixed Courts.

The judicial systems applicable solely to Egyptians are supervised by the ministry of justice, to which has been attached since 1890 a British judicial adviser. Two systems of laws are administered:—(1) the *Mekkemehs*, (2) the Native Tribunals. The *mehkemehs*, or courts of the cadis, judge in all matters of personal status, such as marriage, inheritance and guardianship, and are guided in their decisions by the code of laws founded on the Koran. The grand cadi, who must belong to the sect of the *Hanifis*, sits at Cairo, and is aided by a council of *Ulema* or learned men. This council consists of the sheikh or religious chief of each of the four orthodox sects, the sheikh of the mosque of Azhar, who is of the sect of the *Shafi'is*, the chief (*nakib*) of the *Sherifs*, or descendants of Mahomet, and others. The cadis are chosen from among the students at the Azhar university. (In the same manner, in matters of personal law, Copts and other non-Moslem Egyptians are, in general, subject to the jurisdiction of their own religious chiefs.)

For other than the purposes indicated, the native judicial system, both civil and criminal, was superseded in 1884 by tribunals administering a jurisprudence modelled on that of the French code. It is, in the words of Lord Cromer, "in many respects ill adapted to meet the special needs of the country" (*Egypt*, No. 1, 1904, p. 33). The system was, on the advice of an Anglo-Indian official (Sir John Scott), modified and simplified in 1891, but its essential character remained unaltered. In 1904, however, more important modifications were introduced. Save on points of law, the right of appeal in criminal cases was abolished, and assize courts, whose judgments were final, established. At the same time the penal code was thoroughly revised, so that the Egyptian judges were "for the first time provided with a sound working code" (*Ibid.* p. 49). The native courts have both native and foreign judges. There are courts of summary jurisdiction presided over by one judge, central tribunals (or courts of first instance) with three judges, and a court of appeal at Cairo. A committee of judicial surveillance watches the working of the courts of first instance and the summary courts, and endeavours, by letters and discussions, to maintain purity and sound law. There is a *procureur-général*, who, with other duties, is entrusted with criminal prosecutions. His representatives are attached to each tribunal, and form the *parquet* under whose orders the police act in bringing criminals to justice. In the *markaz* (district) tribunals, created in 1904 and presided over by magistrates with jurisdiction in cases of misdemeanour, the prosecution is, however, conducted directly by the police. Special Children's Courts have been established for the trial of juvenile offenders.

The police service, which has been subject to frequent modification, was in 1895 put under the orders of the ministry of the interior, to which a British adviser and British inspectors are attached. The provincial police is under the direction of the local authorities, the *mudirs* or governors of provinces, and the *mamurs* or district officials; to the *omdas*, or village head-men, who are responsible for the good order of the villages, a limited criminal jurisdiction has been entrusted.

Religion.—The great majority of the inhabitants are Mahommedans. In 1907 the Moslems numbered over ten millions, or 91·8% of the entire population. The Christians in the same year numbered 880,000, or 8% of the population. Of these the Coptic Orthodox church had some 667,000 adherents. Among other churches represented were the Greek Orthodox, the Armenian, Syrian and Maronite, the Roman Catholic and various Protestant bodies. The last-named numbered 37,000 (including 24,000 Copts). There were in 1907 over 38,000 Jews in Egypt.

The Mahommedans are Sunnites, professing the creed commonly termed "orthodox," and are principally of the persuasion of the *Shafi'is*, whose celebrated founder, the imam ash-Shafi'i, is buried in the great southern cemetery of Cairo. Many of them are, however, *Hanifis* (to which persuasion the Turks chiefly belong), and in parts of Lower, and almost universally in Upper, Egypt, *Mālikis*. Among the Moslems the *Sheikh-el-Islam*, appointed by the khedive from among the *Ulema* (learned class), exercises the highest religious and, in certain subjects, judicial authority. There is also a grand cadi, nominated by the sultan of Turkey from among the *Ulema* of Stamboul. Valuable property is held by the Moslems in trust for the promotion of religion and for charitable purposes, and is known as the Wakfs administration. The revenue derived is over £250,000 yearly.

The Coptic organization includes in Egypt three metropolitans and twelve bishops, under the headship of the patriarch of Alexandria. The minor orders are arch-priests, priests, archdeacons, deacons, readers and monks (see COPTS: *Coptic Church*).

Education.—Two different systems of education exist, one founded on native lines, the other European in character. Both systems are more or less fully controlled by the ministry of public instruction. The government has primary, secondary and technical schools, training colleges for teachers, and schools of agriculture, engineering, law, medicine and veterinary science. The government system, which dates back to a period before the British occupation, is designed to provide, in the main, a European education. In the primary schools Arabic is the medium of instruction, the use of English for that purpose being confined to lessons in that language itself. The school of law is divided into English and French sections according to the language in which the students study law. Besides the government primary and secondary schools, there are many other schools in the large towns owned by the Moslems, Copts, Hebrews, and by various missionary societies, and in which the education is on the same lines. A movement initiated among the leading Moslems led in 1908 to the establishment as a private enterprise of a national Egyptian university devoted to scientific, literary and philosophical studies. Political and religious subjects are excluded from the curriculum and no discrimination in regard to race or religion is allowed.

Education on native lines is given in *kuttabs* and in the Azhar university in Cairo. *Kuttabs* are schools attached to mosques, found in every village and in every quarter of the larger towns. In these schools the instruction given before the British occupation was very slight. All pupils were taught to recite portions of the Koran, and a proportion of the scholars learnt to read and write Arabic and a little simple arithmetic. Those pupils who succeeded in committing to memory the whole of the Koran were regarded as *fiki* (learned in Mahommedan law), and as such escaped liability to military conscription. The government has improved the education given in the *kuttabs*, and numbers of them have been taken under the direct control of the ministry of public instruction. In these latter schools an excellent elementary secular education is given, in addition to the instruction in the Koran, to which half the school hours are devoted. The number of pupils in 1905 was over 12,000 boys and 2000 girls. Grants-in-aid are given to other schools where a sufficiently good standard of instruction is maintained. No grant is made to any *kuttab* where any language other than Arabic is taught. In all there are over 10,000 kuttabs, attended by some 250,000 scholars. The number of pupils in private schools under government inspection was in 1898, the first year of the grant-in-aid system, 7536; in 1900, 12,315; in 1905, 145,691. The number of girls in attendance rose from 598 in 1898 to 997 in 1900 and 9611 in 1905. The Copts have about 1000 primary schools, in which the teaching of Coptic is compulsory, a few industrial schools, and one college for higher instruction.

Cairo holds a prominent place as a seat of Moslem learning, and its university, the Azhar, is considered the first of the eastern world. Its professors teach "grammatical inflexion and syntax, rhetoric, versification, logic, theology, the exposition of the Koran, the traditions of the Prophet, the complete science of jurisprudence, or rather of religious, moral, civil and criminal law, which is chiefly founded on the Koran and the traditions, together with arithmetic as far as it is useful in matters of law. Lectures are also given on algebra and on the calculations of the Mahommedan calendar, the times of prayer, &c." (E. W. Lane, *Modern Egyptians*). The students come from all parts of the Mahommedan world. They number about 8000, of whom some 2000 are resident. The students pay no fees, and the professors receive no salaries. The latter maintain themselves by private teaching and by copying manuscripts, and the former in the same manner, or by reciting the Koran. To meet the demand for better qualified judges for the Moslem courts a training college for cadis was established in 1907. Besides the subjects taught at the Azhar university, instruction is given in literature, mathematics and physical science. The necessity for a reorganization of the Azhar system itself being also recognized by the high Moslem dignitaries in Egypt, a law was passed in 1907 creating a superior board of control under the presidency of the Sheikh el-Azhar to supervise the proceedings of the university and other similar establishments. This attempt to reform the Azhar met, however, with so much opposition that in 1909 it was, for the time, abandoned.

In 1907, of the sedentary Egyptian population over seven years of age, some 12% of the Moslems could read and write, female literacy having increased 50% since 1897; of the foreign population over seven years of age 75% could read and write. Of the Coptic community about 50% can read and write.

Literature and the Press.—Since the British occupation there has been a marked renaissance of Arabic learning and literature in Egypt. Societies formed for the encouragement of Arabic literature have brought to light important texts bearing on Mahommedan history, antiquities and religion. Numbers of magazines and reviews are published in Arabic which cater both for the needs of the moment and the advancement of learning. Side by side with these literary organs there exists a vernacular press largely devoted to nationalist propaganda. Prominent among these papers is *Al Lewa* (*The Standard*), founded in 1900. Other papers of a similar character are *Al Omma*, *Al Moayad* and *Al Gerida*. The *Mokattam* represents the views of the more enlightened and conservative section of the native population. In Cairo and Alexandria there are also published several newspapers in English and French.

AUTHORITIES.—(*a*) General descriptions, geography, travel, &c.: *Description de l'Égypte*, 10 folio vols. and atlas of 10 vols. (Paris, 1809–1822), compiled by the scientific commission sent to Egypt by Bonaparte; Clot Bey, *Aperçu général sur l'Égypte*, 2 vols. (Paris, 1840); Boinet Bey, *Dictionnaire géographique de l'Égypte* (Cairo, 1899); Murray's and Baedeker's handbooks and *Guide Joanne*; G. Ebers, *Egypt, Descriptive, Historical and Picturesque*, translated from the German edition of 1879 by Clara Bell, new edition, 2 vols. (London, 1887); Sir Gardiner Wilkinson, *Modern Egypt and Thebes* (2 vols., London, 1843); Lady Duff Gordon, *Letters from Egypt*, complete edition (London, 1902), an invaluable account of social conditions in the period 1862–1869; A. B. Edwards, *A Thousand Miles up the Nile* (2nd edition, London, n.d. [1889]); *Pharaohs, Fellahs and Explorers* (London, 1892); H. W. Mardon, *Geography of Egypt* . . . (London, 1902), an excellent elementary text-book; D. G. Hogarth, *The Nearer East* (London, 1902), contains brief but suggestive chapters on Egypt; S. Lane Poole, *Egypt* (London, 1881); A. B. de Guerville, *New Egypt*, translated from the French (London, 1905); R. T. Kelly, *Egypt Painted and Described* (London, 1902). The best maps are those of the Survey Department, Cairo, on the scale of 1 : 50000 (1·3 in. to the mile).

(*b*) Administration: Sir John Bowring's *Report on Egypt* . . . to Lord Palmerston (London, 1840) shows the system obtaining at that period. For the study of the state of Egypt at the time of the British occupation, 1882, and the development of the country since, the most valuable documents[1] are:

I. *Official.*—The *Reports on the Finances, Administration and Condition of Egypt*, issued yearly since 1892 (the reports 1888–1891 were exclusively financial). Up to 1906 the reports were by Lord Cromer (Sir Evelyn Baring). They clearly picture the progress of the country. The following reports are specially valuable as exhibiting the difficulties which at the outset confronted the British administrators:—*Correspondence respecting the Reorganisation of Egypt* (1883); *Reports by Mr Villiers Stuart respecting Reorganization of Egypt* (1883 and 1895); *Despatch from Lord Dufferin forwarding the Decree constituting the New Political Institutions of Egypt* (1883); *Reports on the State of Egypt and the Progress of Administrative Reforms* (1885); *Reports by Sir H. D. Wolff on the Administration of Egypt* (1887). Annual returns are published in Cairo in English or French by the various ministries, and British consular reports on the trade of Egypt and of Alexandria and of the tonnage and shipping of the Suez Canal are also issued yearly.

II. *Non-official.*—Lord Cromer, *Modern Egypt* (2 vols., 1908), an authoritative record; Alfred (Lord) Milner, *England in Egypt*, first published in 1892, the story being brought up to 1904 in the 11th edition; Sir A. Colvin, *The Making of Modern Egypt* (1906); J. Ward, *Pyramids and Progress* (1900); A. S. White, *The Expansion of Egypt* (1899); and F. W. Fuller, *Egypt and the Hinterland* (1901). See also the works cited in *History*, last section.

(*c*) Law: H. Lamba, *De l'évolution de la condition juridique des Européens en Égypte* (Paris, 1896); J. H. Scott, *The Law affecting Foreigners in Egypt* . . . (Edinburgh, 1907); *The Egyptian Codes* (London, 1892).

(*d*) Irrigation, agriculture, geology, &c.: *Despatch from Sir Evelyn Baring enclosing Report on the Condition of the Agricultural Population in Egypt* (1888); *Notes on Egyptian Crops* (Cairo, 1896); Yacub Artin Bey, *La Propriété foncière en Égypte* (Bulak, 1885); *Report on Perennial Irrigation and Flood Protection for Egypt*, 1 vol. and atlas (Cairo, 1894). The reports (*Egypt*, No. 2, 1901, and *Egypt*, No. 2, 1904), by Sir William Garstin on irrigation projects on the Upper Nile are very valuable records—notably the 1904 report. W. Willcocks, *Egyptian Irrigation* (2nd ed., 1899); H. G. Lyons, *The Physiography of the River Nile and its Basin* (Cairo, 1906); Leigh Canney, *The Meteorology of Egypt and its Influence on Disease* (1897). Annual meteorological reports are issued by the Public Works Department, Cairo. The same department issues special irrigation reports. See for geology Carl von Zittel, *Beiträge zur Geologie und Paläontologie der libyschen Wüste* (Cassel, 1883); *Reports of the Geological Survey of Egypt* (Cairo, 1900, et seq.).

(*e*) Natural history, anthropology, &c.: F. Pruner, *Ägyptens Naturgeschichte und Anthropologie* (Erlangen, 1848); R. Hartmann, *Naturgeschichtliche Skizze der Nilländer* (Berlin, 1866); Captain G. E. Shelley, *Birds of Egypt* (London, 1872). (F. R. C.)

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[1] The place of publication is London unless otherwise stated.

Inhabitants.

The population enumerated at the census taken in April 1907 was 11,189,978. In these figures nomad Arabs or Bedouins, estimated to number 97,381, are not included. The total population was thus returned at 11,287,359, or some 16% more than in 1897 when the inhabitants numbered 9,734,405. The figures for 1897 compared with 6,813,919 in 1882, an increase of 43.5% in fifteen years. Thus, during the first twenty-five years of the British occupation of the country the population increased by nearly 4,500,000. In 1800 the French estimated the population at no more than 2,460,000; the census of 1846 gave the figures at 4,476,440. From that year to 1882 the average annual increase was 1.25%. If the desert regions be excluded, the population of Egypt is extremely dense, being about 939 per sq. m. This figure may be compared with that of Belgium, the most densely populated country in Europe, 589 per sq. m., and with that of Bengal, 586 per sq. m. In parts of Menufia, a Delta province, the density rises to 1352 per sq. m., and in the Kena province of Upper Egypt to 1308.

The population is generally divisible into—

1. The fellahin or peasantry and the native townsmen.
2. The Bedouins or nomad Arabs of the desert.
3. The Nuba, Nubians or Berberin, inhabitants of the Nile valley between Assuan and Dongola.
4. Foreigners.

The first of these divisions includes both the Moslem and Coptic inhabitants. The Bedouins, or the Arabs of the desert, are of two different classes: first, Arabic-speaking tribes who range the deserts as far south as 26° N.; secondly, the tribes inhabiting the desert from Kosseir to Suakin, namely the Hadendoa, Bisharin and the Ababda tribes. This group speak a language of their own, and are probably descendants of the Blemmyes, who occupied these parts in ancient times (see ARABS; BEDOUINS; HADENDOA; BISHĀRIN; &c.). The Nubas are of mixed negro and Arab blood. They are mainly agriculturists, though some are keen traders (see NUBIA).

Foreigners number over 150,000 and form 1½% of the total population. They are chiefly Greeks—of whom the majority live in Alexandria—Italians, British and French. Syrians and Levantines are numerous, and there is a colony of Persians. The Turkish element is not numerically strong—a few thousands only—but holds a high social position.

Of the total population, about 20% is urban. In addition to the 97,000 pure nomads, there are half a million Bedouins described as "semi-sedentaries," *i.e.* tent-dwelling Arabs, usually encamped in those parts of the desert adjoining the cultivated land. The rural classes are mainly engaged in agriculture, which occupies over 62% of the adults. The professional and trading classes form about 10% of the whole population, but 50% of the foreigners are engaged in trade. Of the total population the males exceed the females by some 46,000.

Physical characteristics of the Egyptians.

The Coptic inhabitants are described in the article COPTS, and the rural population under FELLAH. It remains here to describe characteristics and customs common to the Moslem Egyptians and particularly to those of the cities. In some respects the manner of life of the natives has been modified by contact with Europeans, and what follows depicts in general the habits of the people where little affected by western culture. With regard to physical characteristics the Egyptians are of full average height (the men are mostly 5 ft. 8 in. or 5 ft. 9 in.), and both sexes are remarkably well proportioned and of strong physique. The Cairenes and the inhabitants of Lower Egypt generally have a clear complexion and soft skin of a light yellowish colour; those of Middle Egypt have a tawny skin, and the dwellers in Upper Egypt a deep bronze or brown complexion. The face of the men is of a fine oval, forehead prominent but seldom high, straight nose, eyes deep set, black and brilliant, mouth well formed, but with rather full lips, regular teeth beautifully made, and beard usually black and curly but scanty. Moustaches are worn, while the head is shaved save for a small tuft (called *shusheh*) upon the crown. As to the women, "from the age of about fourteen to that of eighteen or twenty, they are generally models of beauty in body and limbs; and in countenance most of them are pleasing, and many exceedingly lovely; but soon after they have attained their perfect growth, they rapidly decline." There are few Egyptian women over forty who retain either good looks or good figures. "The forms of womanhood begin to develop themselves about the ninth and tenth year: at the age of fifteen or sixteen they generally attain their highest degree of perfection. With regard to their complexions, the same remarks apply to them as to the men, with only this difference, that their faces, being generally veiled when they go abroad, are not quite so much tanned as those of the men. They are characterized, like the men, by a fine oval countenance, though in some instances it is rather broad. The eyes, with very few exceptions, are black, large and of a long almond-form, with long and beautiful lashes, and an exquisitely soft, bewitching expression—eyes more beautiful can hardly be conceived: their charming effect is much heightened by the concealment of the other features (however pleasing the latter may be), and is rendered still more striking by a practice universal among the females of the higher and middle classes, and very common among those of the lower orders, which is that of blackening the edge of the eyelids both above and below the eye, with a black powder called 'kohl'" (Lane, *Modern Egyptians*). Both sexes, but especially the women, tattoo several parts of the person, and the women stain their hands and feet with the red dye of the henna.

Dress and social life.

The dress of the men of the upper and middle classes who have not adopted European clothing—a practice increasingly common—consists of cotton drawers, and a cotton or silk shirt with very wide sleeves. Above these are generally worn a waistcoat without sleeves, and a long vest of silk, called kaftan, which has hanging sleeves, and reaches nearly to the ankles. The kaftan is confined by the girdle, which is a silk scarf, or cashmere or other woollen shawl. Over all is worn a long cloth robe, the gibbeh (or jibbeh) somewhat resembling the kaftan in shape, but having shorter sleeves, and being open in front. The dress of the lower orders is the shirt and drawers, and waistcoat, with an outer shirt of blue cotton or brown woollen stuff; some wear a kaftan. The head-dress is the red cloth fez or tarbush round which a turban is usually worn. Men who have otherwise adopted European costume retain the tarbush. Many professions and religions, &c., are distinguished by the shape and colour of the turban, and various classes, and particularly servants, are marked by the form and colour of their shoes; but the poor go usually barefoot. Many ladies of the upper classes now dress in European style, with certain modifications, such as the head-veil. Those who retain native costume wear a very full pair of silk trousers, bright coloured stockings (usually pink), and a close-fitting vest with hanging sleeves and skirts, open down the front and at the sides, and long enough to turn up and fasten into the girdle, which is generally a cashmere shawl; a cloth jacket, richly embroidered with gold, and having short sleeves, is commonly worn over the vest. The hair in front is combed down over the forehead and cut across in a straight line; behind it is divided into very many small plaits, which hang down the back, and are lengthened by silken cords, and often adorned with gold coins and ornaments. A small tarbush is worn on the back of the head, sometimes having a plate of gold fixed on the crown, and a handkerchief is tastefully bound round the temples. The women of the lower orders have trousers of printed or dyed cotton, and a close waistcoat. All wear the long and elegant head-veil. This is a simple "breadth" of muslin, which passes over the head and hangs down behind, one side, being drawn forward over the face in the presence of a man. A lady's veil is of white muslin, embroidered at the ends in gold and colours; that of a person of the lower class is simply dyed blue. In going abroad the ladies wear above their indoor dress a loose robe of coloured silk without sleeves, and nearly open at the sides, and above it a large enveloping piece of black silk, which is brought over the head, and gathered round the person by the arms and hands on each side. A face-veil entirely conceals the features, except the eyes; it is a long and narrow piece of thick white muslin, reaching to a little below the knees. The women of the lower orders have the same out-door dress of different materials and colour. Ladies use slippers of yellow morocco, and abroad, inner boots of the same material, above which they wear, in either case, thick shoes, having only toes. The poor wear red shoes, very like those of the men. The women, especially in Upper Egypt, not infrequently wear nose-rings.

Children, though often neglected, are not unkindly treated, and reverence for their parents and the aged is early inculcated. They are also well grounded in the leading doctrines of Islam. Boys are circumcised at the age of five or six years, when the boy is paraded, generally with a bridal procession, on a gaily caparisoned horse and dressed in woman's clothes. Most parents send their boys to school where a knowledge of reading and writing Arabic—the common tongue of the Egyptians—is obtainable, and from the closing years of the 19th century a great desire for the education of girls has arisen (see § *Education*).

It is deemed disreputable for a young man not to marry when he has attained a sufficient age; there are, therefore, few unmarried men. Girls, in like manner, marry very young, some at ten years of age, and few remain single beyond the age of sixteen; they are generally very prolific. The bridegroom never sees his future wife before the wedding night, a custom rendered more tolerable than it otherwise might be by the facility of divorce. A dowry is always given, and a simple marriage ceremony performed by a *fiki* (a schoolmaster, or one who recites the Koran, properly one learned in *fiqh*, Mahommedan law) in the presence of two witnesses. The bridal of a virgin is attended with great festivity and rejoicing, a grandee's wedding sometimes continuing eleven days and nights. On the last day, which should be that terminating with the eve of Friday, or of Monday, the bride is taken in procession to the bridegroom's house, accompanied by her female friends, and a band of musicians, jugglers, wrestlers, &c. As before stated, a boy about to be circumcised joins in such a procession, or, frequently, a succession of such boys. Though allowed by his religion four wives, most Egyptians are monogamists. A man may, however, possess any number of concubines, who, though objects of jealousy to the legal wife, are tolerated by her in consideration of her superior position and power over them, a power which she often uses with great tyranny; but certain privileges are possessed by concubines, especially if they have borne sons to their master. A divorce is rendered obligatory by the simple words "Thou art divorced." Repudiation may take place twice without being final, but if the husband repeats thrice "Thou art divorced" the separation is absolute. In that case the dowry must be returned to the wife.

Elaborate ceremonies are observed at funerals. Immediately on death the corpse is turned towards Mecca, and the women of the household, assisted by hired mourners, commence their peculiar wailing, while fikis recite portions of the Koran. The funeral takes place on the day of the death, if that happen in the morning; otherwise on the next day. The corpse, having been washed and shrouded, is placed in an open bier, covered with a cashmere shawl, in the case of a man; or in a closed bier, having a post in front, on which are placed feminine ornaments, in that of a woman or child. The funeral procession is headed by a number of poor, and generally blind, men, chanting the profession of the faith, followed by male friends of the deceased, and a party of schoolboys, also chanting, generally from a poem descriptive of the state of the soul after death. Then follows the bier, borne on the shoulders of friends, who are relieved by the passers-by, such an act being deemed highly meritorious. Behind come the women relatives and the hired wailers. On the way to the cemetery the corpse is generally carried to some revered mosque. Here the funeral service is performed by the imam, and the procession then proceeds to the tomb. In the burials of the rich, water and bread are distributed to the poor at the grave; and sometimes a buffalo or several buffaloes are slaughtered there, and the flesh given away. The tomb is a vault, surmounted by an oblong stone monument, with a stele at the head and feet; and a cupola, supported by four walls, covers the whole in the case of sheikhs' tombs and those of the wealthy. During the night following the interment, called the Night of Desolation, or that of Solitude, the soul being believed to remain with the body that one night, fikis are engaged at the house of the deceased to recite various portions of the Koran, and, commonly, to repeat the first clause of the profession of the faith, "There is no God but God," three thousand times. The women alone put on mourning attire, by dyeing their veils, shirts, &c., dark blue, with indigo; and they stain their hands, and smear the walls, with the same colour. Everything in the house is also turned upside down. The latter customs are not, however, observed on the death of an old man. At certain periods after the burial, a khatmeh, or recitation of the whole of the Koran, is performed, and the tomb is visited by the women relations and friends of the deceased. The women of the peasants of Upper Egypt perform strange dances, &c., at funerals, which are regarded partly as relics of ancient Egyptian customs.

The harem system of appointing separate apartments to the women, and secluding them from the gaze of men, is observed in Egypt as in other Moslem countries, but less strictly. The women of an Egyptian household in which old customs are maintained never sit in the presence of the master, but attend him at his meals, and are treated in every respect as inferiors. The mother, however, forms a remarkable exception to this rule; in rare instances, also, a wife becomes a companion to her husband. On the other hand, if a pair of women's shoes are placed outside the door of the harem apartments, they are understood to signify that female visitors are within, and a man is sometimes thus excluded from the upper portion of his own house for many days. Ladies of the upper or middle classes lead a life of extreme inactivity, spending their time at the bath, which is the general place of gossip, or in receiving visits, embroidering, and the like, and in absolute *dolce far niente*. Both sexes are given to licentiousness.

The principal meals are breakfast, about an hour after sunrise; dinner, or the mid-day meal, at noon; and supper, which is the chief meal of the day, a little after sunset. Pastry, sweetmeats and fruit are highly esteemed. Coffee is taken at all hours, and is, with a pipe, presented at least once to each guest. Tobacco is the great luxury of the men of all classes in Egypt, who begin and end the day with it, and generally smoke all day with little intermission. Many women, also, especially among the rich, adopt the habit. The smoking of hashish, though illegal, is indulged in by considerable numbers of people. Men who can afford to keep a horse, mule or ass are very seldom seen to walk. Ladies ride asses and sit astride. The poorer classes cannot fully observe the harem system, but the women are in general carefully veiled. Some of them keep small shops, and all fetch water, make fuel, and cook for their households. Domestic slavery lingers but is moribund. The majority of the slaves are negresses employed in household duties.

In social intercourse the Egyptians observe many forms of salutation and much etiquette; they are very affable, and readily enter into conversation with strangers. Their courtesy and dignity of manner are very striking, and are combined with ease and a fluency of discourse. They have a remarkable quickness of apprehension, a ready wit, a retentive memory, combined, however, with religious pride and hypocrisy, and a disregard for the truth. Their common discourse is full of asseverations and expressions respecting sacred things. They entertain reverence for their Prophet; and the Koran is treated with the utmost respect—never, for example, being placed in a low situation—and this is the case with everything they esteem holy. They are fatalists, and bear calamities with surprising resignation. Their filial piety and respect for the aged have been mentioned, and benevolence and charity are conspicuous in their character. Humanity to animals is another virtue, and cruelty is openly discountenanced in the streets. Their affability, cheerfulness and hospitality are remarkable, as well as frugality and temperance in food and drink, and honesty in the payment of debt. Their cupidity is mitigated by generosity; their natural indolence by the necessity, especially among the peasantry, to work hard to gain a livelihood. Egyptians, however, are as a rule suspicious of all not of their own creed and country. Murders and other grave crimes are rare, but petty larcenies are very common.

The amusements of the people are generally not of a violent kind, being in keeping with their sedentary habits and the heat of the climate. The bath is a favourite resort of both sexes and all classes. They are acquainted with chess, draughts, backgammon, and other games, among which is one peculiar to themselves, called Mankalah, and played with cowries. Notwithstanding its condemnation by Mahomet, music is the most favourite recreation of the people; the songs of the boatmen, the religious chants, and the cries in the streets are all musical. There are male and female musical performers; the former are both instrumental and vocal, the latter (called *‘Almeh*, pl. *‘Awālim*) generally vocal. The ‘Awālim are, as their name ("learned") implies, generally accomplished women, and should not be confounded with the Ghawāzi, or dancing-girls. There are many kinds of musical instruments. The music, vocal and instrumental, is generally of little compass, and in the minor key; it is therefore plaintive, and strikes a European ear as somewhat monotonous, though often possessing a simple beauty, and the charm of antiquity, for there is little doubt that the favourite airs have been handed down from remote ages. The Ghawāzi (sing. Ghāzia) form a separate class, very similar to the gipsies. They intermarry among themselves only, and their women are professional dancers. Their performances are often objectionable and are so regarded by many Egyptians. They dance in public, at fairs and religious festivals, and at private festivities, but, it is said, not in respectable houses. Mehemet Ali banished them to Esna, in Upper Egypt; and the few that remained in Cairo called themselves ‘Awālim, to avoid punishment. Many of the dancing-girls of Cairo to-day are neither ‘Awālim nor Ghawāzi, but women of the very lowest class whose performances are both ungraceful and indecent. A most objectionable class of male dancers also exists, who imitate the dances of the Ghawāzi, and dress in a kind of nondescript female attire. Not the least curious of the public performances are those of the serpent-charmers, who are generally Rifā‘ia (Saadia) dervishes. Their power over serpents has been doubted, yet their performances remain unexplained; they, however, always extract the fangs of venomous serpents. Jugglers, rope-dancers and farce-players must also be mentioned. In the principal coffee-shops of Cairo are to be found reciters of romances, surrounded by interested audiences.

Public festivals.

The periodical public festivals are exceedingly interesting, but many of the remarkable observances connected with them are passing away. The first ten days of the Mahommedan year are held to be blessed, and especially the tenth; and many curious practices are observed on these days, particularly by the women. The tenth day, being the anniversary of the martyrdom of Hosain, the son of Ali and grandson of the Prophet, the mosque of the Hasanēn at Cairo is thronged to excess, mostly by women. In the evening a procession goes to the mosque, the principal figure being a white horse with white trappings, upon which is seated a small boy, the horse and the lad, who represents Hosain, being smeared with blood. From the mosque the procession goes to a private house, where a mullah recites the story of the martyrdom. Following the order of the lunar year, the next festival is that of the Return of the Pilgrims, which is the occasion of great rejoicing, many having friends or relatives in the caravan. The Mahmal, a kind of covered litter, first originated by Queen Sheger-ed-Dur, is brought into the city in procession, though not with as much pomp as when it leaves with the pilgrims. These and other processions have lost much of their effect since the extinction of the Mamelukes, and the gradual disuse of gorgeous dress for the retainers of the officers of state. A regiment of regular infantry makes but a sorry substitute for the splendid cavalcade of former times. The Birth of the Prophet (Molid en-Nebi), which is celebrated in the beginning of the third month, is the greatest festival of the whole year. For nine days and nights Cairo has more the aspect of a fair than of a city keeping a religious festival. The chief ceremonies take place in some large open spot round which are erected the tents of the khedive, of great state officials, and of the dervishes. Next in time, and also in importance, is the Molid El-Hasanēn, commemorative of the birth of Hosain, and lasting fifteen days and nights; and at the same time is kept the Molid of al-Sâlih Ayyûb, the last sovereign but two of the Ayyubite dynasty. In the seventh month occur the Molid of the sayyida Zenab, and the commemoration of the Miarâg, or the Prophet's miraculous journey to heaven. Early in the eighth month (Sha'bân), the Molid of the imam Shâfi'i is observed; and the night of the middle of that month has its peculiar customs, being held by the Moslems to be that on which the fate of all living is decided for the ensuing year. Then follows Ramadân, the month of abstinence, a severe trial to the faithful; and the Lesser Festival (Al-'id aṣ-ṣaghir), which commences Shawwâl, is hailed by them with delight. A few days after, the Kiswa, or new covering for the Ka'ba at Mecca, is taken in procession from the citadel, where it is always manufactured, to the mosque of the Hasanên to be completed; and, later, the caravan of pilgrims departs, when the grand procession of the Mahmal takes place. On the tenth day of the last month of the year the Great Festival (Al-'id al-kabir), or that of the Sacrifice (commemorating the willingness of Ibrahim to slay his son Ismail—according to the Arab legend), closes the calendar. The Lesser and Great Festivals are those known in Turkish as the Bairam (*q.v.*).

The rise of the Nile is naturally the occasion of annual customs, some of which are doubtless relics of antiquity: these are observed according to the Coptic calendar. The commencement of the rise is commemorated on the night of the 11th of Baûna, the 17th of June, called that of the Drop (Lelet-en-Nukta), because a miraculous drop is then supposed to fall and cause the swelling of the river. The real rise begins at Cairo about the summer solstice, or a few days later, and early in July a crier in each district of the city begins to go his daily rounds, announcing, in a quaint chant, the increase of water in the nilometer of the island of Rôda. When the river has risen 20 or 21 ft., he proclaims the Wefâ en-Nil, "Completion" or "Abundance of the Nile." On the following day the dam which closed the canal of Cairo was cut with much ceremony. The canal having been filled up in 1897 the ceremony has been much modified, but a brief description of what used to take place may be given. A pillar of earth before the dam is called the "Bride of the Nile," and Arab historians relate that this was substituted, at the Moslem conquest, for a virgin whom it was the custom annually to sacrifice, to ensure a plentiful inundation. A large boat, gaily decked out, representing that in which the victim used to be conveyed, was anchored near, and a gun on board fired every quarter of an hour during the night. Rockets and other fireworks were also let off, but the best, strangely, after daybreak. The governor of Cairo attended the ceremony, with the cadi and others, and gave the signal for the cutting of the dam. As soon as sufficient water had entered, boats ascended the canal to the city. The crier continues his daily rounds, with his former chant, excepting on the Coptic New Year's Day, when the cry of the Wefâ is repeated, until the Salib, or Discovery of the Cross, the 26th or 27th of September, at which period, the river having attained its greatest height, he concludes his annual employment with another chant, and presents to each house some limes and other fruit, and dry lumps of Nile mud.

The period of the hot winds, called the khamsin, that is, "the fifties," is calculated from the day after the Coptic Easter, and terminates on the day of Pentecost, and the Moslems observe the Wednesday preceding this period, called "Job's Wednesday," as well as its first day, when many go into the country from Cairo, "to smell the air." This day is hence called Shem en-Nesim, or "the smelling of the zephyr." The Ulema observe the same custom on the first three days of the spring quarter.

Tombs of saints abound, one or more being found in every town and village; and no traveller up the Nile can fail to remark how every prominent hill has the sepulchre of its patron saint. The great saints of Egypt are the imam Ash-Shâfi'i, founder of the persuasion called after him, the sayyid Aḥmad al-Baidâwi, and the sayyid Ibrâhim Ed-Desûki, both of whom were founders of orders of dervishes. Al-Baidâwi, who lived in the 13th century A.D., is buried at the town of Tanta, in the Delta, and his tomb attracts many thousands of visitors at each of the three festivals held yearly in his honour; Ed-Desûki is also much revered, and his festivals draw together, in like manner, great crowds to his birthplace, the town of Desûk. But, besides the graves of her native saints, Egypt boasts of those of several members of the Prophet's family, the tomb of the sayyida Zeyneb, daughter of 'Ali, that of the sayyida Sekeina, daughter of Hosain, and that of the sayyida Nefisa, great-granddaughter of Hasan, all of which are held in high veneration. The mosque of the Hasanên (or that of the "two Hasans") is the most reverenced shrine in the country, and is believed to contain the head of Hosain. Many orders of Dervishes live in Egypt, the following being the most celebrated:—(1) the Rifâ'ia, and their sects the 'Ilwânia and Saadia; (2) the Qâdiria (Kâhiria), or howling dervishes; (3) the Ahmedia, or followers of the sayyid Aḥmad al-Baidâwi, and their sects the Beyûmia (known by their long hair), Shinnawia, Sharawia and many others; and (4) the Barâmia, or followers of the sayyid Ibrâhim Ed-Desûki. These are all presided over by a direct descendant of the caliph Abu Bekr, called the Sheikh El-Bekri. The Saadia are famous for charming and eating live serpents, &c., and the 'Ilwânia for eating fire, glass, &c. The Egyptians firmly believe in the efficacy of charms, a belief associated with that in an omnipresent and over-ruling providence. Thus the doors of houses are inscribed with sentences from the Koran, or the like, to preserve from the evil eye, or avert the dangers of an unlucky threshold; similar inscriptions may be observed over most shops, while almost every one carries some charm about his person. The so-called sciences of magic, astrology and alchemy still flourish.

AUTHORITIES.—The standard authority for the Moslem Egyptians is E. W. Lane's *Manners and Customs of the Modern Egyptians*, first published in 1836. The best edition is that of 1860, edited, with additions, by E. S. Poole. See also B. Saint-John, *Village Life in Egypt* (2 vols., 1852); S. Lane Poole, *Social Life in Egypt* (1884); P. Arminjon, *L'Enseignement, la doctrine, et la vie dans les universités musulmanes d'Égypte* (Paris, 1907). For the language see J. S. Willmore, *The Spoken Arabic of Egypt* (2nd ed., London, 1905); Spitta Bey, *Grammatik des arabischen Vulgardialektes von Ägypten*, *Contes arabes modernes* (Leiden, 1883). For statistical information consult the reports on the censuses of 1897 and 1907, published by the Ministry of the Interior, Cairo, in 1898 and 1909.

(E. S. P.; S. L.-P.; F. R. C.)

Finance.

The important part which the financial arrangements have played in the political and social history of Egypt since the accession of Ismail Pasha in 1863 is shown in the section *History* of this article. Here it is proposed to trace the steps by which Egypt, after having been brought to a state of bankruptcy, passed through a period of great stress, and finally attained prosperity and a large measure of financial autonomy.

In 1862 the foreign debt of Egypt stood at £3,292,000. With the accession of Ismail (*q.v.*) there followed a period of wild extravagance and reckless borrowing accompanied by the extortion of every piastre possible from the fellahin. The real state of affairs was disclosed in the report of Mr Stephen Cave, a well-known banker, who was sent by the British government in December 1875 to inquire into the situation. The Cave report showed that Egypt suffered from "the ignorance, dishonesty, waste and extravagance of the East" and from "the vast expense caused by hasty and inconsiderate endeavours to adopt the civilization of the West." The debtor and creditor account of the state from 1864 to 1875 showed receipts amounting to £148,215,000. Of this sum over £94,000,000 had been obtained from revenue and nearly £4,000,000 by the sale of the khedive's shares in the Suez Canal to Great Britain. The rest was credited to: loans £31,713,000, floating debt £18,243,000. The cash which reached the Egyptian treasury from the loans and floating debt was far less than the nominal amount of such loans, none of which cost the Egyptian government less than 12% per annum. When the expenditure during the same period was examined the extraordinary fact was disclosed that the sum raised by revenue was only three millions less than that spent on administration, tribute and public works, including a sum of £10,500,000, described as "expenses of questionable utility or policy." The whole proceeds of the loans and floating debt had been absorbed in payment of interest and sinking funds, with the exception of £16,000,000 debited to the Suez Canal. In other words, Egypt was burdened with a debt of £91,000,000—funded or floating—for which she had no return, for even from the Suez Canal she derived no revenue, owing to the sale of the khedive's shares.

Soon after Mr Cave's report appeared (March 1876), default took place on several of the loans. Nearly the whole of the debt, it should be stated, was held in England or France, and at the instance of French financiers the stoppage of payment was followed by a scheme to unify the debt. This scheme included the distribution of a bonus of 25% to holders of treasury bonds. These bonds had then reached a sum exceeding £20,000,000 and were held chiefly by French firms. The unification scheme was elaborated in a khedivial decree of the 7th of May 1876, but was rendered abortive by the opposition of the British bondholders. Its place was taken by another scheme drawn up by Mr (afterwards Lord) Goschen and M. Joubert, who represented the British and French bondholders respectively. The details of this settlement, promulgated by decree of the 17th of November 1876, need not be given, as it was superseded in 1880. One of the securities devised for the benefit of the bondholders in the abortive scheme of May 1876 was retained in the

Goschen-Joubert settlement, and being continued in later settlements grew to be one of the most important institutions in Egypt. This security was the establishment of a Treasury of the Public Debt, known by its French title of *Caisse de la Dette*, and commonly spoken of simply as "the Caisse." The duty of this body was to act as receivers of the revenues assigned to the service of the debt. To render their powers effective they were given the right to sue the Egyptian government in the Mixed Tribunals for any breach of engagement to the bondholders.

The Law of Liquidation.

The Goschen-Joubert settlement was accompanied by guarantees against maladministration by the appointment of an Englishman and a Frenchman to superintend the revenue and expenditure—the "Dual Control"; while a commission was appointed in 1878 to investigate the condition of the country. The settlement of 1880 was effected on the basis of the proposals made by this commission, and was embodied in the Law of Liquidation of July 1880—after the deposition of Ismail. For the purposes of the new settlement the loans raised by Ismail on his private estates, those known as the Daïra (*i.e.* "administrations") and Domains loans, were brought into account. By the Law of Liquidation the floating debt was paid off, the whole debt being consolidated into four large loans, upon which the rate of interest was reduced to a figure which it was considered Egypt was able to bear. The Egyptian debt under this composition was:

Privileged debt	£22,609,000
Unified debt	58,018,000
Daïra Sanieh loan	9,513,000
Domains loan	8,500,000
	£98,640,000

The rate of interest was, on the Privileged debt and Domains loan, 5%; on the Unified debt and Daïra loan, 4%. Under this settlement the total annual charges on the country amounted to £4,500,000, about half the then revenue of Egypt. These charges included the services of the Privileged and Unified debts, the tribute to Turkey and the interest on the Suez Canal shares held by Great Britain, but excluded the interest on the Daïra and Domains loans, expected to be defrayed by the revenues from the estates on which those loans were secured. The general revenue of Egypt was divided between the bondholders and the government, any surplus on the bondholders' share being devoted to the redemption of the capital.

The 1880 settlement proved little more lasting than that of 1876. After a brief period of prosperity, the Arabi rising, the riots at Alexandria, and the events generally which led to the British occupation of Egypt in 1882, followed by the losses incurred in the Sudan in the effort to prevent it falling into the hands of the Mahdi, brought Egypt once more to the verge of financial disaster. The situation was an anomalous one. While the revenue assigned to the service of the debt was more than sufficient for the payment of interest and the sinking fund was in full operation, the government found that their share of the revenue was altogether inadequate for the expenses of administration, and they were compelled to borrow on short loans at high rate of interest. Moreover, to make good the losses incurred at Alexandria, and to get money to pay the charges arising out of the Sudan War and the Arabi rebellion, a new loan was essential. On the initiative of Great Britain a conference between the representatives of the great powers and Turkey was held in London, and resulted in the signing of a convention in March 1885. The terms agreed upon in this instrument, known as the London Convention, were embodied in a khedivial decree, which, with some modification in detail, remained for twenty years the organic law under which the finances of Egypt were administered.

The principle of dividing the revenue of the country between the Caisse, as representing the bondholders, and the government was maintained by the London Convention. The revenue assigned to the service of the debt, namely, that derived from the railway, telegraphs, port of Alexandria, customs (including tobacco) and from four of the provinces, remained as before. It was recognized, however, that the non-assigned revenue was insufficient to meet the necessary expenses of government, and a scale of administrative expenditure was drawn up. This was originally fixed at £E.5,237,000,[1] but subsequently other items were allowed, and in 1904, the last year in which the system described existed, it was £E.6,300,600. The Caisse was authorized, after payment of the coupons on the debt, to make good out of their balance in hand the difference between the authorized expenditure and the non-assigned revenue. If a surplus remained to the Caisse after making good such deficit the surplus was to be divided equally between the Caisse and the government; the government to be free to spend its share as it pleased, while the Caisse had to devote its share to the reduction of the debt. This limitation of administrative expenditure was the cardinal feature and the leading defect of the convention. Those responsible for this arrangement—the most favourable for Egypt that Great Britain could secure—failed to recognize the complete change likely to result from the British occupation of Egypt, and probably regarded that occupation as temporary. The system devised might have been justifiable as a check on a retrograde government, but was wholly inapplicable to a reforming government and a serious obstacle to the attainment of national prosperity. In practice administrative expenditure always exceeded the amount fixed by the convention. Any excess could, however, only be met out of the half-share of the eventual surplus reached in the manner described. Consequently, in order to meet new expenditure necessitated by the growing wants of a country in process of development, just double the amount of revenue had to be raised.

Provisions of the London Convention.

To return to the provisions of the London Convention. The convention left the permanent rate of interest on the debt, as fixed by the Law of Liquidation, unchanged, but to afford temporary relief to the Egyptian exchequer a reduction of 5% on the interest of the debt was granted for two years, on condition that if at the end of that period payment, including the arrears of the two years, was not resumed in full, another international commission was to be appointed to examine into the whole financial situation. Lastly, the convention empowered Egypt to raise a loan of nine millions, guaranteed by all the powers, at a rate of interest of 3%. For the service of this loan—known as the Guaranteed loan—an annuity of £315,000 was provided in the Egyptian budget for interest and sinking fund. The £9,000,000 was sufficient to pay the Alexandria indemnities, to wipe out the deficits of the preceding years, to give the Egyptian treasury a working balance of £E.500,000 and thereby avoid the creation of a fresh floating debt, and to provide a million for new irrigation works. To the wise foresight which, at a moment when the country was sinking beneath a weight of debt, did not hesitate to add this million for expenditure on productive works, the present prosperity of Egypt is largely due.

The provisions of the London Convention did not exhaust the restrictions placed upon the Egyptian government in respect of financial autonomy. These restrictions were of two categories, (1) those independent of the London Convention, (2) those dependent upon that instrument. In the first category came (*a*) the prohibition to raise a loan without the consent of the Porte. The right to raise loans had been granted to the khedive Ismail in 1873, but was taken away in 1879 by the firman appointing Tewfik khedive. (*b*) Next came the inability to levy taxes on foreigners without the consent of their respective governments. This last obligation was, in virtue of the Capitulations, applicable to Egypt as part of the Ottoman empire. The only exception, resulting from the Ottoman law under which foreigners are allowed to acquire and hold real property, is the land tax. (All taxes formerly paid by natives and not by foreigners have been abolished in Egypt, but the immunity described constitutes a most serious obstacle to the redistribution of the burden of taxation in a more equitable manner.)

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[1] The figures of the debt are always given in £ sterling. The budget figures are in £E. (pounds Egyptian), equal to £1, 0s. 6d.

From the purely Egyptian point of view the most powerful restriction in this first category remains to be named. In 1883 the supervision exercised over the finances by French and British controllers was replaced by that of a British official called the financial adviser. The British government has declared that "no financial decision shall be taken without his consent," a declaration never questioned by the Egyptian government. This restriction, therefore, is at the same time the chief safeguard for the purity of Egypt's finances.

In the second category of restrictions, namely, those dependent on the London Convention, were the various commissions or boards known as Mixed Administrations and having relations of a quasi-independent character with the ministry of finance. Of these boards by far the most important was the Caisse. As first constituted it consisted of a French, an Austrian, and an Italian member; a British member was added in 1877 and a German and a Russian member in 1885. The revenue assigned to the debt charges was paid direct to the Caisse without passing through the ministry of finance. The assent of the Caisse (as well as that of the sultan) was necessary before any new loan could be issued, and in the course of a few years from its creation this body acquired very extensive powers. Besides the Caisse there was the Railway Board, which administered the railways, telegraphs and port of Alexandria for the benefit of the bondholders, and the Daïra and Domains commissions, which administered the estates mortgaged to the holders of those loans. Each of the three boards last named consisted of an Englishman, a Frenchman and an Egyptian.

The race against bankruptcy.

During the two years that followed the signing of the London Convention, the financial policy of the Egyptian government was directed to placing the country in a position to resume full payment of the interest on the debt in 1887, and thereby to avoid the appointment of an international commission. By the exercise of the most rigid economy in all branches this end was attained, though budgetary equilibrium was only secured by a variety of financial expedients, justified by the vital importance of saving Egypt from further international interference. By such means this additional complication was averted, but the struggle to put Egypt in a genuinely solvent position was by no means over. It was not until his report on the financial results of 1888 that Sir Evelyn Baring (afterwards Lord Cromer) was able to inform the British government that the situation was such that "it would take a series of untoward events seriously to endanger the stability of Egyptian finance and the solvency of the Egyptian government." From this moment the corner was turned, and the era of financial prosperity commenced. The results of the labours of the preceding six years began to manifest themselves with a rapidity which surprised the most sanguine observers. The principal feature of the successive Egyptian budgets of 1890–1894 was the fiscal relief afforded to the population. From 1894 onward more attention was paid than had hitherto been possible to the legitimate demands of the spending departments and to the prosecution of public works. Of these the most notable was the construction (1898–1902) of the Assuan dam, which by bringing more land under cultivation permanently increased the resources of the country and widened the area of taxation.

Reserve funds.

With the accumulating proofs of the financial stability of the country various changes were made in connexion with the debt charges. With the consent of the powers a General Reserve Fund was created by decree of the 12th of July 1888, into which was paid the Caisse's half-share in the eventual surplus of revenue. This fund, primarily intended as a security for the bondholders, might be drawn upon for extraordinary expenditure with the consent of the commissioners of the Caisse. Large sums were so advanced for the purposes of drainage and irrigation and other public works, and in relief of taxation. The defect of this arrangement consisted in the necessity of obtaining the consent of the commissioners—a consent sometimes withheld on purely political grounds. At the same time it is believed that but for the faculty given by the decree of 1888 to spend the General Reserve Fund on public works, the financial system elaborated by the London Convention would have broken down altogether. Between 1888 and 1904 about £10,000,000 was devoted from this fund to public works.

In June 1890 the assent of the powers was obtained to the conversion of the Preference (Privileged), Domains and Daïra loans on the following conditions, imposed at the initiative of the French government:—

1. The employment of the economies resulting from the conversion was to be the subject of future agreement with the powers.

2. The Daïra loan was to be reimbursed at 85%, instead of 80%, as provided by the Law of Liquidation.

3. The sales of Domains and Daïra lands were to be restricted to £E.300,000 a year each, thus prolonging the period of liquidation of those estates.

The interest on the Preference stock was reduced from 5 to 3½%, and on the Domains from 5 to 4¼%. As regards the Daïra loan, there was no apparent reduction in the rate of interest, which remained at 4%, but the bondholders received £85 of the new stock for every £100 of the old. The capital of the debt was increased by £1,945,000 by these conversions, while the annual economy to the Egyptian government amounted at the time of the conversion to £E.348,000. Further, an engagement was entered into that there should be no reimbursement of the loans till 1905 for the Preference and Daïra, and 1908 for the Domains. By an arrangement concluded in June 1898, between the Egyptian government and a syndicate, the unsold balance of the Daïra estates was taken over by the syndicate in October 1905, for the amount of the debt remaining, when the Daïra loan ceased to exist. The fund formed by the accumulation of the economies resulting from the conversion of the Privileged, Daïra and Domains loan was known as the Conversion Economies Fund. The fund could not be used for any purpose without the consent of the powers, and the money paid into it was invested by the Caisse in Egyptian stock. The fund therefore acted as a very expensive sinking fund, the market price of the stock purchased being above par. Up to 1904 the consent of the powers to the employment of this fund for any purpose of public utility was withheld. On the 31st of December of that year the fund amounted to £E.6,031,000. It may be added that besides the General Reserve Fund and the Conversion Economies Fund, there existed another fund called the Special Reserve Fund. This was constituted in 1886 and was chiefly made up of the net savings of the Egyptian government on its share of the annual surpluses from revenue. Of the three funds this last-named was the only one at the absolute disposal of the government. The whole of the extraordinary expenditure of the Sudan campaigns of 1896–1898, with the exception of £800,000 granted by the British government, was paid out of this fund—a sum amounting in round figures to £1,500,000.

An era of prosperity.

Notwithstanding all the hampering conditions stated, the prosperity of the country became more manifest each succeeding year. During the four years 1883–1886, both inclusive, the aggregate deficit amounted to £E.2,606,000. In 1887 there was practical equilibrium in the budget, in 1888 there was a deficit of £E.53,000. In 1889 there was a surplus of £E.218,000, and from that date onward every year has shown a surplus. In 1895 the surplus exceeded, for the first time, £E.1,000,000. The growth of revenue was no less marked. "In 1883—the first complete year after the British occupation—the revenue was slightly under 9 millions. This sum was collected with difficulty. The revenue steadily rose until, in 1890, the figure of 10 millions was exceeded. In 1897 a figure of over 11 millions was attained. Continuing to rise with ever-increasing rapidity, a revenue of close on 12 millions was collected in 1901 and 1902, in spite of the fact that during the latter of these two years the Nile flood was one of the lowest on record. In 1903 the revenue amounted to 12½ millions, and in 1904 the unprecedented figure of £E.13,906,000 was reached."[1] Yet during this period the amount of direct taxation remitted reached £E.1,900,000 a year. Arrears of land tax to the extent of £E.1,245,000 were cancelled. In indirect taxation the salt tax had been reduced by 40%, the postal, railway and telegraph rates lowered, octroi duties and bridge and lock dues abolished. The only increase of taxation had been on tobacco, on which the duty was raised from

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[1] *Egypt*, No. 1 (1905), p. 20.

P.T. 14 to P.T 20 per kilogramme. At the same time the house duty, with the consent of the powers, had been imposed on European residents. The fact that during the period under review Egypt suffered very severely from the general fall in the price of commodities makes the prosperity of the country the more remarkable. Had it not been for the great increase of production as the result of improved irrigation and the fiscal relief afforded to landowners, the agricultural depression would have impaired the financial situation. In this connexion it should be stated that during 1899 the reassessment of the land tax, a much-needed reform, was seriously taken in hand. The existing assessment, made before the British occupation, had long been condemned by all competent authorities, but the inherent intricacies and difficulties of the problem had hitherto postponed a solution. After careful study and a preliminary examination of the land, a scheme was passed which has given satisfaction to the landowning community, and which distributes the tax equitably in proportion to the fertility of the soil. The reassessment was completed in 1907.

The cost of internationalism.

While the country thus prospered it also suffered greatly from the restrictions imposed by the system of international control. This system produced a great disproportion between the sums available for capital and those available for administrative expenditure. Although the money for public works could be obtained out of grants from the General Reserve Fund, there was no fund from which to provide a sufficient sum to keep those works in order. Moreover, to avoid having to pay half the amount received into the General Reserve Fund the government was compelled to keep certain items of revenue and expenditure out of the accounts altogether—a violation of the principles of sound finance. Then there was the glaring anomaly of allowing the Conversion Economies to accumulate at compound interest in the hands of the commissioners of the Caisse, instead of using the money for remunerative purposes. The net result of internationalism was to impose an extra charge of about £1,750,000 a year on the Egyptian treasury.

Egypt gains financial liberty.

All these cumbersome restrictions were swept away by the khedivial decree of the 28th of November 1904, a decree which received the assent of the powers and was the result of the Anglo-French agreement of April 1904 (see § *History*). The decree did not affect the inability of Egypt to tax foreigners without their consent nor remove the right of Turkey to veto the issue of new loans, but in other respects the financial changes made by it were of a radical character. The main effect was to give to the Egyptian government a free hand in the disposal of its own resources so long as the punctual payment of interest on the debt was assured. The plan devised by the London Convention of fixing a limit to administrative expenditure was abolished. The consent of the Caisse to the raising of a new loan was no longer required. The Caisse itself remained, but shorn of all political and administrative powers, its functions being strictly limited to receiving the assigned revenues and to ensuring the due payment of the coupon. The nature of the assigned revenue was altered, the land tax being substituted for those previously assigned, that tax being chosen as it had a greater character of stability than any other source of revenue. By this means Egypt gained complete control of its railways, telegraphs, the port of Alexandria and the customs, and as a consequence the mixed administration known as the Railway Board ceased to exist. Moreover, it was provided that when the Caisse had received from the land tax the amount needed for the service of the debt, the balance of the tax was to be paid direct to the Egyptian treasury. The Conversion Economies Fund was also placed at the free disposal of the Egyptian government. The General Reserve Fund ceased to exist, but for the better security of the bondholders a reserve fund of £1,800,000 was constituted and left in the hands of the Caisse to be used in the highly improbable event of the land tax being insufficient to meet the debt charges. Moreover, the Caisse started under the new arrangement with a cash balance of £1,250,000 The interest of the money lying in the hands of the Caisse goes towards meeting the debt charges and thus reduces the amount needed from the land tax. The bondholders gained a further material advantage by the consent of the Egyptian government to delay the conversion of the loans, which under previous arrangements they would have been free to do in 1905. It was agreed that there should be no conversion of the Guaranteed or Privileged debts before 1910 and no conversion of the Unified debt until 1912. Such were the chief provisions of the khedivial decree, and in 1905, for the first time, it was possible to draw up the Egyptian budget in accordance with the needs of the country and on perfectly sound principles.

In the system adopted in 1905 and since maintained, recurring and non-recurring expenditure were shown separately, the non-recurring expenditure being termed "special." At the same time a new General Reserve Fund was created, made up chiefly of the surpluses of the old General Reserve, Special Reserve, and Conversion Economies funds. This new fund started with a capital of £13,376,000 and was replenished by the surpluses of subsequent years, by the interest earned by its temporary investment, and by the sums accruing by the liquidation of the Daïra and Domains loans. During 1905 and 1906 about £3,000,000 was paid into the fund through the liquidation of the Daïra loan. From this fund, which had a balance of over £12,000,000 in 1906, is taken capital expenditure on remunerative public works in Egypt and the Sudan, and while the fund lasts the necessity for any new loan is avoided. The greater freedom of action attained as the result of the Anglo-French declaration of 1904 enabled the Egyptian government to advance simultaneously along the lines of fiscal reform and increased administrative expenditure. Thus in 1906 the salt monopoly was abolished at a cost to the revenue of £175,000, while the reduction of import duties on coal and other fuels, live-stock, &c., involved a further loss of £118,000, and an increase of over £1,000,000 in expenditure was budgeted for. The accounts for 1907 showed a total revenue of £E.16,368,000 and a total expenditure of £E.14,280,000, a surplus of £E.2,088,000. The annual growth of revenue for the previous five years averaged over £E.500,000. About one-third of the annual revenue is derived from the land tax; customs and tobacco duties yield about £3,000,000, and an equal or larger amount is received from railways and other revenue-earning departments. The chief items of ordinary expenditure are tribute and debt charges, the expenses of the civil administration, of the Egyptian army (between £500,000 and £600,000 yearly), of the revenue-earning departments and of pensions.

It will be convenient here to summarise the position of the Egyptian debt at the close of 1905, that is at the period immediately following the liquidation of the Daïra loan. In a previous table it has been shown that under the Law of Liquidation of 1880 the total debt was £98,640,000. In 1883, the first complete year after the British occupation, the capital of the debt—then exclusively held by the public—was £96,457,000. In 1885 the Guaranteed loan, the nominal capital of which was £9,424,000, was issued, and in 1891 the debt reached its maximum figure of £106,802,000. At that period the charge for interest and sinking fund was £4,127,000. On the 31st of December 1905 the total capital of the debt was as follows:—

Guaranteed 3%	£7,849,000
Preference 3½%	31,128,000
Unified 4%	55,972,000
Domains 4¼%	1,535,000
Total	£96,484,000

The charge on account of interest and sinking fund was £3,709,000. Thus the capital of the debt in 1905 stood at almost the exact figure it did in 1883, although by borrowing and conversion operations nearly £17,000,000 had in the meantime been added to the capital. This reduction was brought about by surplus revenue, and by the operation of the sinking fund in the case of the Guaranteed loan, while £15,729,000 had been wiped out by the sale of Daïra and Domains property. These figures do not, however, indicate fully the prosperity of the country, for although the nominal amount of the capital was practically identical in 1883 and 1905, in the latter year the Egyptian government or the Caisse held stock (bought with surplus revenue) to the value of £8,770,000. The amount of debt in the hands of the public was therefore only £87,714,000, that is to say £8,743,000 less than in 1883, while the interest charge to be borne by the taxpayer of Egypt was £3,378,000, being £890,000 less than in 1883. The charge amounts to about 40% of the national expenditure. On the other hand, Egypt is not now weighed down with a huge warlike expenditure. There is no navy to support, and the army costs but 7% of the total expenditure.

AUTHORITIES.—A concise view of the financial situation in 1877 will be found in J. C. McCoan's *Egypt as it is* (London n.d.). Mr Cave's report is printed in an appendix. The subsequent history of Egyptian finance is told in the following blue-books, &c.:—*Correspondence respecting the State Domains of Egypt* (1883); *Statement of the Revenue and Expenditure of Egypt, together with a List of the Egyptian Bonds and the Charges for their Services* (1885);

Reports on the Finances of Egypt, by the British agent, yearly from 1888; *Convention . . . relative to the Finance of Egypt, signed at London, March 18, 1885*; *Khedivial decree of the 28th November 1904*; *Compte général de l'administration des finances*, issued yearly at Cairo. Consult also the works of Lord Cromer, Lord Milner, and Sir A. Colvin cited under § *History*, last section. (E. Go.; F. R. C.)

The Egyptian Army.

Early history.

The fellah soldier has been aptly likened to a bicycle, which although incapable of standing up alone, is very useful while under the control of a skilful master. It is generally believed that the successes gained in the time of the Pharaohs were due to foreign legions; and from Cambyses to Alexander, from the Ptolemies to Antony (Cleopatra), from Augustus to the 7th century, throughout the Arab period, and from Saladin's dynasty down to the middle of the 13th century, the military power of Egypt was dependent on mercenaries. The Mamelukes (slaves), imported from the eastern borders of the Black Sea and then trained as soldiers, usurped the government of Egypt, and held it till 1517, when the Ottomans began to rule. This form of government, speaking generally, endured till the French invasion at the end of the 18th century. British and Turkish troops drove the French out after an occupation of two years, the British troops remaining till 1803. Then Mehemet Ali, a small tobacconist of Kavala, Macedonia, coming with Albanian mercenaries, made himself governor, and later (1811), by massacring the Mamelukes, became the actual master of the country, and after seven years' war brought Arabia under Egypt's rule. He subdued Nubia and Sennar in 1820–22; and then, requiring a larger army, he obtained instructors from France. To them were handed over 1000 Turks and Circassians to be trained as officers, who later took command of 30,000 Sudanese. These died so rapidly in Egypt from pneumonia[1] that Mehemet Ali conscripted over 250,000 fellahin, and in so arbitrary a fashion that many peasants mutilated themselves to avoid the much-dreaded service. The common practice was to place a small piece of nitrate of silver into the eye, which was then kept tightly bandaged till the sight was destroyed. Battalions were then formed of one-eyed men, and of soldiers who, having cut off their right-hand fingers, were made to shoot from the left shoulder. Every man who could not purchase exemption, with the exception of those living in Cairo, Alexandria and Suez, on becoming 19 years old was liable nominally to 12 years' service; but many men were kept for 30 or 40 years, in spite of constant appeals. Nevertheless the experiment succeeded. The docile, yet robust and hardy peasants, under their foreign leaders, gained an unbroken series of successes in the first Syrian War; and after the bloody battle of Konia (1832), where the raw Turkish army was routed and the grand vizier taken prisoner, it was only European intervention which prevented the Egyptian general, Ibrahim Pasha, from marching unopposed to the Bosphorus. The defeat of the Turkish army at Nizib (Neseeb or Nisib), in the second Syrian War (1839), showed that it was possible to obtain favourable military results with Egyptians when stiffened by foreigners and well commanded. Ibrahim, the hero of Konia, declared, however, that no native Egyptian ought to rise higher than the rank of sergeant; and in the Syrian campaigns nearly all the officers were Turks or Circassians, as were several non-commissioned officers. In the cavalry and artillery many of the privates were foreigners, numbers of the janissaries who escaped the massacre at Stamboul (1832) having joined Mehemet Ali's army.

In the reign of Abbas, who succeeded Mehemet Ali, the Egyptian troops were driven from Nejd, and the Wahhabi state recovered its independence. The next viceroy, Said, began as an ardent soldier, but took to agriculture, and at his death (1863) 3000 men only were retained under arms. Ismail, on succeeding, immediately added 27,000 men, and in seven years was able to put 100,000 men, well equipped, in the field. He sent 10,000 men to help to suppress a rebellion in Crete, and conquered the greater part of the (Nile) Sudan; but an expedition of 11,000 men, sent to Abyssinia under Prince Hasan and Rateb Pasha, well equipped with guns and all essentials, was, in two successive disasters (1875 and 1876), practically destroyed. The education of Egyptians in continental cities had not produced the class of leaders who led the fellahin to victory at Konia.

Ismail's exactions from the Egyptian peasantry reacted on the army, causing discontent; and when he was tottering on the throne he instigated military demonstrations against his own government, and, by thus sapping the foundations of discipline, assisted Arabi's revolution; the result was the battle of Tell el-Kebir, the British occupation, and the disbandment of the army, which at that time in Egypt proper consisted of 18,000 men. Ismail had collected 500 field-guns, 200 Armstrong cannon, and had created factories of warlike and other stores. These latter were conducted extravagantly, and badly administered.

Reorganization.

In January 1883, Major-General Sir Evelyn Wood, V.C., was given £200,000, and directed to spend it in raising a fellahin force of 6000 men for the defence of Egypt. He was assisted at first by 26 officers, amongst whom were two who later became successively sirdars—Colonel F. Grenfell, commanding a brigade, and Lieutenant H. Kitchener, R.E., second in command of the cavalry regiment. There were four batteries, eight battalions, and a camel company. Each battalion of the 1st infantry brigade had three British mounted officers, Turks and Egyptians holding the corresponding positions in the battalions of the 2nd Brigade. The sirdar selected these native officers from those of Arabi's followers who had been the least prominent in the recent mutiny; non-commissioned officers who had been drill-instructors in the old army were recalled temporarily, but all the privates were conscripted from their villages. The earlier merciless practice had been in theory abolished by a decree based on the German system, published in 1880; but owing to defective organization, and internal disturbances induced by Khedive Ismail's follies, the law had not been applied, and the 6000 recruits collected at Cairo in January 1883 represented the biggest and strongest peasants who could not purchase exemption by bribing the officials concerned. The difficulties experienced in applying the 1880 decree were great, but the perseverance of British officers gave the oppressed peasants, in 1885, an equitable law, which has been since improved by the decree of 1900. General considerations later caused the sirdar to allow exemption by payment of (Badalia) £20 before ballot. This tax, which is popular amongst the peasantry, produced in 1906 £E.150,000, and over £250,000 in 1908. This is a marked indication of the increasing prosperity of the fellahin. A portion of the badalia is expended in the betterment of the soldier's position. He is no longer drafted into the police on completing his army service, but goes free at the end of five years with a gift of £E.20. The sirdar is allowed, moreover, to use £20,000 per annum of the badalia for the improvement of the education of the rank and file. As an experiment the police is now a voluntary service, except in Alexandria and Cairo, for which cities peasants are conscripted for the police under army conditions. The recruiting superintending committee, travelling through districts, supervise every ballot, and work under stringent rules which render systematic bribery difficult. The recruits who draw unlucky numbers at 19 years of age are seldom called up till they are 23, when they are summoned by name and escorted by a policeman to Cairo. To prevent substitution on the journey each recruit wears a string girdle sealed in lead. The periods of service are: with the colours, 5 years; in the reserve, 5 years, during which time they may be called up for police service, manœuvres, &c. The pay is £E.3, 14s. per annum for all services, and the liberal scale of rations of meat, bread and rice remains as before in theory, but in practice the value of pay and food received is greatly enhanced. So also with the pension and promotion regulations. They were in 1882 sufficiently liberal on paper, but had never been carried into effect.

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[1] Similar mortality, though on a smaller scale, recurred in 1889, when Sudanese battalions coming from Suakin were detained temporarily in Cairo.

The efforts of 48 American officers, who under Gen. C. P. Stone zealously served Ismail, had entirely failed to overcome Egyptian venality and intrigue; and in spite of the military schools, with a comprehensive syllabus, the only perceptible difference between the Egyptian officer and private in 1879 consisted, according to one of the Americans, in the fact that the first was the product of the harem, and the second of the field. Marshal Marmont, writing in 1839, mentions the capacity of the Egyptians for endurance; and it was tested in 1883, especially in the 2nd Brigade, since its officers (Turks and Egyptians), anxious to excel as drill-masters, worked their men not only from morn till eve, but also by lamplight in the corridors of the barracks. On the 31st March 1883, ten weeks after the arrival of the first draft of recruits, about 5600 men went through the ceremonial parade movements as practised by the British guards in Hyde Park, with unusual precision. The British officers had acquired the words of command in Turkish, as used in the old army, an attempt to substitute Egyptian words having failed owing to lack of crisp, sharp-sounding words. As the Egyptian brigadier, who had spent some years in Berlin, spoke German fluently, and it was also understood by the senior British officers, that language was used for all commands given by the sirdar on that special parade. The British drill-book, minus about one-third of the least serviceable movements, was translated by an English officer, and by 1900 every necessary British official book had been published in English and Arabic, except the new Recruiting Law (1885) and a manufacturing manual, for which French and Arabic editions are in use. The discipline of the old army had been regulated by a translation of part of the Code Napoleon, which was inadequate for an Eastern army, and the sirdar replaced it by the British Army Act of 1881, slightly modified, and printed in Arabic.

The task undertaken by the small body of British officers was difficult. There was not one point in the former administration of the army acceptable to English gentlemen. That there had been no adequate auxiliary departments, without which an army cannot move or be efficient, was comparatively a minor difficulty. To succeed, it was essential that the fellah should be taught that discipline might be strict without being oppressive, that pay and rations would be fairly distributed, that brutal usage by superiors would be checked, that complaints would be thoroughly investigated, and impartial justice meted out to soldiers of all ranks. An epidemic of cholera in the summer of 1883 gave the British officers their first chance of acquiring the esteem and confidence of their men, and the opportunity was nobly utilized. While the patient fellah, resigned to the decrees of the Almighty, saw the ruling Egyptian class hurry away from Cairo, he saw also those of his comrades who were stricken tenderly nursed, soothed in death's struggles, and in many cases actually washed, laid out and interred by their new self-sacrificing and determined masters. The regeneration of the fellahin army dates from that epidemic.

When the Egyptian Army of the Delta was dispersed at Tell el-Kebir, the khedive had 40,000 troops in the Sudan, scattered from Massawa on the Red Sea to 1200 m. towards the west, and from Wadi Halfa, 1500 m. southward to Wadelai, near Albert Nyanza. These were composed of Turks, Albanians, Circassians and some Sudanese. Ten thousand fellahin, collected in March 1883, mainly from Arabi's former forces, set out from Duem, 100 m. south of Khartum, in September 1883, under Hicks Pasha, a dauntless retired Indian Army officer, to vanquish the Mahdi. They disappeared in the deserts of Kordofan, where they were destroyed by the Mahdists about 50 m. south of El Obeid. In the wave of successful rebellion, except at Khartum, few of the Egyptian garrisons were killed when the posts fell, long residence and local family ties rendering easy their assimilation in the ranks of the Mahdists.

Baker Pasha, with about 4000 constabulary, who were old soldiers, attempted to relieve Tokar in February 1884. He was attacked by 1200 tribesmen and utterly routed, losing 4 Krupp guns, 2 machine guns and 3000 rifles. Only 1400 Egyptians escaped the slaughter.

The sirdar made an attempt to raise a battalion of Albanians, but the few men obtained mutinied when ordered to proceed to the Sudan, and it was deemed advisable, after the ringleaders had been executed, to abandon the idea, and rely on blacks to stiffen the fellahin. Then the 9th (Sudanese) Battalion was created for service at Suakin, and four others having been successively added, these (with one exception—at Gedaref) have since borne the brunt of all the fighting which has been done by the khedivial troops. The Egyptian troops in the operations near Suakin behaved well; and there were many instances of personal gallantry by individual soldiers. In the autumn of 1884, when a British expedition went up the Nile to endeavour to relieve the heroic Gordon, besieged in Khartum, the Egyptians did remarkably good work on the line of communication from Assiut to Korti, a distance of 800 m., and the training and experience thus gained were of great value in all subsequent operations. The honesty and discipline of the fellah were shown to be undoubtedly of a high order. When the crews of the whale-boats were conveying stores, the forwarding officers tried to keep brandy and such like medical comforts from the European crews, coffee and tea from Canadian voyageurs and sugar from Kroo boys. The only immaculate carrier was the Egyptian. A large sum of specie having failed under British escort to reach Dongola, an equivalent sum was handed to an Egyptian lieutenant of six months' service, with 10 men, and duly reached its destination.

Twelve years later the standard of honesty was unimpaired, and the British officers had imparted energy and activity into Egyptians of all ranks. The intelligent professional knowledge of the native officers, taught under British gentlemen, and the constant hard work cheerfully rendered by the fellah soldiers, were the main factors of the success achieved at Omdurman on the 2nd of September 1898. The large depots of stores at Assuan, Halfa and Dongola could only be cursorily supervised by British officers, and yet when the stores were received at the advance depot the losses were infinitesimal.

Character of Egyptian soldiers.

By nature the fellah is unwarlike. Born in the valley of a great river, he resembles in many respects the Bengali, who exists under similar conditions; but the Egyptian has proved capable of greater improvement. He is stronger in frame, and can undergo greater exertion. Singularly unemotional, he stood steady at Tell el-Kebir after Arabi Pasha and all his officers, from general to subaltern, had fled, and gave way only when decimated by the British field artillery firing case shot. At El Teb, however, in 1884 he allowed himself to be slaughtered by tribesmen formerly despised, and only about one-fourth of the force under General Valentine Baker escaped. Baker Pasha's force was termed constabulary, yet his men were all old soldiers, though new to their gallant leader and to the small band of their brave but strange British officers. Since that fatal day, however, many of the fellahin have shown they are capable of devoted conduct, and much has been done to raise in the soldiers a sense of self-respect, and, in spite of centuries of oppression, of veracity. The barrack-square drill was smart under the old system, but there was no fire discipline, and all individuality was crushed. Now both are encouraged, and the men, receiving their full rations, are unsurpassable in endurance at work and in marching. All the troops present in the surprise fight when the Dervish force was destroyed at Firket in June 1896 had covered long distances, and one battalion (the 10th Sudanese) accomplished 90 m. within 72 hours, including the march back to railhead immediately after the action. The troops under Colonel Parsons, Royal Artillery, who beat the Dervishes at Gedaref, were so short of British officers that all orders were necessarily given in Arabic and carried to commanders of units by Arabs. While an Egyptian battalion was attacking in line, it was halted to repel a rush from the rear, and front and rear ranks were simultaneously engaged, firing in opposite directions—yet the fellahin were absolutely steady; they shot well and showed no signs of trepidation. On the other hand, neither was there any exultation after their victory. It has been aptly said "the fellah would make an admirable soldier if he only wished to kill some one!" The fellahin furnish three squadrons, five batteries, three garrison artillery companies and nine battalions.

The well-educated Egyptian officer, with his natural aptitude for figures, does subordinate regimental routine carefully, and works well when supervised by men of stronger character. The ordinary Egyptian is not self-reliant or energetic by nature, and, like most Eastern people, finds it difficult to be impartial where duty and family or other personal relations are in the balance. The black soldier has, on the other hand, many of the finest fighting qualities. This was observed by British officers, from the time of the preliminary operations about Kosha and at the action near Ginnis in December 1885 down to the brilliant operations in the pursuit of the Mahdists on the Blue Nile after the action of Gedaref (subsequent to the battle of Omdurman), and the fighting in Kordofan in 1899, which resulted in the death of the khalifa and his amirs.

Black soldiers served in the army of Mehemet Ali, but their fighting value was not then duly appreciated. Prior to the death of the khalifa, many of his soldiers deserted to join their brethren who had been captured by the sirdar's troops, during the gradual advance up the Nile. After 1899 many more enlisted: the greater number were Shilluks and Dinkas coming from the country between Fashoda and the equatorial provinces, but a proportion came from the western borders of the Sudan, and some from Wadai and Bornu. Many were absolute savages, difficult to control, wayward and thoughtless like children. Sudanese are very excitable and apt to get out of hand; unlike the fellahs they are not fond of drill, and are slow to acquire it; but their dash, pugnacious instincts and desire to close with an enemy, are valuable military qualities. The Sudanese, moreover, shoot better than the fellahin, whose eyesight is often defective. The Sudanese captain can seldom read or write, and is therefore in the hands of the Egyptian-born company quartermaster-sergeant as regards pay and clothing accounts. He is slow, and as a rule has little knowledge of drill. Nevertheless he is self-reliant, much respected by his men, and can be trusted in the field to carry out any orders received from his British officer. The most efficient companies in the Sudanese battalions are apparently those in which the captain is a black and the lieutenants are Egyptians.

In 1908 the Egyptian army, with a total establishment of 18,000, consisted of three squadrons of cavalry (one composed of Sudanese) each numbering 116 men; four batteries of field artillery and a Maxim battery, horses and mules being used, with a total strength of 1257 of all ranks; the camel corps, 626 of all ranks (fellahin and Sudanese); and nine fellahin and six Sudanese infantry battalions, 10,631 of all ranks. Every battalion receives two additional companies on mobilization and takes the field with six companies.

The armament of the infantry is Martini-Henry rifle and bayonet; of the cavalry, lance, sword and carbine.

There are seven gunboats on the Nile.

The medical department (reorganized in 1883 by Surgeon-Major J. G. Rogers at the time of the cholera epidemic) controls in peace fourteen station hospitals, and in war furnishes a mobile field hospital to each brigade. There are also veterinary station hospitals. The supply department controls mills at Tura, Halfa and Khartum.

The stringent system of selecting British officers, originated by the first sirdar in 1883, is shown by the fact that of the 24 employed in creating the army, 14 rose to be generals. The competition for employment in the army is still severe. In 1908 there were 140 British warrant and non-commissioned officers. Four of the fellahin battalions were officered by Orientals; in the other five, British officers commanded. Seven officers were employed with the artillery, six with the camel corps. Each of the Sudanese battalions had four British officers, and each squadron of cavalry one. Twelve medical and two veterinary officers are also employed departmentally, as well as officers acting as directors of supply, &c. Since the assumption of command by the third sirdar, Colonel (afterwards Lord) Kitchener, the ordnance, supply and engineer services have been separately administered, and a financial secretary is charged with the duty of preparing the budget, making contracts, &c. The total annual expenditure is £500,000.

The reorganized military school system under British control, for supplying officers, dates from 1887. The course lasts for about two years, and two hundred students can be accommodated. After the reconquest of the Sudan one-fourth of the cadets in the military school of Cairo were Sudanese. Later, however, the Sudanese cadets were transferred to a branch school at Khartum.

The army raised by the first sirdar in January 1883 was highly commended for its work on the line of communication in 1884-1885, and its artillery and camelry distinguished themselves in the action at Kirbekan in February 1885. Colonel Sir Francis Grenfell succeeded General Sir Evelyn Wood in March 1885, and while under his command the army continued to improve, and fought successful actions at Gemaiza, Argin, Toski and Tokar. At Toski the Dervish force was nearly annihilated. In March 1892 Colonel Kitchener succeeded General Sir Francis Grenfell, and four years later began his successful reconquest of the Sudan. In June 1896, owing to the indefatigable exertions of Major Wingate, a perfected system of secret intelligence enabled the sirdar to bring an overwhelming force of 6 to 1 against the Dervish outpost at Firket and destroy it. In September 1896 a skirmish at Hafir, with similarly successful tactics, gave the British commander the possession of Dongola. On the 7th of August 1897 Colonel Hunter surprised and annihilated a weak Dervish garrison at Abu Hamed, to which place, by the 31st of October 1897, a railway had been laid across the Nubian desert from Wadi Halfa, a distance of 230 m., the "record" construction of 5300 yds surveyed, embanked and laid in one day having been attained. On the 26th of December 1897 the Italian troops handed over Kassala to Colonel Parsons, R.A. On the 8th of April 1898 a British division, with the Egyptian army, destroyed the Dervish force under the amir Mahmud Ahmed, on the Atbara river On the 2nd of September the khalifa attacked the British-Egyptian troops at Kerreri (near Omdurman), and being routed, his men dispersed; Khartum was occupied, and on the 19th of September the Egyptian flag was rehoisted at Fashoda. On the 22nd of September 1898 Gedaref was taken from the amir Ahmed Fedil by Colonel Parsons, and on the 26th of December the army of Ahmed Fedil was finally defeated and dispersed near Roseires. The khalifa's army, reduced to an insignificant number, after several unsuccessful engagements withdrew to the west of the Nile, where it was attacked, on the 24th of November 1899, after a forced march by Colonel Wingate, and annihilated. The khalifa himself was killed, while the victor, who had joined the Egyptian army in 1883 as aide-de-camp to the first sirdar, in December 1899 became the fourth sirdar, as Major-General Sir F. R. Wingate, K.C.B., K.C.M.G., D.S.O., &c. (E. Wo.)

II. ANCIENT EGYPT

A. *Exploration and Research.*—Owing to its early development of a high civilization with written records, its wealth, and its preservative climate, Egypt is the country which most amply repays archaeological research. It is especially those long ages during which Egypt was an independent centre of culture and government, before its absorption in the Persian empire in the 6th century B.C., that make the most powerful appeal to the imagination and can often justify this appeal by the splendour of the monuments representing them. Later, however, the history of Hellenism, the provincial history of the Roman empire, the rise of Christianity and the triumph of Islam successively receive brilliant illustration in Egypt.

As early as the 17th century travellers began to bring home specimens of ancient Egyptian handiwork: a valuable stele from Sakkara of the beginning of the Old Kingdom was presented to the Ashmolean Museum at Oxford in 1683. In the following century the Englishman R. Pococke (1704–1765), the Dane F. L. Norden (1708–1742), both travelling in 1737, and others later, planned, described or figured Egyptian ruins in a primitive way and identified many of the sites with cities named in classical authors. Napoleon's great military expedition in 1798 was accompanied by a scientific commission including artists and archaeologists, the results of whose labours fill several of the magnificent volumes of the *Description de l'Égypte.* The antiquities collected by the expedition, including the famous Rosetta stone, were ceded to the British government at the capitulation of Alexandria, in 1801. Thereafter Mehemet Ali threw Egypt freely open to Europeans, and a busy traffic in antiquities began, chiefly through the agency of the consuls of different powers. From the year 1820 onwards the growth of the European collections was rapid, and Champollion's decipherments (see below, § "Language and Writing") of the hieroglyphic inscriptions, dating from 1821, added fresh impetus to the fashion of collecting, in spite of doubts as to their trustworthiness. In 1827 a combined expedition led by Champollion and Rosellini was despatched by the governments of France and Tuscany, and accomplished a great deal of valuable work in copying scenes and inscriptions. But the greatest of such expeditions was that of Lepsius, under the auspices of the

Prussian government, in 1842–1845. Its labours embraced not only Egypt and Nubia (as far as Khartum) but also the Egyptian monuments in Sinai and Syria; its immense harvest of material is of the highest value, the new device of taking paper impressions or "squeezes" giving Lepsius a great advantage over his predecessors, similar to that which was later conferred by the photographic camera.

A new period was opened in Egyptian exploration in 1858 when Mariette was appointed director of archaeological works in Egypt, his duties being to safeguard the monuments and prevent their exploitation by dealers. As early as 1835 Mehemet Ali had given orders for a museum to be formed; little however, was accomplished before the whole of the resulting collection was given away to the Archduke Maximilian of Austria in 1855. Mariette, who was appointed by the viceroy Said Pasha at the instance of the French government, succeeded in making his office effective and permanent, in spite of political intrigues and the whims of an Oriental ruler; he also secured a building on the island of Bulak (Bulaq) for a viceregal museum in which the results of his explorations could be permanently housed. Supported by the French interest, the established character of this work as a department of the Egyptian government (which also claims the ancient sites) has been fully recognized since the British occupation. The "Service of Antiquities" now boasts a large annual budget and employs a number of European and native officials—a director, curators of the museum, European inspectors and native sub-inspectors of provinces (at Luxor for Upper Egypt and Nubia, at Assiut for Middle Egypt and the Fayum, at Mansura for Lower Egypt, besides a European official in charge of the government excavations at Memphis). The museum, no longer the property of an individual, was removed in 1889 from the small building at Bulak to a disused palace at Giza, and since 1902 has been established at Kasr-en-Nil, Cairo, in a special building, of ample size and safe from fire and flood In the year 1881 the directorship of the museum was temporarily undertaken by Prof. Maspero, who resumed it in 1899. The admirably conducted Archaeological Survey of the portion of Nubia threatened by the raising of the Assuan dam is in the charge of another department—the Survey department, directed for many years up to 1909 by Captain H. G. Lyons. Non-official agencies (supported by voluntary contributions) for exploration in Egypt comprise the Egypt Exploration Fund, started in London in 1881, with its two branches, viz. the Archaeological Survey (1890) for copying and publishing the monuments above ground, and the Graeco-Roman Branch (1897), well known through the brilliant work in Greek papyri of B. P Grenfell and A. S. Hunt; and the separate Research Account founded by Professor W. M. Flinders Petrie in London (University College) in 1896, and since 1905 called the British School of Archaeology in Egypt (see especially MEMPHIS). The *Mission archéologique française au Caire*, established as a school by the French government in 1881, was re-organized in 1901 on a lavish scale under the title *Institut français d'archéologie orientale du Caire*, and domiciled with printing-press and library in a fine building near the museum. As the result of an excellent bargain, it was afterwards removed to the Munira palace in the south-east part of the city. An archaeologist is attached to the German general consulate to look after the interests of German museums, and is director of the German Institute of Archaeology. The Orient-Gesellschaft (German Orient-Society) has worked in Egypt since 1901 with brilliant results. Excavations and explorations are also conducted annually by the agents of universities and museums in England, America and Germany, and by private explorers, concessions being granted generally on the terms that the Egyptian government shall retain half of the antiquities discovered, while the other half remains for the finders.

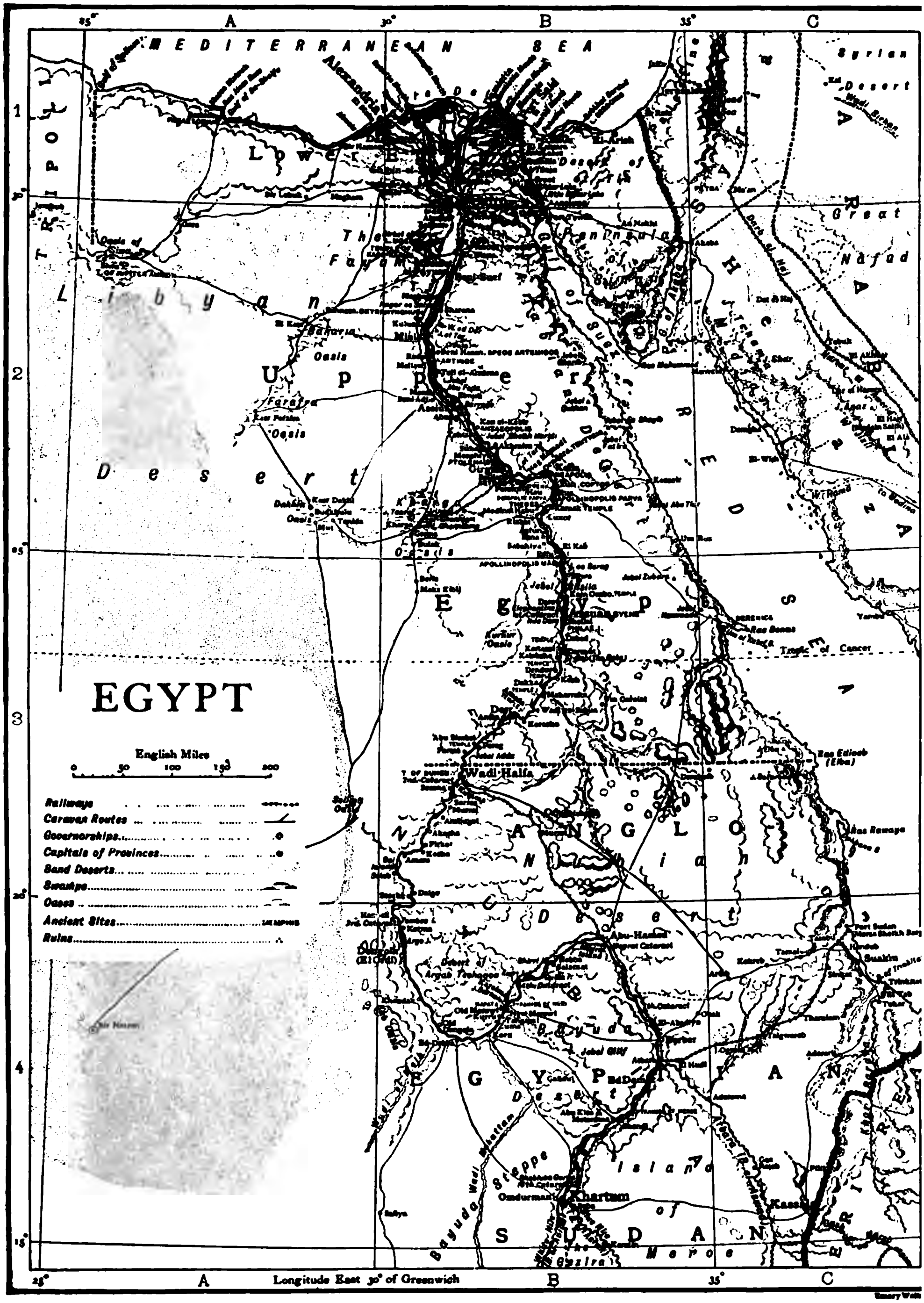
The era of scientific excavation began with Flinders Petrie's work at Tanis in 1883. Previous explorers kept scientific aims in view, but the idea of scientific archaeology was not realized by them. The procedure in scientific excavation is directed to collecting and interpreting all the information that can be obtained from the excavation as to the history and nature of the site explored, be it town, temple, house, cemetery or individual grave, wasting no evidence that results from it touching the endless problems which scientific archaeology affords—whether in regard to arts and crafts, manners and customs, language, history or beliefs. This is a totally different thing from mere hunting for inscriptions, statues or other portable objects which will present a greater or less value in themselves even when torn from their context. Such may, of course, form the greater part of the harvest and working material of a scientific excavator; their presence is most welcome to him, but their complete absence need be no bar to his attainment of important historical results. The absence of scientific excavation in Egypt was deplored by the Scottish archaeologist Alexander Henry Rhind (1833–1863), as early as 1862. Since Flinders Petrie began, the general level of research has gradually risen, and, while much is shamefully bad and destructive, there is a certain proportion that fully realizes the requirements of scientific archaeology.

Antiquities, Sites, &c.—The remains for archaeological investigation in Egypt may be roughly classified as material and literary: to the latter belong the texts on papyri and the inscriptions, to the former the sites of ancient towns with the temples, fortifications and houses; remains of roads, canals, quarries and other matters falling within the domain of ancient topography; the larger monuments, as obelisks, statues, stelae, &c.; and finally the small antiquities—utensils, clothes, weapons, amulets, &c. Where moisture can reach the antiquities their preservation is no better in Egypt than it would have been in other countries; for this reason all the papyri in the Delta have perished unless they happen to have been charred by fire. A terrible pest is a kind of termite which is locally abundant and has probably visited most parts of Egypt at one time or another, destroying all dead vegetable or animal material in the soil that was not specially protected.

In Lower Egypt the cities built of crude brick were very numerous, especially after the 7th century B.C., but owing to the value of stone very few of their monuments have escaped destruction: even the mounds of rubbish which marked their sites furnish a valuable manure for the fields and in consequence are rapidly disappearing. Granite and other hard stones, having but a limited use (for millstones and the like), have the best chance of survival. At Bubastis, Tanis, Behbeit (Iseum) and Heliopolis considerable stone remains have been discovered. In the north of the Delta wherever salt marshes have prevented cultivation in modern times, the mounds, such as those of Pelusium, still stand to their full height, and the more important are covered with ruins of brick structures of Byzantine and Arab date.

Middle and Upper Egypt were less busy and prosperous in the later ages than Lower Egypt. There was consequently somewhat less consumption of the old stone-work. Moreover, in many places equally good material could be obtained without much difficulty from the cliffs on both sides of the Nile. Yet even the buried portions of limestone buildings have seldom been permitted to survive on the cultivated land; the Nubian sandstone of Upper Egypt was of comparatively little value, and, generally speaking, buildings in that material have fallen into decay rather than been destroyed by quarrying.

Starting from Cairo and going southward we have first the great pyramid-field, with the necropolis of Memphis as its centre; stretching from Abū Roāsh on the north to Lisht on the south, it is followed by the pyramid group of Dahshūr, the more isolated pyramids of Medūm and Illahūn, and that of Hawāra in the Fayūm. On the east bank are the limestone quarries of Turra and Masāra opposite Memphis. South of the Fayūm on the western border of the desert are the tombs of Deshāsha, Meir and Assiūt, and on the east bank those of Beni Hasan, the rock-cut temple of Speos Artemidos, the tombs of El Bersha and Sheikh Said; the tombs and stelae of El Amarna with the alabaster quarries of Hanub in the desert behind them, and the tombs of Deir el Gebrāwi. Beyond Assiūt are the tombs of Dronka and Rifa, the temples of Abydos and Dendera, and the tombs, &c., at Akhmim and Kasr es Saiyād. Farther south are the stupendous


EGYPT
English Miles
0 50 100 150 200
Railways
Caravan Routes
Governorships
Capitals of Provinces
Sand Deserts
Swamps
Oases
Ancient Sites
Ruins
MEDITERRANEAN SEA
Lower Egypt
Libyan Desert
Upper Egypt
The Fayum
Baharia Oasis
Farafra Oasis
Dakhla Oasis
Kharga Oasis
Peninsula of Sinai
Gulf of Suez
Red Sea
Great Nafud
Syrian Desert
Arabia
Alexandria
El Arish
Wadi Halfa
Abu Hamed
Berber
Khartum
Omdurman
Kassala
Suakin
Port Sudan
Anglo Egyptian Sudan
Nubian Desert
Bayuda Desert
Bayuda Steppe
Island of Meroe
Gezira
Tropic of Cancer
Ras Benas
Ras Elba
Ras Rawaya
Dongola
Aswan
Kosseir
Jebel Gilif
Bir Natrun
A B C
1 2 3 4
25° 30° 35°
Longitude East 30° of Greenwich
Emery Walker

ruins of Thebes on both sides of the river, the temple of Esna, the ruins and tombs of El Kāb, the temple of Edfū, the quarries of Silsila and the temple of Ombos, followed by the inscribed rocks of the First Cataract, the tombs and quarries of Assuan and the temples of Philae.

In Nubia, owing to the poverty of the country and its scanty population, the proportion of monuments surviving is infinitely greater than in Egypt. Here are the temples of Debōd, the temple and quarries of Kertassi, the temples of Kalabsha, Bēt el Wali, Dendūr, Gerf Husēn, Dakka, Maharaka, Es-Sebū'a, 'Amāda and Derr, the grottes of Ellesīya, the tombs of Anība, the temple of Ibrīm, the great rock-temples of Abū-Simbel, the temples at Jebel Adda and Wadi Halfa, the forts and temples of Semna, the temples of Amāra (Meroitic) and Sōleb. Beyond are the Ethiopian temples and pyramids of Jebel Barkal and the other pyramids of Napata at Tangassi, &c., the still later pyramids of Meroe at Begarawia, and the temples of Messuwarāt and Nāga reaching to within 50 m. of Kharṭūm.

Outside the Nile valley on the west are temples in the Great and Little Oases and the Oasis of Ammon: on the east quarries and stelae on the Hammamāt road to the Red Sea, and mines and other remains at Wadi Maghāra and Serābīt el Khādim in the Sinai peninsula. In Syria there are tablets of conquest on the rocks at the mouth of the Nahr el Kelb.

Of the collections of Egyptian antiquities in public museums, those of the British Museum, Leiden, Berlin, the Louvre, Turin were already very important in the first half of the 19th century, also in a less degree those of Florence, Bologna and the Vatican. Most of these have since been greatly increased and many others have been created. By far the largest collection in the world is that at Cairo. In America the museums and universities of Boston, Chicago, Philadelphia, San Francisco and New York have collections of greater or less interest. Besides these the museums of Edinburgh, Liverpool, Manchester and Oxford are noteworthy in Great Britain for their Egyptian antiquities, as are those of St Petersburg, Vienna, Marseilles, Munich, Copenhagen, Palermo and Athens; there are also collections in most of the British colonies. Private collections are numerous.

Literary Records.—In estimating the sources of information regarding pre-Christian Egypt, the native sources, first opened to us by Champollion, are infinitely the most important. With very few exceptions they are contemporary with the events which they record. Of the composition of history and the description of their own manners and customs by the Egyptians for posterity, few traces have reached our day. Consequently the information derived from their monuments, in spite of their great abundance, is of a fortuitous character. For one early papyrus that survives, many millions must have perished. If the journals of accounts, the letters and business documents, had come down to us *en masse*, they would no doubt have yielded to research the history and life of Egypt day by day; but those that now represent a thousand years of the Old Kingdom and Middle Kingdom together would not half fill an ordinary muniment chest. A larger proportion of the records on stone have survived, but that an event should be inscribed on stone depends on a variety of circumstances and not necessarily on its importance. There may seem to be a great abundance of Egyptian monuments, but they have to cover an enormous space of time, and even in the periods which are best represented, gravestones recording the names of private persons with a prayer or two are scarcely material for history. A scrap of annals has been found extending from the earliest times to the Vth Dynasty, as well as a very fragmentary list of kings reaching nearly to the end of the Middle Kingdom, to help out the scattered data of the other monuments. As to manners and customs, although we possess no systematic descriptions of them from a native source, the native artists and scribes have presented us with exceptionally rich materials in the painted and sculptured scenes of the tombs from the Old and Middle Kingdoms and the New Empire. For the Deltaic dynasties these sources fail absolutely, the scenes being then either purely religious or conventional imitations of the earlier ones.

Fortunately the native records are largely supplemented by others: valuable information comes from cuneiform literature, belonging to two widely separated periods. The first group is contemporary with the XVIIIth and XIXth Dynasties and consists in the first place of the Tell el Amarna tablets with others related to them, containing the reports of governors of the Syrian possessions of Egypt, and the correspondence of the kings of Babylon, Assur, Mitanni and Khatti (the Hittites) with the Pharaohs. The sequel to this is furnished by Winckler's discovery of documents relating to Rameses II. of the XIXth Dynasty in the Hittite capital at Boghaz Keui (see also Hittites and Pteria). The other group comprises the annals and inscriptions of the Assyrian kings Esarhaddon and Assur-bani-pal, recording their invasions of Egypt under the XXVth Dynasty. There are also a few references to Egypt of later date down to the reign of Darius. In Hebrew literature the Pentateuch, the historical books and the prophets alike contain scanty but precious information regarding Egypt. Aramaic papyri written principally by Jews of the Persian period (5th century B.C.) have been found at Syene and Memphis.

Of all the external sources the literary accounts written in Greek are the most valuable. They comprise fragments of the native historian Manetho, the descriptions of Egypt in Herodotus and Diodorus, the geographical accounts of Strabo and Ptolemy, the treatise of Plutarch on Isis and Osiris and other monographs or scattered notices of less importance. Our knowledge of the history of Alexander's conquest, of the Ptolemies and of the Roman occupation is almost entirely derived from Greek sources, and in fact almost the same might be said of the history of Egypt as far back as the beginning of the XXVIth Dynasty. The non-literary Greek remains in papyri and inscriptions which are being found in great abundance throw a flood of light on life in Egypt and the administration of the country from the time of Ptolemy Philadelphus to the Arab conquest. On the other hand, papyri and inscriptions in Latin are of the greatest rarity, and the literary remains in that language are of small importance for Egypt.

Arabic literature appears to be entirely barren of authentic information regarding the earlier condition of the country. Two centuries of unchallenged Christianity had broken almost completely the traditions of paganism, even if the Moslems had been willing to consider them, either in their fanciful accounts of the origins of cities, &c., or elsewhere.

B. *The Country in Ancient Times.*—The native name of Egypt was Kēmi (KM·T); clearly meaning "the black land," Egypt being so called from the blackness of its alluvial soil (cf. Plut. *De Is. et Os.* cap. 33): in poetical inscriptions *Kēmi* is often opposed to *Toshri*, "the red land," referring to the sandy deserts around, which however, would probably be included in the term Kēmi in its widest sense. Egypt is called in Hebrew Mizraim, מצרים, possibly a dual form describing the country in reference to its two great natural and historical divisions of Upper Egypt and Lower Egypt: but Mizraim (poetically sometimes Māzōr) often means Lower Egypt, Upper Egypt being named Pathros, "the south land." In Assyrian the name was Muṣri, Miṣri: in Arabic it is Miṣr, مصر, pronounced Masr in the vulgar dialect of Egypt. These names are certainly of Semitic origin and perhaps derive from the Assyrian with the meaning "frontier-land" (see Mizraim). Winckler's theory of a separate Muṣri immediately south of Palestine is now generally rejected (see, for instance, Ed. Meyer, *Die Israeliten und ihre Nachbarstämme*, 455). The Greek Αἴγυπτος (Aegyptus) occurs as early as Homer; in the *Odyssey* it is the name of the Nile (masc.) as well as of the country (fem.): later it was confined to the country. Its origin is very obscure (see Pietschmann in Pauly-Wissowa, *Realencyclopädie*, s.v. "Aigyptos"). Brugsch's derivation from Hakeptah, a name of the northern capital, Memphis, though attractive, is unconfirmed.

Egypt normally included the whole of the Nile valley from the First Cataract to the sea; pure Egyptians, however, formed the population of Lower Nubia above the Cataract in prehistoric times; at some periods also the land was divided into separate kingdoms, while at others Egypt stretched southward into Nubia, and it generally claimed the neighbouring Libyan deserts and oases on the west and the Arabian deserts on the east to the shore of the Red Sea, with Sinai and the Mediterranean coast as far as Rhinocorura (El Arish). The physical features in ancient times were essentially the same as at the present day. The bed of the Nile was lower: it appears to have risen by its own deposits at a rate of about 4 in. in a century. In the north of the Delta, however, there was a sinking of the land, in consequence of which the accumulations on some of the ancient sites there extend below the present sea-level. On the other hand at the south end of the Suez canal the land may have risen bodily, since the head of the Gulf of Suez has been cut off by a bank of rock from the Bitter lakes, which were probably joined to it in former days. The banks of the Nile and the islands in it are subject to gradual but constant alteration—indeed, several ancient sites have been much eroded or destroyed—and the main volume of the stream may in course of time be diverted into what has previously been a secondary channel. According to the classical writers, the mouths or branches of the Nile in the Delta were five in number (seven including two that were artificial): now there are only two. In Upper Egypt the main stream tended as now to flow along the eastern edge of the valley, while to the west was a parallel stream corresponding to the Bahr Yusuf. From the latter a canal or branch led to the Lake of Moeris, which, until the 3rd century B.C., filled the deep depression of the Fayum, but is now represented only by the strongly brackish waters of the Birket el Kerūn, left in the deepest part. The area of alluvial land has probably not changed greatly in historic times. The principal changes that have occurred are due to the grip which civilization has taken upon the land in the course of thousands of years, often weakening but now firmer than ever. In early days no doubt the soil was cultivated in patches, but gradually a great system of canals was organized under the control of the central government, both for irrigation and for transport. The wild flora of the alluvial valley was probably always restricted and eventually was reduced almost to the "weeds of cultivation," when every acre of soil, at one period of the year under water, and at another roasted under the burning heat of a semi-tropical sun, was carefully tilled. The acacia abounded on the borders of the valley, but the groves were gradually cut down for the use of the carpenter and the charcoal-burner. The desert was full of wild life, the balance of nature being preserved by the carnivorous animals preying on the herbivorous; trees watered by soakage from the Nile protected the undergrowth and encouraged occasional rainfall. But this balance was upset by the early introduction of the goat and later of the camel, which destroyed the sapling trees, while the grown ones fell to the axe of the woodcutter. Thus in all probability the Egyptian deserts have become far poorer in animals and trees than they were in primitive times. Much of Lower Egypt was left in a wilder state than Upper Egypt. The marshy lands in the north were the resort of fishermen and fowlers, and the papyrus, the cultivation of which was a regular industry, protected an abundance of wild life. The abandonment of papyrus culture in the 8th century A.D., the neglect of the canals, and the inroads of the sea, have converted much of that country into barren salt marsh, which only years of draining and washing can restore to fertility.

The rich alluvial deposits of the Nile which respond so readily to the efforts of the cultivator ensured the wealth of the country. Moulded into brick, without burning, this black clay also supplied the common wants of the builder, and even the palaces of the greatest kings were constructed of crude brick. For more lasting and ambitious work in temples and tombs the materials could be obtained from the rocks and deserts of the Nile valley. The chief of these was limestone of varying degrees of fineness, composing the cliffs which lined the valley from the apex of the Delta to the neighbourhood of El Kāb; the best quality was obtained on the east side opposite Memphis from the quarries of Turra and Masāra. From El Kāb southward its place was taken by Libyan sandstone, soft and easily worked, but unsuitable for fine sculpture. These two were the ordinary building stones. In the limestone was found the flint or chert used for weapons and instruments in early times. For alabaster the principal quarry was that of Hanub in the desert 10 m. behind El Amarna, but it was obtained elsewhere in the limestone region, including a spot near Alexandria. A hard and fine-grained quartzite sandstone was quarried at Jebel Ahmar behind Heliopolis, and basalt was found thence along the eastern edge of the Delta to near the Wadi Tumilāt. Red granite was obtained from the First Cataract, breccia and diorite were quarried from very early times in the Wadi Hammamāt, on the road from Coptos to the Red Sea, and porphyry was brought, chiefly in Roman times but also in the prehistoric age, from the same region at Jebel Dokhān.

Egypt was poor in metals. Gold was obtained chiefly from Nubia: iron was found in small quantities in the country and at one time was worked in the neighbourhood of Assuān. Some copper was obtained in Sinai. Of stones that were accounted precious Sinai produced turquoise and the Egyptian deserts garnet, carnelian and jasper.

The native supply of wood for industrial purposes was exceedingly bad: there was no native wood long enough and straight enough to be used in joiners' work or sculpture without fitting and patching: palm trees were abundant, and if the trees could be spared, their split stems could be used for roofing. For boatbuilding papyrus stems and acacia wood were employed, and for the best work cedar-wood was imported from Lebanon.

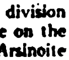
Egypt was isolated by the deserts and the sea. The Nile valley afforded a passage by ship or on foot into Nubia, where, however, little wealth was to be sought, though gold and rarities from the Sudan, such as ivory and ebony, came that way and an armed raid could yield a good spoil in slaves and cattle. The poverty-stricken and barbarous Nubians were strong and courageous, and gladly served in Egypt as mercenary soldiers and police. Through the oases also ran paths to the Sudan by which the raw merchandise of the southern countries could be brought to Egypt. Eastward, roads led through the Arabian mountains to the Red Sea, whence ships made voyages to the incense-bearing land of Puoni (Punt) on the Somali coast of Africa, rich also in gold and ivory. The mines of Sinai could be reached either by sea or by land along the route of the Exodus. The roads to Syria skirted the east border of the Delta and then followed the coast from near Pelusium through El Arish and Gaza. A secondary road branched off through the Wadi Tumilāt, whence the ways ran northwards to Syria and southwards to Sinai. On the Libyan side the oasis of Siwa could be reached from the Lake of Moeris or from Terrana (Terenuthis), or by the coast route which also led to the Cyrenaica. The Egyptians had some traffic on the Mediterranean from very remote times, especially with Byblus in Phoenicia, the port for cedar-wood.

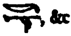
Of the populations surrounding Egypt the negroes (Nehsi) in the south (Cush) were the lowest in the scale of civilization: the people of Puoni and of Libya (the Tehen, &c.) were pale in colour and superior to the negroes, but still show no sign of a high culture. The Syrians and the Keftiu, the latter now identified with the Cretans and other representatives of the Aegean civilization, are the only peoples who by their elaborate clothing and artistic products reveal themselves upon the ancient Egyptian monuments as the equals in culture of the Egyptian nation.

The Egyptians seem to have applied no distinctive name to themselves in early times: they called themselves proudly *rōmi* (RMTW), *i.e.* simply "men," "people," while the despised races around them, collectively Ḥ'SWT, "desert-peoples," were distinguished by special appellations. The races of mankind, including the Egyptians, were often called the Nine Archers. Ultimately the Egyptians, when their insularity disappeared under the successive dominations of Ethiopia, Assyria and Persia, described themselves as *rem-n-Kēmi*, "men of Egypt." Whence the population of Egypt as we trace it in prehistoric and historic times came, is not certain. The early civilization of Egypt shows remarkable coincidences with that of Babylonia, the language is of a Semitic type, the religion may well be a compound of a lower African and a higher Asiatic order of ideas. According to the evidence of the mummies, the Egyptians were of slender build, with dark hair and of Caucasian type. Dr Elliott Smith, who has examined thousands of skeletons and mummies of all periods, finds that the prehistoric population of Upper Egypt, a branch of the North African-Mediterranean-Arabian race, changed with the advent of the dynasties to a stronger type, better developed than before in skull and muscle. This was apparently due to admixture with the Lower Egyptians, who themselves had been affected by Syrian immigration. Thereafter little further change is observable, although the rich lands of Egypt must have attracted foreigners from all parts. The Egyptian artists of the New Empire assigned distinctive types of feature as well as of dress to the different races with which they came into contact, Hittites, Syrians, Libyans, Bedouins, negroes, &c.

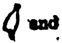
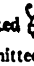
The people of Egypt were not naturally fierce or cruel. Intellectually, too, they were somewhat sluggish, careless and unbusinesslike. In the mass they were a body of patient labourers, tilling a rich soil, and hating all foreign lands and ways. The wealth of their country gave scope for ability within the population and also attracted it from outside: it enabled the kings to organize great monumental enterprises as well as to arm irresistible raids upon the inferior tribes around. Urged on by necessity and opportunity, the Egyptians possessed sufficient enterprise and originating power to keep ahead of their neighbours in most departments of civilization, until the more warlike empires of Assyria and Persia overwhelmed them and the keener intellects of the Greeks outshone them in almost every department. The debt of civilization to Egypt as a pioneer must be considerable, above all perhaps in religious thought. The moral ideals of its nameless teachers were high from an early date: their conception of an after-life was exceedingly vivid: the piety of the Egyptians in the later days was a matter of wonder and scoffing to their contemporaries; it is generally agreed that certain features in the development of Christianity are to be traced to Egypt as their birthplace and nidus.

For researches into the ethnography of Egypt and the neighbouring countries, see W. Max Müller, *Asien und Europa nach den altäg. Inschriften* (Leipzig, 1893), *Egyptological Researches* (Washington, 1906); for measurements of Egyptian skulls, Miss Fawcett in *Biometrika* (1902); A. Thomson and D. Randall-MacIver, *The Ancient Races of the Thebaid* (Oxford, 1905) (cf. criticisms in *Man*, 1905; and for comparisons with modern measurements, C. S. Myers, *Journ. Anthropological Institute*, 1905, 80). W. Flinders Petrie has collected and discussed a series of facial types shown in prehistoric and early Egyptian sculpture, *Journal Anthropological Institute*, 1901, 248. For Elliott Smith's results see *The Cairo Scientific Journal*, No. 30, vol. iii., March 1909.

Divisions.—In ancient times Egypt was divided into two regions, representing the kingdoms that existed before Menes. Lower Egypt, comprising the Delta and its borders, formed the "North Land," *To-meh*, and reached up the valley to include Memphis and its province or "nome," while the remainder of the Egyptian Nile valley was "the South,' *Shems* (SM'W ). The south, if only as the abode of the sun, always had the precedence over the north in Egypt, and the west over the east. Later the two regions were known respectively as P-to-rēs (Pathros), "the south land," and P-to-meh, "the north land." In practical administration this historic distinction was sometimes observed, at others ignored, but in religious tradition it had a firm hold. In Roman times a different system marked off a third region, namely Middle Egypt, from the point of the Delta southward. Theoretically, as its name Heptanomis implies, this division contained seven nomes, actually from the Hermopolite on the south to the Memphite on the north (excluding the Arsinoite according to the papyri). Some tendency to this existed earlier. Egypt to the south of the Heptanomis was the Thebais, called P-tesh-en-Ne, "the province of Thebes," as early as the XXVIth Dynasty. The Thebais was much under the influence of the Ethiopian kingdom, and was separated politically in the troubled times of the XXIIIrd Dynasty, though the old division into Upper and Lower Egypt was resumed in the XXVIth Dynasty.

If Upper and Lower Egypt represented ancient kingdoms, the nomes have been thought to carry on the traditions of tribal settlements. They are found in inscriptions as early as the end of the IIIrd Dynasty, and the very name of Thoth, and that of another very ancient god, are derived from those of two contiguous nomes in Lower Egypt. The names are written by special emblems placed on standards, such as an ibis , a jackal , a hare , a feathered crown , a sistrum , a blade , &c., suggesting tribal badges. Some nomes having a common badge but distinguished as "nearer" or "further," i.e "northern" or "southern," have simply been split, as they are contiguous: in one case, however, corresponding "eastern" and "western" Harpoon nomes are widely separated on opposite sides of the Delta. In a few cases, such as "the West," "the Beginning of the East," it is obvious that the names are derived solely from their geographical situation. It is quite possible that the divisions are geographical in the main, but it seems likely that there were also religious, tribal and other historical reasons for them. How their boundaries were determined is not certain: in Upper Egypt in many cases a single nome embraced both sides of the river. The number and nomenclature of the nomes were never absolutely fixed. In temples of Ptolemaic and Roman age the full series is figured presenting their tribute to the god, and this series approximately agrees with the scattered data of early monuments. The normal number of the nomes in the sacred lists appears to be 42, of which 22 belonged to Upper Egypt and 20 to Lower Egypt. In reality again these nome-divisions were treated with considerable freedom, being split or reunited and their boundaries readjusted. Each nome had its metropolis, normally the seat of a governor or nomarch and the centre of its religious observances. During the New Empire, except at the beginning, the nomes seem to have been almost entirely ignored: under the Deltaic dynasties (except of course in the traditions of the sacred writing) they were named after the metropolis, as "the province (*tosh*) of Busiris," "the province of Sais," &c.: hence the Greek names Βουσιρίτης *νομός*, &c. The Arsinoite nome was added by the Ptolemies after the draining of the Lake of Moeris (*q.v.*), and in the later Ptolemaic and the Roman times many changes and additions to the list must have been made. In Christian texts the "provinces" appear to have been very numerous.

See H. Brugsch, *Geographische Inschriften altägyptischer Denkmäler* (3 vols., Leipzig, 1857–1860), and for the nomes on monuments of the Old Kingdom, N. de G. Davies, *Mastaba of Ptahhetep and Akhethetep* (London, 1901), p. 24 et sqq.

King and Government.—The government of Egypt was monarchical. The king (for titles see PHARAOH) was the head of the hierarchy: he was himself divine and is often styled "the good god," and was the proper mediator between gods and men. He was also the dispenser of office, confirmer of hereditary titles and estates and the fountain of justice. Oaths were generally sworn by the "life" of the king. The king wore special head-dresses and costumes, including the crowns of Upper  and Lower Egypt (often united ), and the cobra upon his forehead. Females were admitted to the succession, but very few instances occur before the Cleopatras. The most notable Pharaonic queen in her own right was Hatshepsut in the XVIIIth Dynasty, but her reign was ignored by the later rulers even of her own family. A certain Nitocris of about the VIIIth Dynasty and Scemiophris of the XIIth Dynasty are in the lists, but are quite obscure. Yet inheritance through the female line was fully recognized, and marriage with the heiress princess was sought by usurpers to legitimate the claims of their offspring.

Often, especially in the XIIth Dynasty, the king associated his heir on the throne with him to ensure the succession.

From time to time feudal conditions prevailed: the great landowners and local princes had establishments of their own on the model of the royal court, and were with difficulty kept in order by the monarch. In rare cases during the Middle Kingdom (inscriptions in the tomb of Ameni at Beni Hasan, graffiti in the quarries of Hanub) documents were dated in the years of reign of these feudatory nobles. Under the Empire all power was again centralized in the hands of the Pharaoh. The apportionment of duties amongst the swarm of officials varied from age to age, as did their titles. Members of the royal family generally held high office. Under the Empire Egypt was administered by a vast bureaucracy, at the head of which, responsible to the king, was the vizier, or sometimes two viziers, one for Upper Egypt, the other for Lower Egypt (in which case the former, stationed at Thebes, had the precedence). The duties of the vizier and the procedure in his court are detailed in a long inscription which is repeated in three tombs of the XVIIIth Dynasty at Thebes (Breasted, *Records*, ii. § 663 et seqq.). The strictest impartiality was enjoined upon him, and he was advised to hold aloof from the people in order to preserve his authority. The office of vizier was by no means a sinecure. All the business of the country was overlooked by him—treasury, taxation, army, law-courts, expeditions of every kind. Egypt was the vast estate of Pharaoh, and the vizier was the steward of it.

Army.—The youth of Egypt was liable to be called upon for service in the field under the local chiefs. Their training consisted of gymnastic and warlike exercises which developed strength and discipline that would be as useful in executing public works and in dragging large monuments as in strictly military service. They were armed in separate companies with bows and arrows, spears, daggers and shields, and the officers carried battle-axes and maces. The army, commanded in chief by Una under the VIth Dynasty for raids in Sinai or Palestine, comprised levies from every part of Egypt and from Nubia, each under its own leader. Under the New Empire, when Egypt was almost a military state, the army was a more specialized institution, the art of war in siege and strategy had developed, divisions were formed with special standards, there were regiments armed with battle-axes and scimitars, and chariots formed an essential part of the host. Egyptian cavalry are not represented upon the monuments, and we hear little of such at any time. Herodotus divides the army into two classes, the Calasiries and the Hermotybies; these names, although he was not aware of it, mean respectively horse- and foot-soldiers, but it is possible that the former name was only traditional and had characterized those who fought from chariots, a mode of warfare that was obsolete in Herodotus's own day: as a matter of fact both classes are said to have served on the warships of Xerxes' fleet.

Arms and Armour.—From the contents of graves and other remains, and the sculptured and painted scenes, an approximate idea can be obtained of the weapons of the Egyptians at all periods from the prehistoric age onwards. Only a few points are here noted. Stone mace-heads are found in the earliest cemeteries, together with flint implements that may be the heads of lances, &c., and thin leaf-shaped daggers of bronze. Stone arrow-heads are common on the surface of the desert. Thin bronze arrow-heads appear at an early date; under the Empire they are stouter and furnished with a tang, and later still, towards the Greek period, they are socketed (often three-sided), or, if of iron, still tanged. The wooden club, a somewhat primitive weapon, seems to have been considered characteristic of foreigners from very early times, and, in scenes dating from the Middle Kingdom, belong principally to the levies from the surrounding barbarians. The dagger grew longer and stouter, but the sword made its appearance late, probably first in the hands of the *Sherdana* (Sardinian?), mercenaries of the time of Rameses II. A peculiar scimitar, *khopsh* , is characteristic of the Empire. Slings are first heard of in Egyptian warfare in the 8th century B.C. The chariot was doubtless introduced with the horse in the Hyksos period; several examples have been discovered in the tombs of the New Kingdom. Shields were covered with ox-hide and furnished with round sighting-holes above the middle. Cuirasses of bronze scales were worn by the kings and other leaders. The linen corslets of the Egyptian soldiery at a later time were famous, and were adopted by the Persian army. According to the paintings of the Middle Kingdom in the tombs of Beni Hasan, the battlements of brick fortresses were attacked and wrenched away with long and massive spears. No siege engines are depicted, even in the time of the Empire, and the absence of original representations after the XXth Dynasty renders it difficult to judge the advances made in the art of war during the first half of the last millennium B.C. The inscription of Pankhi, however, proves that in the 8th century approaches and towers were raised against the walls of besieged cities.

Priesthood.—The priesthood was in a great degree hereditary, though perhaps not essentially so. In each temple the priests were divided into four orders (until Ptolemy Euergetes added a fifth), each of which served in turn for a lunar month under the chief priest or prophet. They received shares of the annual revenues of the temple in kind, consisting of linen, oil, flesh, bread, vegetables, wine, beer, &c. The "divine servants" or "prophets" had residences assigned them in the temple area. In late times the priests were always shaven, and paid the greatest attention to cleanliness and ceremonial purity already implied in their ancient name. Fish and beans then were abhorred by them. Among the priests were the most learned men of Egypt, but probably many were illiterate. For the Hellenistic period see W. Otto, *Priester und Tempel im hellenistischen Ägypten* (Leipzig, 1905 foll.).

For ancient Egyptian life and civilization in all departments, the principal work is Ad. Erman, *Life in Ancient Egypt*, translated by H. M. Tirard (London, 1894), (the original *Ägypten und ägyptisches Leben im Altertum*, 2 vols., was published in 1885 at Tübingen); G. Maspero, *Life in Ancient Egypt and Assyria*, translated by A. P. Morton (London, 1892), (*Lectures historiques*, Paris, 1890); also J. G. Wilkinson, *Manners and Customs of the Ancient Egyptians*, new ed. by S. Birch (3 vols., London, 1878). The annual *Archaeological Reports* of the Egypt Exploration Fund contain summaries of the work done each year in the several departments of research.

Of the innumerable publications of Egyptian monuments, scenes and inscriptions, C. R. Lepsius, *Denkmäler aus Ägypten und Äthiopien* (Berlin, 1849–1859), and Memoirs of the *Archaeological Survey* of the Egypt Exploration Fund, may be specified. For antiquities in museums there is the sumptuous *Catalogue général des antiquités égyptiennes du musée de Caire*; for excavations the Memoirs of the Egypt Exploration Fund, of the Research Account, of the British School of Archaeology, of the Liverpool School of Archaeology, of the Deutsche Orient-Gesellschaft, of the Hearst Egyptian Expedition, of the Theodore M. Davis excavations (Tombs of the Kings).

Trade and Money.—There is little evidence to show how buying and selling were carried on in ancient Egypt. A unique scene in a tomb of the IVth Dynasty, however, shows men and women exchanging commodities against each other—fish, fish-hooks, fans, necklaces, &c. Probably this was a market in the open air such as is held weekly at the present time in every considerable village. Rings of metal, gold, silver and bronze played some part in exchange, and from the Hyksos period onwards formed the usual standards by which articles of all kinds might be valued. In the XVIIIth Dynasty the value of meat, &c., was reckoned in gold; somewhat later copper seems the commonest standard, and under the Deltaic dynasties silver. But barter must have prevailed much longer. The precious metals were kept in the temples under the tutelage of the deities. During the XXVth and XXVIth Dynasties silver of the treasury of Harshafe (at Heracleopolis Magna) was commonly prescribed in contracts, and in the reign of Darius we hear of silver of the treasury of Ptah (at Memphis). Aryandes, satrap of Egypt, is said by Herodotus to have been punished by Darius for coining money of equal fineness with that of the king in Persia: thus coinage had then begun in Egypt. But the early coins that have been found there are mainly Greek, and especially Athenian, and it was not until the introduction of a regular currency in the three metals under the Ptolemies that much use was made of coined money.

Corn was the staple produce of Egypt and may have been exported regularly, and especially when there was famine in other countries. In the Tell el-Amarna letters the friendly kings ask Pharaoh for "much gold." Papyrus rolls and fine linen were good merchandise in Phoenicia in the 10th century B.C. From the earliest times Egypt was dependent on foreign countries to supply its wants in some degree. Vessels were fashioned in foreign stone as early as the Ist Dynasty. All silver must have been imported, and all copper except a little that the Pharaohs obtained from the mines of Sinai. Cedar wood was brought from the forests of Lebanon, ivory, leopard skins and gold from the south, all kinds of spices and ingredients of incense from Somaliland and Arabia, fine linen and beautifully worked vessels from Syria and the islands. Such supplies might be obtained by forcible raiding or as tribute of conquered countries, or perhaps as the free offerings of simple savages awed by the arrival of ships and civilized well-armed crews, or again by royal missions in which rich gifts on both sides were exchanged, or lastly by private trading. For deciding how large a share was due to trade, there is almost no evidence. But there are records of expeditions sent out by the king to obtain the rarities of different countries, and the hero of the Story of the Shipwrecked Sailor was upon this quest. Egyptian objects of the age of the XVIIIth Dynasty are found in the Greek islands and on the mainland among remains of the Mycenaean epoch, and on the other hand the products of the workshops of Crete and other centres of that culture are found in Egypt and are figured as "tribute of the Keftiu" in the tomb-paintings, though we have no information of any war with or conquest of that people. It must be a case of trade rather than tribute here and in like instances. According to the papyrus of Unamun at the end of the weak XXth Dynasty payment for cedar was insisted on by the king of Byblus from the Egyptian commissioner, and proofs were shown to him of payment having been made even in the more glorious times of Egypt. Trade both internal and external must have been largely in the hands of foreigners. It is impossible to say at what period Phoenician traffic by sea with Egypt began, but it existed as early as the IIIrd Dynasty. In the time of Herodotus much wine was imported from Syria and Greece. Amasis II. (*c.* 570 B.C.) established Naucratis as the centre of Greek trade in Egypt. Financial transactions by Jews settled at the southern extremity of Egypt, at Assuan, are found as early as the reign of Artaxerxes.

Hunting, Fishing, &c.—In the desert hunting was carried on by hunters with bows and arrows, dogs and nets to check the game. Here in ancient times were found the oryx, addax, ibex, gazelle, bubale, ostrich, hyena and porcupine, more rarely the wild ox and wild sheep (*O. tragelaphus*). All of these were considered fit for the table. The lion, leopard and jackal were not eaten. Pigeons and other birds were caught in traps, and quails were netted in the fields and on the sea-shore. In the papyrus marshes the hippopotamus was slain with harpoons, the wild boar, too, was probably hunted, and the sportsman brought down wild-fowl with the boomerang, or speared or angled for fish. Enormous quantities of wild-fowl of many sorts were taken in clap-nets, to be preserved in jars with salt. Fish were taken sometimes in hand-nets, but the professional fishermen with their draw-nets caught them in shoals. The fishing industry was of great importance: the annual catch in the Lake of Moeris and its canal formed an important part of the Egyptian revenue. The fish of the Nile, which were of many kinds (including mullets, &c., which came up from the sea), were split and dried in the sun: others were salted and so preserved. A supply of sea fish would be obtained off the coast of the Delta and at the mouth of the Lake Serbonis.

Farming, Horticulture, &c.—The wealth of Egypt lay in its agriculture. The regular inundations, the ease of irrigating the rich alluvial flats, and the great heat of the sun in a cloudless sky, while limiting the natural flora, gave immense opportunities to the industrious farmer. The normal rise of the Nile was sixteen cubits at the island of Roda, and two cubits more or less caused a failure of the harvest. In the paintings we see gardens irrigated by handbuckets and *shadufs*; the latter (buckets hung on a lever pole) were probably the usual means of raising water for the fields in ancient times, and still are common in Egypt and Nubia, although water-wheels have been known since the Ptolemaic age, if not earlier. Probably a certain amount of cultivation was possible all the year round, and there was perhaps a succession of harvests; but there was a pause after the main harvests were gathered in by the end of April, and from then till June was the period in which taxes were collected and loans were repaid. Under the Ptolemaic régime the records show a great variety of crops, wheat and barley being probably the largest (see B. P. Grenfell and A. S. Hunt, *Tebtunis Papyri*, i. 560; J. P. Mahaffy and J. G. Smyly, *Petrie Papyri*, iii. p. 205). Earlier the *bōti*, in Greek ὄλυρα (spelt? or durra?) was the main crop, and earlier again inferior varieties of wheat and barley took the lead, with *bōti* apparently in the second place. The bread was mainly made of *bōti*, the beer of barley. There were green crops such as clover, and lentils, peas, beans, radishes, onions, lettuces (as a vegetable and for oil), castor oil and flax were grown. The principal fruit trees were the date palm, useful also for its wood and fibre, the pomegranate, fig and fig-sycamore. The vine was much cultivated in early times, and the vintage is a subject frequently depicted. Later the wine of the Mareotic region near Alexandria was celebrated even amongst Roman epicures. Papyrus, which grew wild in the marshes, was also cultivated, at least in the later ages: its stems were used for boat-building, and according to the classical authors for rope-making, as well as for the famous writing material. About the 8th century A.D. paper drove the latter out of use, and the papyrus plant quickly became extinct. The Indian lotus described by Herodotus is found in deposits of the Roman age. Native lotuses, blue and white, were much used for decoration in garlands, &c., also the chrysanthemum and the corn-flower.

See chapters on plant remains by Newberry in W. M. F. Petrie, *Hawara, Biahmu, and Arsinoe* (London, 1889); *Kahun, Gurob and Hawara* (1890); V. Loret, *La Flore pharaonique* (2nd ed., Paris, 1892), and the authorities there cited.

Domestic Animals and Birds.—The farmer kept up a large stock of animals: in the houses there were pets and in the temples sacred creatures of many kinds. Goats browsed on the trees and herbage at the edge of the desert. Sheep of a peculiar breed with horizontal twisted horns and hairy coat are figured on the earliest monuments: a more valuable variety, woolly with curved horns, made its appearance in the Middle Kingdom and pushed out the older form: sheep were driven into the ploughed fields to break the clods and trample in the seed. The oxen were long-horned, short-horned and polled. They drew the plough, trampled the corn sheaves round the circular threshing floor, and were sometimes employed to drag heavy weights. The pig is rarely figured and was less and less tolerated as the Egyptians grew in ceremonial purity. A variety of wild animals caught in the chase were kept alive and fed for slaughter. Geese and ducks of different sorts were bred in countless numbers by the farmers, also pigeons and quails, and in the early ages cranes. The domestic fowl was unknown in Egypt before the Deltaic dynasties, but Diodorus in the first century B.C. describes how its eggs were hatched artificially, as they are at the present day. Bee-keeping, too, must have been a considerable industry, though dates furnished a supply of sweetening material.

The farm lands were generally held at a rent from an overlord, who might according to times and circumstances be the king, a feudal prince, or a temple-corporation. The stock also might be similarly held, or might belong to the farmers. The ordinary beast of burden, even in the desert, was the ass. The horse seems to have been introduced with the chariot during the Hyksos period. It is thought that the camel is shown in rude figures of the earliest age, but it is scarcely traceable again before the XXVIth Dynasty. In the Ptolemaic period it was used for desert transport and gradually became common. Strange to say, it is only very rarely that men are depicted riding on animals, and never before the New Kingdom.

The dog was of many varieties as early as the XIIth Dynasty, when the greyhound and turnspit and other well-marked forms are seen. The cat was sometimes trained by the sportsman to catch birds. Monkeys were commonly kept as pets. The sacred beasts in the various temples, tame as far as possible, were of almost every conceivable variety, from the vulture to the swallow or the goose, from the lion to the shrew-mouse, from the hippopotamus to the sheep and the monkey, from the crocodile to the tortoise and the cobra, from the carp to the eel; the scorpion and the scarab beetle were perhaps the strangest in this strange company of deities.

For agriculture see J. J. Tylor and F. Ll. Griffith, *The Tomb of Paheri* at El Kab, in the XIth Memoir of the Egypt Exploration Fund. Together with hunting and fishing it is illustrated in many of the Memoirs of the *Archaeological Survey* of the same society. See also Lortet and M. C. Gaillard, *La Faune momifiée de l'ancienne Égypte* (Lyons, 1905).

Law.—No code of Egyptian laws has come down to us. Diodorus names a series of Egyptian kings who were law-givers, ending with Amasis (Aḥmosi II.) and Darius. Frequent reference is made in inscriptions to customs and laws which were traditional, and perhaps had been codified in the sacred books. From time to time regulations on special points were issued by royal decree: a fragment of such a decree, directed by Horemheb of the XVIIIth Dynasty against oppression of the peasantry by officials and prescribing penalties, is preserved on a stela in the temple of Karnak, and enactments of Ptolemy Philadelphus and Euergetes II. are known from papyri. In the Ptolemaic age matters arising out of native contracts were decided according to native law by *λαοκριταί*, while travelling courts of *χρηματισταί* representing the king settled litigation on Greek contracts and most other disputes.. Affairs were decided in accordance with the code of the country, *τῆς χώρας νόμοι*, the Greek code, *πολιτικοὶ νόμοι*, modelled, it would seem, on Athenian law or royal decrees, *προστάγματα*. "Native" law was still quoted in Roman times, but the significance of the expression remains to be ascertained. In ancient Egypt petitions were sent to the king or the great feudal landowners in whose territory the petitioner or his adversary dwelt or the injury was committed: courts were composed of royal or feudal officials, or in the New Kingdom of officials or responsible citizens. The right of appeal to the king probably existed at all times. The statement of the case and the evidence were frequently ordered to be put in writing. the evidence was supported by oath: in criminal cases, such as the harem conspiracy against Rameses III., torture of the accused was resorted to to extract evidence, the bastinado being applied on the hands and the feet. Penalties in the New Kingdom were death (by starvation or self-inflicted), fines, beating with a certain number of blows so as to open a specified number of wounds on as many different parts of the body (*e.g.* five wounds, *i.e.* on hands, feet and back?), also cutting off the nose with banishment to Nubia or the Syrian frontier. In the times of the Old Kingdom decapitation was in use, and a decree exists of the Middle Kingdom degrading a nomarch of Coptos and his family for ever from his office and from the priesthood on account of services to a rival pretender.

As to legal instruments: contracts agreed to in public or before witnesses and written on papyrus are found as early as the Middle Kingdom and perhaps belong to all historic times, but are very scarce until the XXVth Dynasty. Two wills exist on papyrus of the XIIth Dynasty, but they are isolated, and such are not again found among native documents, though they occur in Greek in the Ptolemaic age. The virtual will of a high priest of Ammon under the XXIInd Dynasty is put in the form of a decree of the god himself.

From the time of the XXVth Dynasty there is a great increase in written documents of a legal character, sales, loans, &c., apparently due to a change in law and custom; but after the reign of Darius I. there is again almost a complete cessation until the reign of Alexander, probably only because of the disturbed condition of the country. Under Ptolemy Philadelphus Greek documents begin to be numerous: under Euergetes II. (Physcon) demotic contracts are particularly abundant, but they cease entirely after the first century of Roman rule.

Marriage contracts are not found earlier than the XXVIth Dynasty. Women had full powers of inheritance (though not of dealing with their property), and succession through the mother was of importance. In the royal line there are almost certain instances of the marriage of a brother with an heiress-sister in Pharaonic times: this was perhaps helped by the analogy of Osiris and Isis: in the Ptolemaic dynasty it was an established custom, and one of the stories of Khamois, written in the Ptolemaic age, assumes its frequency at a very remote date. It would be no surprise to find examples of the practice in other ranks also at an early period, as it certainly was prevalent in the Hellenistic age, but as yet it is very difficult to prove its occurrence. The native contracts with the wife gave to her child all the husband's property, and divorce or separation was provided for, entailing forfeiture of the dowry. The "native law" of Roman times allowed a man to take his daughter away from her husband if the last quarrelled with him.

Slavery is traceable from an early date. Private ownership of slaves, captured in war and given by the king to their captor or otherwise, is certainly seen at the beginning of the XVIIIth Dynasty. Sales of slaves occur in the XXVth Dynasty, and contracts of servitude are found in the XXVIth Dynasty and in the reign of Darius, appearing as if the consent of the slave was then required. Presumably at this late period there were eunuchs in Egypt, though adequate evidence of their existence there is not yet forthcoming. They must have originated among a more cruel people. That circumcision (though perhaps not till puberty) was regularly practised is proved by the mummies (agreeing with the testimony of Herodotus and the indications of the early tomb sculptures) until an edict of Hadrian forbade it: after that, only priests were circumcised.

See A. H. Gardiner, *The Inscription of Mes* (from Sethe's *Untersuchungen zur Geschichte und Altertumskunde Ägyptens*, iv.); J. H. Breasted, *Ancient Records*, Egypt, *passim*, esp. i. § 190, 535 et seqq., 773, ii. 54, 671, iii. 45, 367, iv. 416, 499, 795; F. Ll. Griffith, *Catalogue of the John Rylands Demotic Papyri*; B. P. Grenfell and J. P. Mahaffy, *Revenue Laws of Philadelphus* (Oxford, 1896); B. P. Grenfell and A. S. Hunt, *Tebtunis Papyri*, part i. (London, 1902); Bouché-Leclercq, *Histoire des Lagides*, tome iv. (Paris, 1907).

Science.—The Egyptians sought little after knowledge for its own sake: they might indulge in religious speculation, but their science was no more than the knowledge of practical methods. Undoubtedly the Egyptians acquired great skill in the application of simple means to the fulfilment of the most difficult tasks. But the books that have come down to us prove how greatly their written theoretical knowledge fell short of their practical accomplishment. The explanation of the fact may partly be that the mechanical and other discoveries of the most ingenious minds among them, when not in constant requisition by later generations, were misunderstood or forgotten, and even in other cases were preserved only as rules of thumb by the craftsmen and experts, who would jealously hide them as secrets of trade. Men of genius were not wanting in the long history of Egypt; two doctors, Imhōtp (Imuthes), the architect of Zoser, in the IIIrd Dynasty, and Amenōphis (Amenhotp), son of Hap, the wise scribe under Amenōphis III. in the XVIIIth, eventually received the honours of deification; and Hardadf under Cheops of the IVth Dynasty was little behind these two in the estimation of posterity. Such men, who, capable in every field, designed the Great Pyramids and bestowed the highest monumental fame on their masters, must surely have had an insight into scientific principles that would hardly be credited to the Egyptians from the written documents alone.

Mathematics.—The Egyptian notation for whole numbers was decimal, each power of 10 up to 100,000 being represented by a different figure, on much the same principle as the Roman numerals. Fractions except $\frac{2}{3}$ were all primary, *i.e.* with the numerator unity: in order to express such an idea as $\frac{2}{13}$ the Egyptians were obliged to reduce it to a series of primary fractions through double fractions $\frac{2}{13}+\frac{2}{13}+\frac{2}{13}+\frac{2}{13}+\frac{1}{13}=4(\frac{1}{8}+\frac{1}{52}+\frac{1}{104})+\frac{1}{13}=\frac{1}{2}+\frac{2}{13}+\frac{1}{26}=\frac{1}{2}+\frac{1}{8}+\frac{1}{26}+\frac{1}{52}+\frac{1}{104}$; this operation was performed in the head, only the result being written down, and to facilitate it tables were drawn up of the division of 2 by odd numbers. With integers, besides adding and subtracting, it was easy to double and to multiply by 10: multiplying and dividing by 5 and finding the $1\frac{1}{2}$ value were also among the fundamental instruments of calculation, and all multiplication proceeded by repetitions of these processes with addition, *e.g.* $9\times7=(9\times2\times2)+(9\times2)+9$. Division was accomplished by multiplying the divisor until the dividend was reached; the answer being the number of times the divisor was so multiplied. Weights and measures proceeded generally on either a decimal or a doubling system or a combination of the two. Apart from a few calculations and accounts, practically all the materials for our knowledge of Egyptian mathematics before the Hellenistic period date from the Middle Kingdom.

The principal text is the Rhind Mathematical Papyrus in the British Museum, written under a Hyksos king *c.* 1600 B.C.; unfortunately it is full of gross errors. Its contents fall roughly into the following scheme, but the main headings are not shown in the original:—

I. *Arithmetic.*—A. Tables and rule to facilitate the employment of fractions.

- (*a*) Table of the divisions of 2 by odd numbers from 3 to 99 (*e.g.* $2+11=\frac{1}{6}+\frac{1}{66}$), see above.
- (*b*) Conversions of compound fractions (*e.g.* $\frac{2}{3}\times\frac{1}{3}=\frac{1}{6}+\frac{1}{18}$), with rule for finding $\frac{2}{3}$ of a fraction.

B. The "bread" calculation—a division by 10 of the units 1 to 9.

C. "Completing" calculations.

- (*a*) Adding multiples of a fraction to produce a more convenient fraction (perhaps connected with the use of palms and cubits in decoration in a proportion based on the number 8).
- (*b*) Finding the difference between a given fraction and a given whole number.

D. *Ake*[1] or "mass"-problems (of the form $x+\frac{x}{n}=a$, to find the *ake* x).

E. *Tooun*- problems (*tooun*, "rising," seems to be the difference between the shares of two sets of persons dividing an amount between them on a lower and a higher scale).

II. *Geometry.*—A. Measurement of volume (amounts of grain in cylindrical and rectangular spaces of different dimensions and *vice versa*).

B. Measurement of area (areas of square, circular, triangular, &c., fields).

C. Proportions of pyramids and other monuments with sloping sides.

III. *Miscellaneous problems* (and tables) such as are met with in bread-making, beer-making, food of live-stock, &c. &c.

The method of estimating the area of irregular fields and the cubic contents of granaries, &c., is very faulty. It would be interesting to find material of later date, such as Pythagoras is reported to have studied.

See A. Eisenlohr, *Ein mathematisches Handbuch der alten Ägypter* (Leipzig, 1877); F. Ll. Griffith, "The Rhind Mathematical Papyrus" in *Proceedings of the Soc. of Biblical Archaeology*, Nov. 1891, March, May and June 1894.

Astronomy.—The brilliant skies of day and night in Egypt favoured the development of astronomy. A papyrus of the Roman period in the British Museum attributes the invention of horoscopes to the Egyptians, but no early instance is known. Professor Petrie has indeed suggested, chiefly on chronological grounds, that a table of stars on the ceiling of the Ramesseum temple and another in the tomb of Rameses VI. (repeated in that of Rameses IX. without alteration) were horoscopes of Rameses II. and VI.; but Mahler's interpretation of the tables on which this would rest appears to be false. Astronomy played a considerable part in religious matters for fixing the dates of festivals and determining the hours of the night. The titles of several temple books are preserved recording the movements and phases of the sun, moon and stars. The rising of Sothis (Sirius) at the beginning of the inundation was a particularly important point to fix in the yearly calendar (see below, § "Chronology"). The primitive clock[2] of the temple time-keeper (horoscopus), consisting of a *ὡρολόγιον καὶ φοίνικα* (Clemens Alex. *Strom.*, vi. 4. 35), has been identified with two inscribed objects in the Berlin Museum; these are a palm branch with a sight-slit in the broader end, and a short handle from which a plummet line was hung. The former was held close to the eye, the latter in the other hand, perhaps at arm's length. From the above-mentioned tables of culmination in the tombs of Rameses VI. and IX. it seems that for fixing the hours of the night a man seated on the ground faced the horoscopus in such a position that the line of observation of the Pole-star passed over the middle of his head. On the different days of the year each hour was determined by a fixed star culminating or nearly culminating in it, and the position of these stars at the time is given in the tables as "in the centre," "on the left eye," "on the right shoulder," &c. According to the texts, in founding or rebuilding temples the north axis was determined by the same apparatus, and we may conclude that it was the usual one for astronomical observations. It is conceivable that in ingenious and careful hands it might give results of a high degree of accuracy.

See L. Borchardt, "Ein altägyptisches astronomisches Instrument" in *Zeitschrift für ägyptische Sprache*, xxxvii. (1899), p. 10; Ed. Meyer, *Ägyptische Chronologie*, p. 36. Besides the sun and moon, five planets, thirty-six dekans, and constellations to which animal and other forms are given, appear in the early astronomical texts and paintings. The zodiacal signs were not introduced till the Ptolemaic period. See H. Brugsch, *Die Ägyptologie* (Leipzig, 1891), pp. 315 et seqq., for a full account of all these.

Medicine.—Except that splints are sometimes found on the limbs of bodies of all periods, at present nothing is known, from texts or otherwise, of the existence of Egyptian surgery or dentistry. For historical pathology the examination of mummies and skeletons is yielding good results. There is little sign of the existence of gout or of syphilitic diseases until late times (see MUMMY). A number of papyri have been discovered containing medical prescriptions. The earliest are of the XIIth Dynasty from Kahûn, one being veterinary, the other gynaecological. The finest non-religious papyrus known, the Ebers Papyrus, is a vast collection of receipts. One section, giving us some of "the mysteries of the physician," shows how lamentably crude were his notions of the constitution of the body. It teaches little more than that the pulse is felt in every part of the body, that there are vessels leading from the heart to the eyes, ears, nose and all the other members, and that "the breath entering the nose goes to the heart and the lungs." The prescriptions are for a great variety of ailments and afflictions—diseases of the eye and the stomach, sores and broken bones, to make the hair grow, to keep away snakes, fleas, &c. Purgatives and diuretics are particularly numerous, and the medicines take the form of pillules, draughts, liniments, fumigations, &c. The prescriptions are often fanciful and may thus bear some absurd relation to the disease to be cured, but generally they would be to some extent effective. Their action was assisted by spells, for general use in the preparation or application, or for special diseases. In most cases several ingredients are prescribed together: when the amounts are indicated it is by measure not by weight, and evidently no very potent drugs were employed, for the smallest measure specified is equal to about half of a cubic inch. Little has yet been accomplished in identifying the diseases and the substances named in the medical papyri.

See G. A. Reisner, *The Hearst Medical Papyrus* (Leipzig, 1905), (XVIIIth Dynasty), and for a great magical text of the Roman period (3rd century A.D.) with some prescriptions, F. Ll. Griffith and H. Thompson, *The Demotic Magical Papyrus of London and Leiden* (London, 1904).

Literature.—The vast mass of writing which has come down to us from the ancient Egyptians comprises documents of almost every conceivable kind, business documents and correspondence, legal documents, memorial inscriptions, historical, scientific, didactic, magical and religious literature; also tales and lyrics and other compositions in poetical language. Most of these classes are dealt with in this article under special headings. In addition there should be mentioned the abundant explanatory inscriptions attached to wall-scenes as a secondary element in those compositions. As early as the Middle Kingdom, papyri are found containing classified lists of words, titles, names of cities,

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[1] Formerly transcribed *hau* or "heap"-problems.

[2] Clepsydras inscribed in hieroglyphic are found soon after the Macedonian conquest.

&c., and of nomes with their capitals, festivals, deities and sacred things, calendars, &c.

To a great extent the standard works in all classes date from an early age, not later than the Middle Kingdom, and subsequent works of religion and learning like the later additions were largely written in the same style. Several books of proverbs or "instructions" were put in circulation during the Middle Kingdom. Kagemni and Ptahhotp of the Old Kingdom were nominally or really the instructors in manners: King Amenemhē I. laid down the principles of conduct in government for his son Senwosri I., preaching on the text of beneficence rewarded by treachery; Kheti points out in detail to his schoolboy son Pepi the advantages enjoyed by scribes and the miseries of all other careers. Some of these books are known only in copies of the New Kingdom. The instructions of Ani to his son Khenshotp are of later date. In demotic the most notable of such works is a papyrus of the first century A.D. at Leiden.

A number of Egyptian tales are known, dating from the Middle Kingdom and later. Some are so sober and realistic as to make it doubtful whether they are not true biographies and narratives of actual events. Such are the story of Sinūhi, a fugitive to Syria in the reign of Sesostris [Senwosri] I., and perhaps the narrative of Unamun of his expedition in quest of cedar wood for the bark of the Theban Ammon in the XXIst Dynasty. Others are highly imaginative or with miraculous incidents, like the story of the Predestined Prince and the story of the Two Brothers, which begins with a pleasing picture of the industrious farmer, and, in demotic of the Ptolemaic and Roman periods, two stories of the learned Sethon Khamois, son of Rameses II. and high priest of Ptah, with his rather tragical experiences at the hands of magicians. The stories of the Middle Kingdom were in choice diction, large portions of them being rhetorical or poetical compositions attributed to the principal characters. The story of Sinūhi is of this description and was much read during the New Kingdom. Another, of the Eloquent Peasant whose ass had been stolen, was only a framework to the rhetoric of endless petitions. The tale of the Shipwrecked Sailor in the Red Sea was a piece of simpler writing, not unpicturesque, of the marvellous type of a Sindbad story. If all these are deficient in literary merit, they are deeply interesting as revelations of primitive mind and manners. Of New Kingdom tales, the story of the Two Brothers is frankly in the simplest speech of everyday life, while others are more stilted. The demotic stories of Khamois are simple, but the "Rape of Inarōs' Cuirass" (at Vienna) is told in a stiff and high-flown style.

In general it may be said of Egyptian literary compositions that apart from their interest as anthropological documents they possess no merit which would entitle them to survive. They are more or less touched by artificiality, but so far as we are able to appreciate them at present they very seldom attain to any degree of literary beauty. Most of the compositions in the literary language, whether old or archaistic, are in a stilted style and often with parallelisms of phrase like those of Hebrew poetry. Simple prose narrative is here quite exceptional. Some few hymns contain stanzas of ten lines, each line with a break in the middle. There is no sign of rhyming in Egyptian poetry, and the rhythm is not yet recognizable owing to our ignorance of the ancient vocalization. In old Egyptian tales the narrative portions are frequently in prose; New Egyptian and demotic contain as a rule little else. Hymns exist in both of these later forms of the language, and a few love songs in Late Egyptian.

See W. M. F. Petrie, *Egyptian Tales* (2 vols., London, 1895); G. Maspero, *Les Contes populaires de l'Égypte ancienne* (3rd edition, Paris, 1906); W. Max Müller, *Die Liebespoesie der alten Ägypter* (Leipzig, 1899). (F. Ll. G.)

C. *Religion.*—1. *Introductory.*—Copious as are the sources of information from which our knowledge of the Egyptian religion is drawn, there is nevertheless no aspect of the ancient civilization of Egypt that we really so little understand. While the youth of Egyptological research is in part responsible for this, the reason lies still more in the nature of the religion itself and the character of the testimony bearing upon it. For a true appreciation of the chaotic polytheism that reveals itself even in the earliest texts it would be necessary to be able to trace its development, stage by stage, out of a number of naive primitive cults; but the period of growth lies behind recorded history, and we are here reduced to hypotheses and *a posteriori* reconstructions. The same criticism applies, no doubt, to other religions, like those of Greece and Rome. In Egypt, however, the difficulty is much aggravated by the poor quality of the evidence. The religious books are textually very corrupt, one-sided in their subject-matter, and distributed over a period of more than two thousand years. The greatest defect of all is their relative silence with regard to the myths. For the story of Isis and Osiris we have indeed the late treatise ascribed to Plutarch, and a few fragments of other myths may be culled from earlier native sources. But in general the tales that passed current about the gods are referred to only in mysterious and recondite allusions; as Herodotus for his own times explicitly testifies, a reticence in such matters seems to have been encouraged by the priests. Thus with regard to Egyptian theology we are very imperfectly informed, and the account that is here given of it must be looked upon as merely provisional. The actual practices of the cult, both funerary and divine, are better known, and we are tolerably familiar with the doctrines as to the future state of the dead. There is good material, too, for the study of Egyptian magic, though this branch has been somewhat neglected hitherto.

2. *Main Sources.*—(*a*) *The Pyramid texts*, a vast collection of incantations inscribed on the inner walls of five royal tombs of the Vth and VIth Dynasties at Sakkāra, discovered and first published by Maspero. Much of these texts is of extreme antiquity; one incantation at least has been proved to belong to an age anterior to the unification of the Northern and Southern kingdoms. Later copies also exist, but possess little independent critical value. The subject-matter is funerary, *i.e.* it deals with the fate of the dead king in the next life. Some chapters describe the manner in which he passes from earth to heaven and becomes a star in the firmament, others deal with the food and drink necessary for his continued existence after death, and others again with the royal prerogatives which he hopes still to enjoy; many are directed against the bites of snakes and stings of scorpions. It is possible that these incantations were recited as part of the funerary ritual, but there is no doubt that their mere presence in the tombs was supposed to be magically effective for the welfare of the dead. Originally these texts had an application to the king alone, but before the beginning of the XIIth Dynasty private individuals had begun to employ them on their own behalf. They seem to be relatively free from textual corruption, but the vocabulary still occasions much difficulty to the translator.

(*b*) *The Book of the Dead* is the somewhat inappropriate name applied to a large similar collection of texts of various dates, certain chapters of which show a tendency to become welded together into a book of fixed content and uniform order. A number of chapters contained in the later recensions are already found on the sarcophagi of the Middle Kingdom, together with a host of funereal texts not usually reckoned as belonging to the Book of the Dead; these have been published by Lepsius and Lacau. The above-mentioned nucleus, combined with other chapters of more recent origin, is found in the papyri of the XVIIIth–XXth Dynasties, and forms the so-called Theban recension, which has been edited by Naville in an important work. Here already more or less rigid groups of chapters may be noted, but individual manuscripts differ greatly in what they include and exclude. In the Saite period a sort of standard edition was drawn up, consisting of 165 chapters in a fixed order and with a common title "the book of going forth in the day"; this recension was published by Lepsius in 1842 from a Turin papyrus. Like the Pyramid texts, the Book of the Dead served a funerary purpose, but its contents are far more heterogeneous; besides chapters enabling the dead man to assume what shape he will, or to issue triumphant from the last judgment, there are lists of gates to be passed and demons to be encountered in the nether world, formulae such as are inscribed on sepulchral figures and amulets, and even hymns to the sun-god. These texts are for the most part excessively corrupt, and despite the translations of Pierret, Renouf and Budge, much labour must yet be expended upon them before they can rank as a first-rate source.

(*c*) The texts of the *Tombs of the Kings at Thebes* (XVIIIth–XXth Dyn.) consist of a series of theological books compiled at an uncertain date; they have been edited by Naville and Lefébure. The chief of these, extant in a longer and a shorter version, is called *The book of that which is in the Nether World* (familiarly known as the *Am Duat*) and deals with the journey of the sun during the twelve hours of the night. *The Book of Gates* treats of the same topic from a more theological standpoint. *The Litanies of the Sun* contain the acclamations with which the sun-god Re was greeted, when at eventide his bark reached the entrance of the nether world. Another treatise relates the destruction of mankind, and the circumstances that led to the creation of the heavens in the form of a cow.

(*d*) Among the *later religious books* one or two deserve a special mention, such as *The Overthrowing of Apophis*, the serpent enemy of the sun-god; *The Lamentations of Isis and Nephthys* over their murdered brother Osiris, *The Book of Breathings*, a favourite book among the later Theban priests. Several of these books were used in the ritual of feast days, but all have received a secondary funerary employment, and are therefore found buried with the dead in their tombs.

(*e*) The *Ritual texts* have survived only in copies not earlier than the New Kingdom. The temple ritual employed in the daily cult is illustrated by the scenes depicted on the inner walls of the great temples: the formulae recited during the performance of the ceremonies are recorded at length in the temple of Seti I. (XIXth Dyn.) at Abydos, as well as in some later papyri in Berlin. The whole material has been collected and studied by Moret. The funerary ritual is known from texts in the Theban tombs (XVIIIth–XXth Dyn.) and papyri and sarcophagi of later date; older versions are contained in the Pyramid texts and *The Book of the Dead*. Schiaparelli has done much towards gathering together this scattered material. The ritual observed during the process of embalmment is preserved in late papyri in Paris and Cairo published by Maspero.

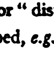
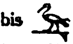
(*f*) The *magical* documents have been comparatively little studied, in spite of their great interest. They deal for the most part with the hearing of diseases, the bites of snakes and scorpions, &c., but incidentally cast many sidelights on the mythology and superstitious beliefs. The best-known of these books is the *Papyrus Harris* published by F. J. Chabas, but other papyri of as great or greater importance are to be found in the Leiden, Turin and other collections. A curious book published by A. Erman contains spells to be used by mothers for the protection of their children. A papyrus in London contains a calendar of lucky and unlucky days. A late class of stelae, of which the best specimen has been published by Golenischeff, consists of spells of various kinds originally intended for the use of the living, but later employed for funerary purposes.

(*g*) Under the heading *Miscellaneous* we must mention a number of sources of great value: the grave-stones, or stelae, especially those from Abydos, which throw much light on funerary beliefs; the great *Papyrus Harris*, the longest of all papyri, which enumerates the gifts of Ramesès III. (XXth Dyn.) to the various temples of Egypt, the hymns to the gods preserved in Cairo and Leiden papyri; and the inscriptions of the Ptolemaic temples (Dendera, Edfu, &c.), which teem with good religious material. Nor can any attempt here be made to summarize the remaining native Egyptian sources, literary and archaeological, that deserve notice.

(*h*) Among the classical writers, Plutarch in his treatise *Concerning Isis and Osiris* is the most important. Diodorus also is useful. Herodotus, owing to his religious awe and dread of divulging sacred mysteries, is only a second-rate source.

3. *The Gods.*—The end of the pre-dynastic period, in which we dimly descry a number of independent tribes in constant warfare with one another, was marked by the rise of a united Egyptian state with a single Pharaonic ruler at its head. The era of peace thus inaugurated brought with it a rapid progress in all branches of civilization; and there soon emerged not only a national art and a condition of material prosperity shared by the entire land in common, but also a state religion, which gathered up the ancient tribal cults and floating cosmical conceptions, and combining them as best it could, imposed them on the people as a whole. By the time that the Pyramid texts were put into writing, doubtless long before the Vth Dynasty, this religion had assumed a stereotyped appearance that clung to it for ever afterwards. But the multitude of the deities and the variety of the myths that it strove to incorporate prevented the development of a uniform theological system, and the heterogeneous origin of the religion remained irretrievably stamped upon its face. Written records were few at the time when the pantheon was built up, so that the process of construction cannot be followed historically from stage to stage; but it is possible by arguing backwards from the later facts to discern the main tendencies at work, and the principal elementary cults that served as the materials.

Classification of pre-dynastic gods.

The gods of the pre-dynastic period may be divided into two chief groups, the tribal or local divinities and the cosmic or explanatory deities. At the beginning each tribe had its own particular god, who in essence was nothing but the articulate expression of the inner cohesion and of the outward independence of the tribe itself, but who outwardly manifested himself in the form of some animal or took up his abode in some fetish of wood or stone. In times of peace this visible emblem of the god's presence was housed in a rude shrine, but in war-time it was taken thence and carried into the battlefield on a standard. We find such divine standards often depicted on the earliest monuments, and among the symbols placed upon them may be detected the images of many deities destined to play an important part in the later national pantheon, such as the falcon Horus , the wolf Wepwawet (Ophois) , the goddess Neith , symbolized by a shield transfixed with arrows, and the god Min , the nature of whose fetish is obscure. In course of time the tribes became localized in particular districts, under the influence of a growing central authority, and their gods then passed from tribal into local deities. Hence it came about that the provincial districts or nomes, as they were called, often derived their names from the gods of tribes that settled in them, these names being hieroglyphically written with the sign for "district" surmounted by standards of the type above described, *e.g.* , "the nome of the dog Anubis," the 17th or Cynopolite nome of Upper Egypt. In this way a large number of deities came to enjoy special reverence in restricted territories, *e.g.* the ram Khnum in Elephantine, the jerboa or okapi (?) Seth in Ombos, the ibis  Thoth in Hermopolis Magna, and of the gods named above, Horus in Hieraconpolis, Wepwawet in Assiut, Neith in Sais, and Min in Coptos. As towns and villages gradually sprang up, they too adopted as their patron some one or other of the original tribal gods, so that these came to have different seats of worship all over Egypt. For this reason it is often hard to tell where the primitive cult-centre of a particular deity is to be sought; thus Horus seems equally at home both at Buto in the Delta and at Hieraconpolis in Upper Egypt, and the earliest worship of Seth appears to have been claimed no less by Tanis in the north than by Ombos in the south. The effect of the localization of gods in many different places was to give them a double aspect; so, for instance, Khnum the god of Elephantine could in one minute be regarded as identical with

Khnum the god of Esna, while in the next minute and without any conscious sense of contradiction the two might be looked upon as entirely separate beings. In order that there might be no ambiguity as to what divinity was meant, it became usual, in speaking of any local deity, to specify the place of which he was "lord." The tendency to create new forms of a god by instituting his worship in new local centres persisted throughout the whole course of Egyptian history, unhindered by the opposite tendency which made national out of local gods. Some of the cosmic gods, like the sun-god Re of Heliopolis and of Hermonthis, early acquired a local in addition to their cosmic aspect.

In the innermost principle of their existence, as patrons and protectors of restricted communities, the primitive tribal gods did not differ from one another. But externally they were distinguishable by the various shapes that their worshippers ascribed to them; and there can be little doubt that even in the beginning each had his own special attributes and particular mythical traits. These, however, may have borne little resemblance to the later conceptions of the same gods with which we are made familiar by the Pyramid texts. Thus we have no means of ascertaining what the earliest people of Sais thought about their goddess Neith, though her fetish would seem to point to her warlike nature. Nor are we much wiser in respect of those primitive tribal gods that are represented on the oldest monuments in animal form. For though we may be sure that the shape of an animal was that in which these gods were literally visible to their worshippers, yet it is impossible to tell whether some one living animal was chosen to be the earthly tenement of the deity, or whether he revealed himself in every individual of a species, or whether merely the cult-image was roughly hewn into the shape of an animal. Not too much weight must be attached to later evidence on this point; for the New Kingdom and still more the Graeco-Roman period witnessed a strange recrudescence of supposed primitive cults, to which they gave a form that may or may not have been historically exact. In some places whole classes of animals came to be deemed sacred. Thus at Bubastis, where the cat-headed Bast (Ubasti) was worshipped, vast cemeteries of mummified cats have been found; and elsewhere similar funerary cults were accorded to crocodiles, lizards, ibises and many other animals. In Elephantine Khnum was supposed to become incarnate in a ram, at whose death the divinity left him and took up his abode in another. So too the bull of Apis (a black animal with white spots) was during its lifetime regarded as a reincarnation of Ptah, the local god of Memphis, and similarly the Mnevis and Bacis bulls were accounted to be "the living souls" of Etom of Heliopolis and of Re of Hermonthis respectively; these latter cults are certainly secondary, for Ptah himself was never, either early or late, depicted otherwise than in human form, as a mummy or as a dwarf; and Etom and Re are but different names of the sun-god. The form of a snake, attributed to many local goddesses, especially in later times (*e.g.* Meresger of the Theban necropolis), was borrowed from the very ancient deity Outo (Buto); the semblance of a snake became so characteristic of female divinities that even the word "goddess" was written with the hieroglyph of a snake. Other animal shapes particularly affected by goddesses were those of a lioness (Sakhmi, Pakhe) or a cow (Hathor, Isis). The primitive animal gods are not to be confused with the animal forms ascribed to many cosmic deities; thus when the sun-god Re was pictured as a scarabaeus, or dung-beetle, rolling its ball of dung behind it, this was certainly mere poetical imagery. Or else a cosmic god might assume an animal shape through assimilation with some tribal god, as when Re was identified with Horus and therefore depicted as a falcon.

With the advance of civilization and the transformation of the tribal gods into national divinities, the beliefs held about them must have become less crude. At a very early date the anthropomorphizing tendency caused the animal deities to be represented with human bodies, though as a rule they retained their animal heads; so in the case of Seth as early as the IInd Dynasty. The other gods carry their primitive fetishes in their hands (like Neith, who is depicted holding arrows) or on their heads (so Nefertem [Iphthimis] with his lotus-flower). At the same time the gods began to acquire human personalities. In a few instances this may have come about by the emphasizing of a really primitive trait; as when the wolf Ophois, in consonance with the predatory nature of that animal, developed into a god of war. In other cases the transitional steps are shrouded in mystery; we do not know, for example, why the ibis Thoth subsequently became the patron of the fine arts, the inventor of writing, and the scribe of the gods. But the main factor in this evolutionary process was undoubtedly the formation of myths, which brought gods of independent origin into relation with one another, and thus imbued them with human passions and virtues. Here dim historic recollections often determined the features of the story, and in one famous legend that knits together a group of gods all seemingly local in origin we can still faintly trace how the tale arose, was added to, and finally crystallized in a coherent form.

Osiris was a wise and beneficent king, who reclaimed the Egyptians from savagery, gave them laws and taught them handicrafts. The prosperous reign of Osiris was brought to a premature close by the machinations of his wicked brother Seth, who with seventy-two fellow-conspirators invited him to a banquet, induced him to enter a cunningly-wrought coffin made exactly to his measure, then shut down the lid and cast the chest into the Nile Isis, the faithful wife of Osiris, set forth in search of her dead husband's body, and after long and adventure-fraught wanderings, succeeded in recovering it and bringing it back to Egypt Then while she was absent visiting her son Horus in the city of Buto, Seth once more gained possession of the corpse, cut it into fourteen pieces, and scattered them all over Egypt. But Isis collected the fragments, and wherever one was found, buried it with due honour; or, according to a different account, she joined the limbs together by virtue of her magical powers, and the slain Osiris, thus resurrected, henceforth reigned as king of the dead in the nether world. When Horus grew up he set out to avenge his father's murder, and after terrible struggles finally conquered and dispossessed his wicked uncle; or, as another version relates, the combatants were separated by Thoth, and Egypt divided between them, the northern part falling to Horus and the southern to Seth. Such is the story as told by Plutarch, with certain additions and modifications from older native sources. There existed, however, a very ancient tradition according to which Horus and Seth were hostile brothers, not nephew and uncle; and many considerations may be urged in support of the thesis which regards their struggles as reminiscences of wars between two prominent tribes or confederations of tribes, one of which worshipped the falcon Horus while the other had the okapi (?) Seth as its patron and champion. The Horus-tribes were the victors, and it was from them that the dynastic line sprang; hence the Pharaoh always bore the name of Horus, and represented in his own hallowed person the ancient tribal deity. Of Osiris we can only state that he was originally the local god of Busiris, whatever further characteristics he primitively possessed being quite obscure. Isis was perhaps the local goddess of Buto, a town not far distant from Busiris; this geographical proximity would suffice to explain her connexion with Osiris in the tale. A legend now arose, we know not how or why, which made Seth the brother and murderer of Osiris; and this led to a fusion of the Horus-Seth and the Seth-Isis-Osiris *motifs*. The relationships had now to be readjusted, and the most popular view recognized Horus as the son and avenger of Osiris. The more ancient account survived, however, in the myth that Osiris, Horus, Seth, Isis and Nephthys (a goddess who plays but a minor part in the Osiris cycle) were all children of the earth-god Keb and the sky-goddess Nut, born on the five consecutive days added on at the end of the year (the so-called epagomenal days). Later generations reconciled these contradictions by assuming the existence of two Horuses, one, the brother of Osiris, Seth and Isis, being named Haroeris, *i.e.* Horus the elder, while the other, the child of Isis and Osiris, was called Harpocrates, *i.e.* Horus the child.

Cosmic deities.

The second main class of divinities that entered into the composition of the Egyptian pantheon was due to that innate and universal speculative bent which seeks, and never fails to find, an explanation of the facts of the external world. Behind the great natural phenomena that they perceived all around them, the Egyptians, like other primitive folk, postulated the existence of divine wills not dissimilar in kind to their own, though vastly superior in power. Chief among these cosmic deities was the sun-god Re, whose supremacy seemed predestined under the cloudless sky of Egypt. The oldest conceptions represented Re as sailing across the heavens in a ship called "Manzet," "the bark of the dawn"; at sunset he stepped aboard another vessel named "Mesenktet," "the bark of the dusk," which bore him back from west to east during the night. Later theories symbolized Re in many different ways. For some he was identical with Horus, and then he was falcon-headed and was called Hor-akhti, the Horus of the horizons. Others pictured him to themselves as a tiny infant in the early dawn, as full-grown at noon, and as an infirm old man in the evening. When the sky was imagined as a cow, he was a calf born anew every morning. The moon was a male deity, who likewise fared across the heavens in a boat; hence he was often named Chons, "the sailor." The ibis-god Thoth was early identified with the moon. The stars and planets were likewise gods. Among them the bright star Sirius was held in special esteem; it was a goddess Sothis (Sopde), often identified by the Egyptians with Isis. The constellations that seemed unceasingly to speed across the sky were named "the never-resting ones," and the circumpolar stars, which never sink beneath the horizon, were known as "the imperishables." Concerning earth and sky there were many different opinions. Some thought that the sky was a goddess Nut, whom the god Show held aloof from her husband Keb the earth, on whose back the plants and trees grew. Others believed in a celestial ocean, personified under the name of Nun over which the heavenly bodies sailed in boats. At a later date the sky was held to be a cow (Hathor) whose four feet stood firm upon the soil; or else a vast face, in which the right eye was the sun and the left eye the moon. Alongside these fanciful conceptions there existed a more sober view, according to which the earth was a long oval plain, and the sky an iron roof supported by the tops of mountains or by four pillars at the cardinal points. Beneath the ground lay a dark and mysterious region, now conceived as an inverse heaven (Nenet), now as a vast series of caverns whose gates were guarded by demons. This nether world was known as the Duat (Dat, Tēi), and through it passed the sun on his journey during the hours of night; here too, as many thought, dwelt the dead and their king Osiris. That great natural feature of Egypt, the Nile, was of course one of the gods; his name was Hapi, and as a sign of his fecundity he had long pendulous breasts like a woman. In contradistinction to the tribal gods, it rarely happened that the cosmic deities enjoyed a cult. But there are a few important exceptions: Re in Heliopolis (here identified with a local god Etom) and in Hermonthis; Hathor at Dendera and elsewhere. Certain of the tribal gods early became identified with cosmic divinities, and the latter thus became the objects of a cult; so, for instance, the Horus of Edfu was a sun-god, and Thoth in Hermopolis Magna was held to be the moon.

Minor deities and demons.

An extension of the principle that created the cosmic gods gave rise to a large number of minor deities and demons. Day and night, the year, the seasons, eternity, and many similar conceptions were each represented by a god or goddess of their own, who nevertheless possessed but a shadowy and doubtful existence. Human attributes like Taste, Knowledge, Joy and so forth were likewise personified, no less than abstract ideas such as Fate, Destiny and others; rather more clearly defined than the rest was Maat, the goddess of Truth and Right, who was fabled to be the daughter of Re and may even have had a cult. Certain gods were purely functional, that is to say, they appeared at special times to perform some appointed task, at the completion of which they vanished. Such were Nepri, the god of the corn-harvest; Meskhenit, the goddess who attended every child-bed; Tait, the goddess of weaving. Numberless semi-divine beings had no other purpose than to fill out the myths, as, for instance, the chattering apes that greeted the sun-god Re as he rose above the eastern horizon, and the demons who opened the gates of the nether world at the approach of the setting sun.

Foreign deities.

We take this opportunity of mentioning sundry other divinities who were later introduced to swell the already overcrowded ranks of the pantheon. Contact with foreign lands brought with it several new deities, Baal, Anat and Resheph from Syria, and the misshapen dwarf Bes from the south; earlier than these, the Astarte of Byblus, whom the Egyptians identified with Hathor. In Thebes Amenophis I. and his spouse Nefertari were worshipped as patron gods of the necropolis many centuries after their death. Two men of exceptional wisdom received divine honours, and had temples of their own in the Ptolemaic period; these were Imouthes, who had lived under Zoser of the IIIrd Dynasty, and Amenophis son of Hapu, a contemporary of the third king of the same name (XVIIIth Dyn.). The hill of Sheikh Abd-el-gurna at Thebes was looked upon as a particularly holy place, and was revered as a goddess. Almost anything that was regarded with awe, any object used in the divine ritual could at a given moment be envisaged as a deity. Thus the boat of Osiris (Neshemet) and those of the sun-god were goddesses; and various wands and sceptres belonging to certain gods were imagined as harbouring the divine being. Truly it might have been said in ancient Egypt: of the making of gods there is no end!

Theological combinations.

For such order as can be discerned in the mythological conceptions of the Egyptians the priesthood was largely responsible. At a very early date the theological school of Heliopolis undertook the task of systematizing the gods and the myths, and it is mainly to them that is due the Egyptian religion as we find it in the Pyramid texts. Their influence is particularly conspicuous in the prominent place accorded to the sun-god Re, and in the creation-legend that made him the father of gods and men. First of all living things was Re; legend told how he arose as a naked babe from a lotus-flower that floated on the primeval ocean Nun. Others held the view that he crept from an egg that lay on a hill in the midst of a lake called Desdes; and a third, more barbarous, tale related his obscene act of self-procreation. Re became the father of the pair of gods Show and Tefnut (Tphenis), who emanated from his spittle. They again gave birth to Keb and Nut, from whom in their turn sprang Osiris and Seth, Isis and Nephthys. These nine gods were together known as the great Ennead or cycle of nine. A second series of nine deities, with Horus as its first member, was invented at the same time or not long afterwards, and was called the Lesser Ennead. In later times the theory of the Ennead became very popular and was adopted by most of the local priesthoods, who substituted their own favourite god for Re, sometimes retaining and sometimes changing the names of the other eight deities. Thus locally many different gods came to be viewed as the creators of the world. Only in two instances, however, did a local god ever obtain wide acceptance in the capacity of demiurge: Ptah of Memphis, who was famed as an artist and master-builder, and Khnum of Elephantine, who was said to have moulded mankind on the potter's wheel.

Already in the Pyramid texts the importance of Osiris almost rivals that of Re. His worship does not seem to have been due to Heliopolitan influence, and may possibly have been propagated by active missionary effort. It is apparently through the funeral cult that Osiris so early took a firm hold on the imagination of the people; for at a very ancient date he was identified with every dead king, and it needed but a slight extension of this idea to make him into a king of the dead. In later times the moral aspect of his tale was doubtless the main cause of its continued popularity; Osiris was named Onnophris, "the good Being" *par excellence*, and Seth was contrasted with him as the author and the root of all evil. Still the Egyptians themselves seem to have been somewhat at a loss to account for the great veneration that they paid to Osiris. Successive theories interpreted him as the god of the earth, as the god of the Nile, as a god of vegetation, as a moon-god and as a sun-god; and nearly every one of these theories has been claimed to be the primitive truth by some scholar or another.

Nowhere is the conservatism of the Egyptians more clearly displayed than in the tenacity with which they clung to the old forms of the theology, such as we have essayed to describe. Neither the influx of new deities nor the diligence of the priestly authors and commentators availed to break down the cast-iron traditions with which the compilers of the Pyramid texts were already familiar. It is true that with the displacement of the capital town certain local deities attained a degree of power that, superficially regarded, seems to alter the entire perspective of the religion. Thus Ammon, originally the obscure local god of Thebes, was raised by the Theban monarchs of the XIIth and of the XVIIIth to XXIst Dynasties to a predominant position never equalled by any other divinity; and, by similar means, Suchos of the Fayum, Ubasti of Bubastis, and Neith of Sais, each enjoyed for a short space of time a consideration that no other cause would have secured to them. But precisely the example of Ammon proves the hopelessness of any attempt to change the time-honoured religious creed; his priests identified him with the sun-god Re, whose cult-centre was thus merely transferred a few hundred miles to the South. Nor could even the violent religious revolution of Akhenaton (Amenophis IV.), of which we shall later have occasion to speak, sweep away for ever beliefs that had persisted for so many generations.

But if the facts of the religion, broadly viewed, never underwent a change, the interpretation of those facts did so in no small degree. The religious books were for the most part written in archaic language, which was only imperfectly understood by the priests of later times; and hence great scope was given to them to exercise their ingenuity as commentators. By the time of the XVIIIth Dynasty some early chapters of the Book of the Dead had been provided with a triple commentary. Unfortunately the methods pursued were as little reasonable as those adopted by the medieval Jewish Rabbis; instead of the context being studied as a whole, with a view to the recovery of its literal sense, each single verse was considered separately, and explained as an allusion to some obscure myth or as embodying some mystical meaning. Thus so far from simplifying or really elucidating the religion, these priestly labours tended rather to confuse one legend with another and to efface the personality of individual gods. The ease with which one god could be identified with another is perhaps the most striking characteristic of later Egyptian theology. There are but few of the greater deities who were not at some time or another identified with the solar god Re. His fusion with Horus and Etom has already been noted; further we find an Ammon-Re, a Sobk-Re, a Khnum-Re; and Month, Onouris, Show and Osiris are all described as possessing the attributes of the sun. Ptah was early assimilated to the sepulchral gods Sokaris and Osiris. Pairs of deities whose personalities are often blended or interchanged are Hathor and Nut, Sakhmi and Pakhe, Seth and Apophis. So too in Abydos, his later home, Osiris was identified with Khante-Amentiu (Khentamenti, Khentamenthes), "the chief of those who are in the West," a name that was given to a vaguely-conceived but widely-venerated divinity ruler of the dead. Many factors helped in the process of assimilation. The unity of the state was largely influential in bringing about the suppression of local differences of belief. The less important priesthoods were glad to enhance the reputation of the deity they served by identifying him with some more important god. And the mystical bent of the Egyptians found satisfaction in the multiplicity of forms that their gods could assume; among the favourite epithets which the hymns apply to divinities are such as "mysterious of shapes," "multiple of faces."

The goal towards which these tendencies verged was monotheism; and though this goal was only once, and then quite ephemerally, reached, still the monotheistic idea was at most periods, so to speak, in the air. Sometimes the qualities common to all the gods were abstracted, and the resultant notion spoken of as "the god." At other times, and especially in the hymns addressed to some divinity, all other gods were momentarily forgotten, and he was eulogized as "the only one," "the supreme," and so forth. Or else several of the chief deities were consciously combined and regarded as different emanations or aspects of a Sole Being; thus a Ramesside hymn begins with the words "Three are all the gods, Ammon, Re and Ptah," and then it is shown how these three gods, each in his own particular way, gave expression and effect to a single divine purpose.

Monotheistic tendency.

Akhenaton.

For a brief period at the end of the XVIIIth Dynasty a real monotheism, as exclusive as that of Judaism or of Islam, was adopted as the state religion of Egypt. The young Pharaoh Amenophis IV. seems to have been fired by genuine fanatical enthusiasm, though political motives, as well as doctrinal considerations, may have prompted him in the planning of his religious revolution (see also § *History*). The Theban god Ammon-Re was then supreme, and the ever-growing power of his priesthood may well have inflamed the jealousy of their Heliopolitan rivals. Amenophis began his reign in Thebes as an adherent of the traditional faith, but after a few years he abandoned that town and built a new capital for his god Aton 200 m. farther north, at a place now called El Amarna. The new deity was a personification of the sun's disk. The name Re was suppressed, as too intimately associated with that of Ammon; and Ammon, together with all the other gods, was put to the ban. Amenophis even changed his own name, of which the name of Ammon formed an element, to Akhenaton, "the brilliancy of the Aton," and the capital was called Khitaton, "The Horizon of the Aton." The new dogmas were known as "the Teaching," and their tenets, as revealed in the poems composed in honour of the Aton, breathe the purest and most exalted monotheistic spirit. The movement had, no doubt, met with serious opposition from the very start, and the reaction soon set in. The immediate successors of Akhenaton strove to follow in his footsteps, but the conservative nature of Egypt quickly asserted itself. Not sixty years after the accession of Akhenaton, his city was abandoned, its rulers branded as heretics, and the old religion restored in Thebes as completely as if the Aton had never existed.

Having thus failed to become rational, Egyptian theology took refuge in learning. The need for a more spiritual and intellectual interpretation of the pantheon still remained, and gave rise to a number of theological sciences. The names of the gods and the places of their worship were catalogued and classified, and manuals were devoted to the topography of mythological regions. Much ingenuity was expended on the development of a history of the gods, the groundwork of which had been laid in much earlier times. Re was not only the creator of the world, but he was also the first king of Egypt. He was followed on the throne by the other eight members of his Ennead, then by the lesser Ennead and by other gods, and finally by the so-called "worshippers of Horus." The latter were not wholly mythical personages, though they were regarded as demigods (Manetho calls them "the dead," *νέκυες*); they have been shown to be none other than the dim rulers of the predynastic age. The Pharaohs of the historic period were thus divine, not only by virtue of their connexion with Horus (see above), but also as descendants of Re; and the king of Egypt was called "the good god" during his lifetime, and "the great god" after his death. The later religious literature is much taken up with the mythical and semi-mythical dynasties of kings, and the priests compiled, with many newly-invented details, the chronicles of the wars they were supposed to have waged.

In a similar manner, the ethical and allegorical methods of interpretation came into much greater prominence towards the end of the New Kingdom. The Osirian legend, as we have already seen, was early accepted as symbolizing the conflict between good and evil. So too the victories of Re over the serpent named Apophis were more or less clearly understood as a simile of the antithetical nature of light and darkness. In one text at least as ancient as the XVIIIth Dynasty (the copy that we have dates only from the Ethiopian period) an ingenious attempt is made to represent Ptah as the source of all life: from him, it is said, emanated Horus as "heart" or "mind" and Thoth as "tongue," and through the conjoint action of these two, the mind conceiving the design and the tongue uttering the creative command, all gods and men and beasts obtained their being. Of this kind of speculation much more must have existed than has reached us. It is doubtless such explanations as these that the Greeks had in view when they praised the wisdom of the ancient Egyptians; and in the classical period similar semi-philosophical interpretations altogether supplanted, among the learned at least, the naive literal beliefs of earlier times. Plutarch in his treatise on Isis and Osiris well exemplifies this standpoint: for him every god and every rite is symbolic of some natural or moral truth.

Later developments.

The final stages of the Egyptian religion are marked by a renewed popularity of all its more barbarous elements. Despairing, as it would seem, of discovering the higher wisdom that the more philosophic of the priests supposed that religion to conceal, the simpler-minded sought to work out their own salvation by restoring the worship of the gods to its most primitive forms. Hence came the fanatical revival of animal-worship which led to feud and bloodshed between neighbouring towns—a feature of Egyptian religion that at once amused and scandalized contemporary Greek and Latin authors (Plut. De Iside, 72; Juv. xv. 33). Nevertheless Egyptian cults, and particularly those of Serapis and Isis, found welcome acceptance on European soil; and the shrines of Egyptian deities were established in all the great cities of the Roman Empire. Serapis was a god imported by the first Ptolemy from Sinope on the Black Sea, who soon lost his own identity by assimilation with Osiris-Apis, the bull revered in Memphis. Far down into the Roman age the worship of Serapis persisted and flourished, and it was only when the Serapeum of Alexandria was razed to the ground by order of Theodosius the Great (A.D. 391) that the death-blow of the old Egyptian religion was struck.

Notes are here added on some divinities who have received inadequate or no attention in the preceding pages. For information as to Ammon, Anubis, Apis, Bes, Bubastis, Buto, Isis and Thoth, reference must be made to the special articles on these gods.

ARSAPHES, in Egyptian *Harshafe*, "he who is upon his lake," the ram-headed god of Heracleopolis Magna, gained an ephemeral importance during the IXth Dynasty, which arose from his town. Outwardly, he resembles Khnum. Little is known about him, and he is seldom mentioned. The burial-place of his priests in later times was in 1904 discovered at Abusir el Meleq.

CHONS, "he who travels by boat," perhaps originally a mere epithet of the moon-god Ioh or Thoth, is chiefly familiar as the third member of the Theban triad. As such he is represented as a youthful god, wearing a skull-cap surmounted by the moon. His cult was revived and became popular in Ptolemaic times. A curious story about the sending of his statue to Mesopotamia to heal a daughter of the king of Bakhtan is related upon a stele that purports to date from the Ramesside period: it has been proved to be a pious fraud invented by the priests not earlier than the Greek period.

HATHOR, whose name means "house of Horus," was at all times a very important deity. She is depicted as a cow, or with a broad human countenance, the cow's ears just showing from under a massive wig. Probably at first a goddess of the sky, she is early mentioned in connexion with Re. Later she was often identified with Isis, and her name was used to designate foreign goddesses like those of Puoni and Byblus. Unlike most cosmic deities, she was worshipped in many localities, chief among which was Dendera, where her magnificent temple, of Ptolemaic date, still stands. "The seven Hathors" is a name given to certain fairies, who appeared shortly after the birth of an infant, and predicted his future.

KHNUM or **KHNOUM**, a ram-headed god, whose principal place of worship was the island of Elephantine (there associated with Satis and Anukis), but also revered elsewhere, *e.g.* together with Nebtu in Esna. He enjoyed great repute as a creator, and was supposed to use the potter's wheel for the purpose. In this capacity he is sometimes accompanied by the frog-headed goddess Heket.

MONTH, a hawk-headed god of the Thebaid. in Thebes itself his cult was superseded by that of Ammon, but it persisted in Hermonthis. He was often given the solar attributes, and was credited as a great warrior.

MIN, the god of Coptos and Panopolis (Akhmim), seems to have been early looked upon as a deity of the harvest and crops. His cult dates from the earliest times. Represented as ithyphallic, with two tall plumes on his head, the right arm upraised and bearing a scourge. In old times he is identified with Horus: later Ammon was confused with him, and depicted in his image.

NECHBET (Nekhbi, Nekhebi), the vulture-goddess of El Kab, called Eileithyia by the Greeks. She gained an ascendancy as patroness of the south at the time when the two kingdoms were striving for the mastery. It is as such, in opposition to Buto the goddess of the north, that she is most often named on the monuments.

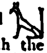
NEITH, the very ancient and important goddess of Sais, the Greek Athene. On the earliest monuments she is represented by a shield transfixed by arrows. Later she wears the crown of Lower Egypt, and carries in her hands a bow and arrows, a sign of her warlike character In the XXVIth Dynasty, when a line of Pharaohs sprang from Sais, she regained a prominent position, and was given many cosmogonic attributes, including the title of mother of Re.

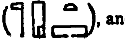
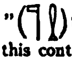
NEPHTHYS, the sister of Osiris and wife of Seth, daughter of Keb and Nut, plays a considerable rôle in the Osiris story. She sided with Isis and aided her to bring Osiris back to life. Isis and Nephthys are often mentioned together as protectresses of the dead.

ONOURIS, Egyptian *En-hūri*, "sky-bearer," the god of Thinis. Later identified with Shu (Show), who holds heaven and earth apart.

PTAH, the Hephaestus of the Greeks, a demiurgic and creative god, special patron of hand-workers and artisans. Worshipped in Memphis, he perhaps owed his importance more to the political prominence of that town than to anything else. He was early identified with an ancient but obscure god Tenen, and further with the sepulchral deity Sokaris. He is represented either as a closely enshrouded figure whose protruding hands grasp a composite sceptre, the whole standing on a pedestal within a shrine; or else as a misshapen dwarf.

SAKHMI, a lion-headed goddess of war and strife, whose name signifies the mighty. She was worshipped at Latopolis (Esna), but also at a late date as a member of the Memphite triad, with Ptah as husband and Nefertem (Iphthimis) as son: often, too, confounded with Ubasti.

SETH (Egyptian Sĕt, Stḫ or Stš), by the Greeks called Typhon, was depicted as an animal  that has been compared with the jerboa by some, and with the okapi by others, but which the Egyptians themselves occasionally conceived to be nothing but a badly drawn ass. In historic times his cult was celebrated at Tanis and Ombos. He regained a certain prestige as god of the Hyksos rulers, and two Pharaohs of the XIXth Dynasty derived their name Sethos (Seti) from him. But, generally speaking, he was abominated as a power of evil, and his figure was often obliterated on the monuments. He is named in similes as a great warrior, and as such and "son of Nut" he is identified with the Syrian Baal.

4. *The Divine Cult.*—In the midst of every town rose the temple of the local god, a stately building of stone, strongly contrasting with the mud and plaster houses in which even the wealthiest Egyptians dwelt. It was called the "house of the god" , and in it the deity was supposed to reside, attended by his "servants"  the priests. There was indeed a certain justification for this contention, even when a contrary theory assigned to the divinity a place in the sky, as in the case of the lunar divinity Thoth; for in the inmost sanctuary stood a statue of the god, which served as his representative for the purposes of the cult. Originally each temple was dedicated to one god only; but it early became usual to associate with him a mate of the opposite sex, besides a third deity who might be represented either as a second wife or as a child. As examples of such triads, as they are called, may be mentioned that of Thebes, consisting of Ammon, Mut and Chons, father, mother and child; and as typical of the other kind, where a god was accompanied by two goddesses, that of Elephantine, consisting of Khnum, Satis and Anukis. The needs of the god were much the same as those of mortals; no more than they could he dispense with food and drink, clothes for his apparel, ointment for his limbs, and music and dancing to rejoice his heart. The only difference was that the divine statue was half-consciously recognized as a lifeless thing that required carefully regulated rites and ceremonies to enable it to enjoy the good things offered to it. Early every morning the officiating priest proceeded to the holy of holies, after the preliminaries of purification had cleansed him from any miasma that might interfere with the efficacy of the rites. Then with the prescribed gestures, and reciting appropriate formulae all the while, he broke the seal upon the door of the shrine, loosed the bolts, and at last stood face to face with the

god. There followed a series of prostrations and adorations, culminating in the offering of a small image of Maat, the goddess of Truth. This seems to have been the psychological moment of the entire service: hitherto the statue had been at best a god in *posse*; now the symbolical act placed him in possession of all his faculties, he was a god in truth, and could participate like any mortal in the food and luxuries that his servants put before him. The daily ceremony closed with ablutions, anointings and a bountiful feast of bread, geese, beer and oxen; having taken his fill of these, the god returned to his shrine until the next morning, when the ritual was renewed. The words that accompanied the manual gestures are, in the rituals that have come down to us, wholly dominated by the myth of Osiris: it is often hard to discern much connexion between the acts and the formulae recited, but the main thought is clearly that the priest represents Horus, the pious son of the dead divinity Osiris. That this conception is very old is proved by the fact that even in the Pyramid texts "the eye of Horus" is a synonym for all offerings: an ancient tale of which only shreds have reached us related how Seth had torn the eye of Horus from him, though not before he himself had suffered a still more serious mutilation; and by some means, we know not how, the restoration of the eye was instrumental in bringing about the vindication of Osiris. As to the manual rites of the daily cult, all that can here be said is that incense, purifications and anointings with various oils played a large part; the sacrifices consisted chiefly of slaughtered oxen and geese; burnt offerings were a very late innovation.

At an early date the rites practised in the various temples were conformed to a common pattern. This holds good not only for the daily ritual, but also for many festivals that were celebrated on the same day throughout the whole length of the land. Such were the calendrical feasts, called "the beginnings of the seasons," and including, for example, the monthly and half-monthly festivals, that of the New Year and that of the rising of Sirius (Sothis). But there were also local feast days like that of Neith in Sais (Hdt. ii. 62) or that of Ammon in southern Opi (Luxor). These doubtless had a more individual character, and often celebrated some incident supposed to have occurred in the lifetime of the god. Sometimes, as in the case of the feast of Osiris in Abydos, a veritable drama would be enacted, in which the whole history of the god, his sufferings and final triumph were represented in mimic form. At other times the ceremonial was more mysterious and symbolical, as in the feast of the raising of the Ded-column when a column of the kind was drawn by cords into an upright position. But the most common feature of these holy days was the procession of the god, when he was carried on the shoulders of the priests in his divine boat far beyond the precincts of his temple; sometimes, indeed, even to another town, where he paid a visit to the god of the place. These occasions were public holidays, and passed amid great rejoicings. The climax was reached when at a given moment the curtains of the shrine placed on the boat were withdrawn, and the god was revealed to the eyes of the awe-struck multitude. Music and dancing formed part of the festival rites.

Temples.

As with the rites and ceremonies, so also the temples were early modelled upon a common type. Lofty enclosure walls, adorned with scenes from the victorious campaigns of the Pharaoh, shut off the sacred buildings from the surrounding streets. A small gateway between two massive towers or pylons gave admittance to a spacious forecourt open to the sky, into which the people were allowed to enter at least on feast days. Farther on, separated from the forecourt by smaller though still massive pylons, lay a hypostyle hall, so called from its covered colonnades; this hall was used for all kinds of processions. Behind the hypostyle hall, to which a second similar one might or might not be added, came the holy of holies, a dark narrow chamber where the god dwelt; none but the priests were admitted to it. All around lay the storehouses that contained the treasures of the god and the appurtenances of the divine ritual. The temples of the earliest times were of course far more primitive than this: from the pictures that are all that is now left to indicate their nature, they seem to have been little more than huts or sheds in which the image of the god was kept. One temple of a type different from that above described has survived at Abusir, where it has been excavated by German explorers. It was a splendid edifice dedicated to the sun-god Re by a king of the Vth Dynasty, and was probably a close copy of the famous temple of Heliopolis. The most conspicuous feature was a huge obelisk on a broad superstructure : the obelisk always remained closely connected with the solar worship, and probably took the place of the innermost shrine and statue of other temples. The greater part of the sanctuary was left uncovered, as best befitted a dwelling-place of the sun. Outside its walls there was a huge brick model of the solar bark in which the god daily traversed the heavens.

Power of the priests.

As the power of the Pharaohs increased, the maintenance of the cult became one of the most important affairs of state. The most illustrious monarchs prided themselves no less on the buildings they raised in honour of the gods than on the successful wars they waged: indeed the wars won a religious significance through the gradual elevation of the god of the capital to god of the nation, and a large part of the spoils was considered the rightful perquisite of the latter. Countless were the riches that the kings heaped upon the gods in the hope of being requited with long life and prosperity on the throne of the living. It became the theory that the temples were the gifts of the Pharaoh to his fathers the gods, and therefore in the scenes of the cult that adorn the inner walls it is always he who is depicted as performing the ceremonies. As a matter of fact the priesthoods were much more independent than was allowed to appear. Successive grants of land placed no small portion of the entire country in their hands, and the administration of the temple estates gave employment to a large number of officials and serfs. In the New Kingdom the might of the Theban god Ammon gradually became a serious menace to the throne: in the reign of Rameses III. he could boast of more than 80,000 dependants, and more than 400,000 cattle. It is not surprising that a few generations later the high priests of Ammon supplanted the Pharaohs altogether and founded a dynasty of their own.

At no period did the priests form a caste that was quite distinctly separated from the laity. In early times the feudal lords were themselves the chief priests of the local temples. Under them stood a number of subordinate priests, both professional and lay. Among the former were the *kher-heb*, a learned man entrusted with the conduct of the ceremonies, and the "divine fathers," whose functions are obscure. The lay priests were divided into four classes that undertook the management of the temple in alternate months; their collective name was the "hour-priesthood." Perhaps it was to them that the often recurring title *oueb*, "the pure," should properly be restricted, though strict rules as to personal purity, dress and diet were demanded of all priests. The personnel of the temple was completed by various subordinate officials, doorkeepers, attendants and slaves. In the New Kingdom the leading priests were more frequently mere clerics than theretofore, though for instance the high priest of Ammon was often at the same time the vizier of southern Egypt. In some places the highest priests bore special names, such as the *Ouer maa*, "the Great Seer," of Re in Heliopolis, or the *Khorp kimet*, "chief artificer," of the Memphite Ptah. Women could also hold priestly rank, though apparently in early times only in the service of goddesses; "priestess of Hathor" is a frequent title of well-born ladies in the Old Kingdom. At a later date many wealthy dames held the office of "musicians" (*shemat*) in the various temples. In the service of the Theban Ammon two priestesses called "the Adorer of the God" and the "Wife of the God" occupied very influential positions, and towards the Saite period it was by no means unusual for the king to secure these offices for his daughters and so to strengthen his own royal title.

5. *The Dead and their Cult.*—While the worship of the gods

tended more and more to become a mónopoly of the state and the priests, and provided no adequate outlet for the religious cravings of the people themselves, this deficiency was amply supplied by the care which they bestowed upon their dead: the Egyptians stand alone among the nations of the world in the elaborate precautions which they took to secure their own welfare beyond the tomb. The belief in immortality, or perhaps rather the incapacity to grasp the notion of complete annihilation, is traceable from the very earliest times: the simplest graves of the prehistoric period, when the corpses were committed to the earth in sheepskins and reed mats, seldom lack at least a few poor vases or articles of toilet for use in the hereafter. In proportion as the prosperity of the land increased, and the advance of civilization afforded the technical means, so did these primitive burials give place to a more lavish funereal equipment. Tombs of brick with a single chamber were succeeded by tombs of stone with several chambers, until they really merited the name of "houses of eternity" that the Egyptians gave to them. The conception of the tomb as the residence of the dead is the fundamental notion that underlies all the ritual observances in connexion with the dead, just as the idea of the temple as the dwelling-place of the god is the basis of the divine cult. The parallelism between the attitude of the Egyptians towards the dead and their attitude towards the gods is so striking that it ought never to be lost sight of: nothing can illustrate it better than the manner in which the Osirian doctrines came to permeate both kinds of cult.

Tombs.

The general scheme of Egyptian tombs remained the same throughout the whole of the dynastic period, though there were many variations of detail. By preference they were built in the Western desert, the Amente, near the place where the sun was seen to go to rest, and which seemed the natural entrance to the nether world. A deep pit led down to the sepulchral chamber where the dead man was deposited amid the funereal furniture destined for his use; and no device was neglected that might enable him to rest here undisturbed. This aim is particularly conspicuous in the pyramids, the gigantic tombs which the Pharaohs of the Old Kingdom constructed for themselves: the passages that lead to the burial chamber were barred at intervals by vast granite blocks, and the narrow opening that gave access to them was hidden from view beneath the stone casing of the pyramid sides. Quite separate from this part of the tomb lay the rooms employed for the cult of the dead: their walls were often adorned with pictures from the earthly life of the deceased, which it was hoped he might still continue to enjoy after death. The innermost chamber was the chapel proper: on its western side was sculptured an imitation door for the dead man to pass through, when he wished to participate in the offerings brought by pious relatives. It was of course only the few who could afford elaborate tombs of the kind: the poor had to make shift with an unpretentious grave, in which the corpse was placed enveloped only by a few rags or enclosed in a rough wooden coffin.

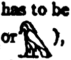
Embalming and burial.

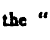
The utmost care was taken to preserve the body itself from decay. Before the time of the Middle Kingdom it became usual for the rich to have their bodies embalmed. The intestines were removed and placed in four vases (the so-called Canopic jars) in which they were supposed to enjoy the protection of the four sons of Horus, the man-headed Mesti, the ape-headed Hapi, the jackal Duamutef and the falcon Kebhsenuf. The corpse was treated with natron and asphalt, and wound in a copious swathing of linen bandage, with a mask of linen and stucco on the face. The "mummy" thus prepared was then laid on its side like a sleeper, the head supported by a head-rest, in a sarcophagus of wood or stone. The operations in connexion with the mummy grow more and more elaborate towards the end of the Pharaonic period: already in the New Kingdom the wealthiest persons had their mummies laid in several coffins, each of which was gaudily painted with mythological scenes and inscriptions. The costliest process of embalmment lasted no less than seventy days. Many superstitious rites had to be observed in the course of the process: a late book has preserved to us the magical formulae that were repeated by the wise *kher-heb* priest (who in the necropolis performed the functions of taricheutes, "embalmer"), as each bandage was applied.

A large number of utensils, articles of furniture and the like were placed in the burial-chamber for the use of the dead—jars, weapons, mirrors, and even chairs, musical instruments and wigs. In the early times statuettes of servants, representing them as engaged in their various functions (brewers, bakers, &c.), were included for the same purpose; they were supposed to perform their menial functions for their deceased lord in the future life. In the Middle Kingdom these are gradually replaced by small models of the mummy itself, and the belief arose that when their owner was called upon to perform any distasteful work in the nether world, they would answer to his name and do the task for him. The later *ushebti*-figures, little statuettes of wood, stone or faience, of which several hundreds are often found in a single tomb, are confused survivals of both of the earlier classes of statuettes. Still more important than all such funereal objects are the books that were placed in the grave for the use of the dead: in the pyramids they are written on the walls of the sepulchral chamber and the passages leading to it; in the Middle Kingdom usually inscribed on the inner sides of the sarcophagus; in later times contained in rolls of papyrus. The Pyramid texts and the *Book of the Dead* are the most important of these, and teach us much about the dangers and needs that attended the dead man beyond the tomb, and about the manner in which it was thought they could be counteracted.

The burial ceremony itself must have been an imposing spectacle. In many cases the mummy had to be conveyed across the Nile, and boats were gaily decked out for this purpose. On the western bank a stately procession conducted the deceased to his last resting-place. At the door of the tomb the final ceremonies were performed; they demanded a considerable number of actors, chief among whom were the *sem*-priest and the *kher-heb* priest. It was a veritable drama that was here enacted, and recalled in its incidents the story of Osiris, the divine prototype of all successive generations of the Egyptian dead.

The soul.

However carefully the preliminary rites of embalmment and burial might have been performed, however sumptuous the tomb wherein the dead man reposed, he was nevertheless almost entirely at the mercy of the living for his welfare in the other world: he was as dependent on a continued cult on the part of the surviving members of his family as the gods were dependent on the constant attendance of their priests. That portion of a man's individuality which required, even after death, food and drink, and the satisfaction of sensuous needs, was called by the Egyptians the *ka*, and represented in hieroglyphs by the uplifted hands . This *ka* was supposed to be born together with the person to whom it belonged, and on the very rare occasions when it is depicted, wears his exact semblance. The conception of this psychical entity is too vaguely formulated by the Egyptians and too foreign to modern thought to admit of exact translation: of the many renderings that have been proposed, perhaps "double" is the most suitable. At all events the *ka* has to be distinguished from the soul, the *bai* (in hieroglyphs or ), which was of more tangible nature, and might be descried hovering around the tomb in the form of a bird or in some other shape; for it was thought that the soul might assume what shape it would, if the funerary rites had been duly attended to. The gods had their *ka* and *bai*, and the forms attributed to the latter are surprising; thus we read that the soul of the sky Nun is Re, that of Osiris the Goat of Mendes, the souls of Sobk are crocodiles, and those "of all the gods are snakes"; similarly the soul of Ptah was thought to dwell in the Apis bull, so that each successive Apis was during its lifetime the reincarnation of the god. Other parts of a man's being to which at given moments and in particular contexts the Egyptians assigned a certain degree of separate existence are the "name"

ran, the "shadow" , *khaibet*, and the "corpse" , *khat*.

It was, however, the *ka* alone to which the cult of the dead was directly addressed. This cult was a positive duty binding on the children of a dead man, and doubtless as a rule discharged by them with some regularity and conscientiousness; at least, on feast-days offerings would be brought to the tomb, and the ceremonies of purification and opening the mouth of the deceased would be enacted. But there could be little guarantee that later generations would perpetuate the cult. It therefore became usual under the Old Kingdom for the wealthiest persons to make testamentary dispositions by which certain other persons agreed for a consideration to observe the required rites at stated periods: they received the name of "servants of the *ka*," and stood in the same relation to the deceased as the priests to the gods. Or again, contracts might be made with a neighbouring temple, the priesthood of which bound itself to reserve for the contracting party some portion of the offerings that had already been used for the divine cult. There is probably a superstitious reason for the preference shown by the dead for offerings of this kind; no wish is commoner than that one may receive "bread and beer that had gone up on to the altar of the local god," or "with which the god had been sated"; something of the divine sanctity still clung about such offerings and made them particularly desirable. In spite of all the precautions they took and the contracts they made, the Egyptians could never quite rid themselves of the dread that their tombs might decay and their cult be neglected; and they sought therefore to obtain by prayers and threats what they feared they might lose altogether. The occasional visitor to the tomb is reminded by its inscriptions of the many virtues of the dead man while he yet lived, and is charged, if he be come with empty hands, at least to pronounce the funerary formula; it will indeed cost him nothing but "the breath of his mouth"! Against the would-be desecrator the wrath of the gods is invoked: "with him shall the great god reckon there where a reckoning is made."

The funerary customs that have been described are meaningless except on the supposition that the tomb was the regular dwelling-place of the dead. But just as the Egyptians found no contradiction between the view of the temple as the residence of the god and the conception of him as a cosmic deity, so too they often attributed to the dead a continued existence quite apart from the tomb. According to a widely-spread doctrine of great age the deceased Egyptian was translated to the heavens, where he lived on in the form of a star. This theme is elaborated with great detail in the Pyramid texts, where it is the dead king to whom this destiny is promised. It was perhaps only a restricted aristocracy who could aspire to such high honour: the *ikh*, or "glorified being," who has his place in the sky seems often to hold an intermediate position between the gods and the rank and file of the dead. But in a few early passages the required qualification appears to be rather moral integrity than exalted station. The life of the dead man in the sky is variously envisaged in different texts: at one moment he is spoken of as accompanying the sun-god in his celestial bark, at another as a mighty king more powerful than Re himself; the crudest fancy of all pictures him as a hunter who catches the stars and gods, and cooks and eats them. According to another conception that persisted in the imagination of the Egyptians longer than any of the ideas just mentioned, the home of the dead in the heavens was a fertile region not very different form Egypt itself, intersected by canals and abounding in corn and fruit; this place was called the Sokhet Earu or "field of Reeds."

Even in the oldest texts these beliefs are blended inextricably with the Osirian doctrines. It is not so much as king of the dead that Osiris here appears, but every deceased Egyptian was regarded as himself an Osiris, as having undergone all the indignities inflicted upon the god, but finally triumphant over the powers of death and evil impersonated by Seth. This notion became so popular, that beside it all other views of the dead sink into insignificance; it permeates the funerary cult in all its stages, and from the Middle Kingdom onwards the dead man is regularly called "the Osiris so-and-so," just as though he were completely identical with the god. One incident of the tale of Osiris acquired a deep ethical meaning in connexion with the dead. It was related how Seth had brought an accusation against Osiris in the great judgment hall of Heliopolis, and how the latter, helped by the skilful speaker Thoth, had emerged from the ordeal acquitted and triumphant. The belief gradually grew up that every dead man would have to face a similar trial before he could be admitted to a life of bliss in the other world. A well-known vignette in the *Book of the Dead* depicts the scene. In a shrine sits Osiris, the ruler and judge of the dead, accompanied by forty-two assessors; and before him stands the balance on which the heart of the deceased man is to be weighed against Truth; Thoth stands behind and registers the result. The words that accompany this picture are still more remarkable: they form a long negative confession, in which the dead man declares that he has sinned neither against man nor against the gods. Not all the sins named are equally heinous according to modern conceptions; many of them deal with petty offences against religious usages that seem to us but trifling. But it is clear that by the time this chapter was penned it was believed that no man could attain to happiness in the hereafter if he had not been upright, just and charitable in his earthly existence. The date at which these conceptions became general is not quite certain, but it can hardly be later than the Middle Kingdom, when the dead man has the epithet "justified" appended to his name in the inscriptions of his tomb.

It was but a natural wish on the part of the Egyptians that they should desire to place their tombs near the traditional burying-place of Osiris. By the time of the XIIth Dynasty it was thought that this lay in Abydos, the town where the kings of the earliest times had been interred. But it was only in a few cases that such a wish could be literally fulfilled. It therefore became customary for those who possessed the means to dedicate at least a tombstone in the neighbourhood of "the staircase of the great god," as the sacred spot was called. And those who had found occasion to visit Abydos in their lifetime took pleasure in recalling the part that they had there taken in the ceremonies of Osiris. Such pilgrims doubtless believed that the pious act would stand to their credit when the day of death arrived.

6. *Magic.*—Among the rites that were celebrated in the temples or before the statues of the dead were many the mystical meaning of which was but imperfectly understood, though their efficacy was never doubted. Symbolical or imitative acts, accompanied by spoken formulae of set form and obscure content, accomplished, by some peculiar virtues of their own, results that were beyond the power of human hands and brain. The priests and certain wise men were the depositaries of this mysterious but highly useful art, that was called *hik* or "magic"; and one of the chief differences between gods and men was the superior degree in which the former were endowed with magical powers. It was but natural that the Egyptians should wish to employ magic for their own benefit or self-gratification, and since religion put no veto on the practice so long as it was exercised within legal bounds, it was put to a widespread use among them. When magicians made figures of wax representing men whom they desired to injure, this was of course an illegal act like any other, and the law stepped in to prevent it: one papyrus that has been preserved records the judicial proceedings taken in such a case in connexion with the harem conspiracy against Rameses III.

One of the chief purposes for which magic was employed was to avert diseases. Among the Egyptians, as in other lands, illnesses were supposed to be due to evil spirits or the ghosts of dead men who had taken up their abode in the body of the sufferer, and they could only be driven thence by charms and spells. But out of these primitive notions arose a real medical science: when the ailment could be located and its nature roughly determined, a more materialistic view was taken of it; and many herbs and drugs that were originally used for some superstitious reason, when once they had been found to be actually effective, easily lost their magical significance and were looked upon as natural specifics. It is extremely hard to draw any fixed line in Egypt between magic and medicine; but it is curious to note that simple diagnoses and prescriptions were employed for the more curable diseases, while magical formulae and amulets are reserved for those that are harder to cope with, such as the bites of snakes and the stings of scorpions.

The formulae recited for such purposes are not purely cabalistic, though inasmuch as mystery is of the very essence of magic, foreign words and outlandish names occur in them by preference. Often the magician relates some mythical case where a god had been afflicted with a disease similar to that of the patient, but had finally recovered: a number of such tales were told of Horus, who was usually healed by some device of his mother Isis, she being accounted as a great enchantress. The mere recitation of such similar cases with their happy issue was supposed to be magically effective; for almost unlimited power was supposed to be inherent in mere words. Often the demon is directly invoked, and commanded to come forth. At other times the gods are threatened with privations or even destruction if they refuse to aid the magician: the Egyptians seem to have found little impiety in such a use of the divine name, though to us it would seem the utmost degree of profanity when, for instance, a magician declares that if his spell prove ineffective, he "will cast fire into Mendes and burn up Osiris."

The verbal spells were always accompanied by some manual performance, the tying of magical knots or the preparation of an amulet. In these acts particular significance was attached to certain numbers: a sevenfold knot, for example, was more efficacious than others. Often the formula was written on a strip of rag or a scrap of papyrus and tied round the neck of the person for whom it was intended. Beads and all kinds of amulets could be infused with magical power so as to be potent phylacteries to those who wore them.

In conclusion, it must be emphasized that in Egypt magic stands in no contrast or opposition to religion, at least as long as it was legitimately used. The religious rites and ceremonies are full of it. When a pretence was made of opening, with an iron instrument, the mouth of the divine statue, to the accompaniment of recited formulae, this can hardly be termed anything but magic. Similarly, the potency attributed to *ushebti*-figures and the copies of the *Book of the Dead* deposited in the tombs is magical in quality. What has been considered under this heading, however, is the use that the same principles of magic were put to by men in their own practical life and for their own advantage.

AUTHORITIES.—An excellent list of books and articles on the various topics connected with Egyptian Religion will be found in H. O. Lange's article on the subject in P. D. Chantepie de la Saussaye, *Lehrbuch der Religionsgeschichte* (Tübingen, 1905), vol. i. pp. 172-245. Among general works may be especially recommended A. Erman, *Die ägyptische Religion* (Berlin, 1905); and chapters 2 and 3 in G. Maspero, *Histoire ancienne des peuples de l'Orient, les origines*, vol. i. (Paris, 1895). (A. H. G.)

D. *Egyptian Language and Writing.—Decipherment.*—Although attempts were made to read Egyptian hieroglyphs so far back as the 17th century, no promise of success appeared until the discovery of the Rosetta stone in 1799 by the French engineers attached to Napoleon's expedition to Egypt. This tablet was inscribed with three versions, in hieroglyphic, demotic and Greek, of a long decree of the Egyptian priests in honour of Ptolemy V., Epiphanes and his wife Cleopatra. The Greek and demotic versions were still almost perfect, but most of the hieroglyphic text had been broken away with the top of the tablet; portions of about half of the lines remained, but no single line was complete. In 1802 J. D. Akerblad, a Swedish orientalist attached to the embassy in Paris, identified the proper names of persons which occurred in the demotic text, being guided to them by the position of their equivalents in the Greek. These names, all of them foreign, were written in an alphabet of a limited number of characters, and were therefore analysed with comparative ease.

The hieroglyphic text upon the Rosetta stone was too fragmentary to furnish of itself the key to the decipherment. But the study of this with the other scanty monuments and imperfect copies of inscriptions that were available enabled the celebrated physicist Thomas Young (1773–1829) to make a beginning. In an article completed in 1819 and printed (over the initials I. J.) in the supplement to the 4th, 5th and 6th editions of the *Encyclopaedia Britannica* (vol. iv., 1824), he published a brief account of Egyptian research, with five plates containing the "rudiments of an Egyptian vocabulary." It appears that Young could place the hieroglyphic, demotic and Greek texts of the Rosetta stone very correctly parallel; but he could not accurately break up the Egyptian sentences into words, much less could he attribute to the words their proper sounds. Yet he recognized correctly the names of Apis and Re, with many groups for words such as "assembly," "good," "name," and important signs such as those which distinguish feminine words. In a bad copy of another monument he rightly guessed the royal name of Berenice in its cartouche by the side of that of Ptolemy, which was already known from its occurrence on the Rosetta stone. He considered that these names must be written in phonetic characters in the hieroglyphic as in demotic, but he failed to analyse them correctly. It was clear, however, that with more materials and perseverance such efforts after decipherment must eventually succeed.

Meanwhile J. F. Champollion "le Jeune" (see CHAMPOLLION; and Hartleben, *Champollion, sein Leben und sein Werk*, Berlin, 1906) had devoted his energies whole-heartedly since 1802, when he was only eleven years old, to preparing himself for the solution of the Egyptian problem, by wide linguistic and historical studies, and above all by familiarizing himself with every scrap of Egyptian writing which he could find. By 1818 he made many equations between the demotic and the hieroglyphic characters, and was able to transcribe the demotic names of Ptolemy and Cleopatra into hieroglyphics. At length, in January 1822, a copy of the hieroglyphic inscription on the Bankes obelisk, which had long been fruitlessly in the hands of Young, reached the French savant. On the base of this obelisk was engraved a Greek inscription in honour of Ptolemy Euergetes II. and Cleopatra; of the two cartouches on the obelisk one was of Ptolemy, the other was easily recognized as that of Cleopatra, spelt nearly as in Champollion's experimental transcript of the demotic name, only more fully. This discovery, and the recognition of the name Alexander, gave fourteen alphabetic signs, including homophones, with ascertained values. Starting from these, by the beginning of September Champollion had analysed a long series of Ptolemaic and Roman cartouches. His next triumph was on the 14th of September, when he read the names of the ancient Pharaohs Rameses and Tethmosis in some drawings just arrived from Egypt, proving that his alphabetic characters were employed, in conjunction with syllabic signs, for spelling native names; this gave him the assurance that his discovery touched the essential nature of the Egyptian writing and not merely, as had been contended, a special cipher for the foreign words which might be quite inapplicable to the rest of the inscriptions. His progress continued unchecked, and before the end of the year the connexion of ancient Egyptian and Coptic was clearly established. Subsequently visits to the museums of Italy and an expedition to Egypt in 1828–1829 furnished Champollion with ample materials. The *Précis du système hiéroglyphique* (1st ed. 1823, 2nd ed. 1828) contained the philological results of his decipherments down to a certain point. But his MS. collections were vast, and his illness after the strenuous labours of the expedition and his early death in 1832 left all in confusion. The *Grammaire égyptienne* and *Dictionnaire égyptien*, edited from these MSS. by his brother, precious as they were, must be a very imperfect register of the height of his attainments. In his last years he was able to translate long texts in hieroglyphic and in hieratic of the New Kingdom and of the later periods with some accuracy, and his comprehension of demotic was considerable. Champollion outdistanced all his competitors from the first, and had practically nothing to thank them for except material to work on, and too often that had been intentionally withheld from him. In eleven years he broke ground in all directions; if the ordinary span of life had been allowed him, with twenty or thirty more years of labour he might have brought order into the chaos of different ages and styles of language and writing; but, as it was, the task of co-ordination remained to be done by others. For one year, before his illness incapacitated him, Champollion held a professorship in Paris; but of his pupils and fellow-workers, F. P. Salvolini, insincere and self-seeking, died young, and Ippolito Rosellini (1800–1843) showed little original power. From 1832 to 1837 there was a pause in the march of Egyptology, and it seemed as if the young science might be overwhelmed by the storm of doubts and detraction that was poured upon it by the enemies of Champollion. Then, however, Lepsius in Germany and Samuel Birch in England took up the thread where the master had dropped it, and E. de Rougé, H. Brugsch, François Joseph Chabas and a number of lesser lights quickly followed. Brugsch (*q.v.*) was the author of a hieroglyphic and demotic dictionary which still holds the field, and from time to time carried forward the study of demotic by a giant's stride. De Rougé (d. 1872) in France was a brilliant translator of hieroglyphic texts and the author of an important grammatical work. Chabas (1817–1882) especially addressed himself to the reading of the hieratic texts of the New Kingdom. By such labours after forty years the results attained by Champollion in decipherment were entirely superseded. Yet, while the values of the signs were for the most part well ascertained, and the meanings of most works fixed with some degree of accuracy, few grammatical rules had as yet been established, the varieties of the language at different periods had not been defined, and the origins of the hieroglyphs and of their values had not been investigated beyond the most obvious points. At this time a rare translator of Egyptian texts in all branches was arising in G. Maspero (*q.v.*), while E. Revillout addressed himself with success to the task of interpreting the legal documents of demotic which had been almost entirely neglected for thirty years. But the honour of inaugurating an epoch marked by greater precision belongs to Germany. The study of Coptic had begun in Europe early in the 17th century, and reached a high level in the work of the Dane Georg Zoega (1755–1809) at the end of the 18th century. In 1835, too late for Champollion to use it, Amadeo Peyron (1785–1870) of Turin published a Coptic lexicon of great merit which is still standard, though far from satisfying the needs of scholars of the present day. In 1880 Ludwig Stern (*Koptische Grammatik*) admirably classified the grammatical forms of Coptic. The much more difficult task of recovering the grammar of Egyptian has occupied thirty years of special study by Adolf Erman and his school at Berlin, and has now reached an advanced stage. The greater part of Egyptian texts after the Middle Kingdom having been written in what was even then practically a dead language, as dead as Latin was to the medieval monks in Italy who wrote and spoke it, Erman selected for special investigation those texts which really represented the growth of the language at different periods, and, as he passed from one epoch to another, compared and consolidated his results.

The *Neuägyptische Grammatik* (1880) dealt with texts written in the vulgar dialect of the New Kingdom (Dyns. XVIII. to XX.). Next followed, in the *Zeitschrift für ägyptische Sprache und Alterthumskunde*, studies on the Old Kingdom inscription of Una, and the Middle Kingdom contracts of Assiut, as well as on an "Old Coptic" text of the 3rd century A.D. At this point a papyrus of stories written in the popular language of the Middle Kingdom provided Erman with a stepping-stone from Old Egyptian to the Late Egyptian of the *Neuägyptische Grammatik*, and gave the connexions that would bind solidly together the whole structure of Egyptian grammar (see *Sprache des Papyrus Westcar*, 1889). The very archaic pyramid texts enabled him to sketch the grammar of the earliest known form of Egyptian (*Zeitschrift d. Deutsch. Morgenl. Gesellschaft*, 1892), and in 1894 he was able to write a little manual of Egyptian for beginners (*Ägyptische Grammatik*, 2nd ed., 1902), centring on the language of the standard inscriptions of the Middle and New Kingdoms, but accompanying the main sketch with references to earlier and later forms. Of the work of Erman's pupils we may mention G. Steindorff's little *Koptische Grammatik* (1894, ed. 1904), improving greatly on Stern's standard work in regard to phonology and the relationship of Coptic forms to Egyptian, and K. Sethe's *Das Ägyptische Verbum* (1899). The latter is an extensive monograph on the verb in Egyptian and Coptic by a brilliant and laborious philologist. Owing to the very imperfect notation of sound in the writing, the highly important subject of the verbal roots and verbal forms was perhaps the obscurest branch of Egyptian grammar when Sethe first attacked it in 1895. The subject has been reviewed by Erman, *Die Flexion des ägyptischen Verbums* in the *Sitzungsberichte* of the Berlin Academy, 1900. The Berlin school, having settled the main lines of the grammar, next turned its attention to lexicography. It has devised a scheme, founded on that for the Latin Thesaurus of the Berlin Academy, which almost mechanically sorts the whole number of occurrences of every word in any text examined. Scholars in England, America and Denmark, as well as in Germany, have taken part in this great enterprise, and though the completion of it may be far off, the collections of classified material already made are very valuable for consultation.[1] At present Egyptologists depend on Heinrich Brugsch's admirable but somewhat antiquated *Wörterbuch* and on Levi's useful but entirely uncritical *Vocabolario*. Though demotic has not yet received serious attention at Berlin, the influence of that great school has made itself felt amongst demotists, especially in Switzerland, Germany, America and England. The death of Heinrich Brugsch in 1895 was a very severe blow to demotic studies; but it must be admitted that his brilliant gifts lay in other directions than exact grammatical analysis. Apart from their philological interest, as giving the history of a remarkable language during a period of several thousand years, the grammatical studies of the last quarter of the 19th century and afterwards are beginning to bear fruit in regard to the exact interpretation of historical documents on Egyptian monuments and papyri. Not long ago the supposed meaning of these was extracted chiefly by brilliant guessing, and the published translations of even the best scholars could carry no guarantee of more than approximate exactitude, where the sense depended at all on correct recognition of the syntax. Now the translator proceeds in Egyptian with some of the sureness with which he would deal with Latin or Greek. The meaning of many words may be still unknown, and many constructions are still obscure; but at least he can distinguish fairly between a correct text and a corrupt text. Egyptian writing lent itself only too easily to misunderstanding, and the writings of one period were but half intelligible to the learned scribes of another. The mistaken readings of the old inscriptions by the priests at Abydos (Table of Abydos), when attempting to record the names of the kings of the Ist Dynasty on the walls of the temple of Seti I., are now admitted on all sides; and no palaeographer, whether his field be Greek, Latin, Arabic, Persian or any other class of MSS., will be surprised to hear that the Egyptian papyri and inscriptions abound in corruptions and mistakes. The translator of to-day can, if he wishes, mark where certainty ends and mere conjecture begins, and it is to be hoped that advantage will be taken more widely of this new power. The Egyptologist who has long lived in the realm of conjecture is too prone to consider any series of guesses good enough to serve as a translation, and forgets to insert the notes of interrogation which would warn workers in other fields from implicit trust.

Language and Writing.—The history of the Egyptian language is evidenced by documents extending over a very long range of time. They begin with the primitive inscriptions of the Ist Dynasty (not later than 3300 B.C.) and end with the latest Coptic compositions of about the 14th century A.D. The bulk of the hieroglyphic inscriptions are written in a more or less artificial literary language; but in business documents, letters, popular tales, &c., the scribes often adhered closely to the living form of the tongue, and thus reveal its progressive changes.

The stages of the language are now distinguished as follows:—

Old Egyptian.—This is properly the language of the Old Kingdom. In it we have (*a*) the recently discovered inscriptions of the Ist Dynasty, too brief and concise to throw much light on the language of that time; and the great collections of spells and ritual texts found inscribed in the Pyramids of the Vth and VIth Dynasties, which must even then have been of high antiquity, though they contain later additions made in the same style. (*b*) A few historical texts and an abundance of short inscriptions representing the language of the IVth, Vth and VIth Dynasties. The ordinary *literary language* of the later monuments is modelled on Old Egyptian. It is often much affected by contemporary speech, but preserves in the main the characteristics of the language of the Old Kingdom.

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[1] Annual reports of the progress of the work are printed in the *Sitzungsberichte* of the Berlin Academy of Sciences; see also Erman, *Zur ägyptischen Sprachforschung*, *ib.* for 1907, p. 400, showing the general trend of the results.

Middle and Late Egyptian.—These represent the vulgar speech of the Middle and New Kingdoms respectively. The former is found chiefly in tales, letters, &c., written in hieratic on papyri of the XIIIth Dynasty to the end of the Middle Kingdom; also in some inscriptions of the XVIIIth Dynasty. Late Egyptian is seen in hieratic papyri of the XVIIIth to the XXIst Dynasties. The spelling of Late Egyptian is very extraordinary, full of false etymologies, otiose signs, &c., the old orthography being quite unable to adapt itself neatly to the profoundly modified language; nevertheless, this clumsy spelling is expressive, and the very mistakes are instructive as to the pronunciation.

Demotic.—Demotic Egyptian seems to represent approximately the vulgar speech of the Saite period, and is written in the "demotic" character, which may be traced back to the XXVIth Dynasty, if not to a still earlier time. With progressive changes, this form of the language is found in documents reaching down to the fall of Paganism in the 4th century A.D.[1] Under the later Ptolemies and the Roman rule documents in Greek are more abundant than in demotic, and the language of the ruling classes must have begun to penetrate the masses deeply.

Coptic.—This, in the main, represents the popular language of early Christian Egypt from the 3rd to perhaps the 10th century A.D., when the growth of Coptic as a literary language must have ceased. The Greek alphabet, reinforced by a few signs borrowed from demotic, rendered the spoken tongue so accurately that four distinct, though closely allied, dialects are readily distinguishable in Coptic MSS.; ample remains are found of renderings of the Scriptures into all these dialects. The distinctions between the dialects consist largely in pronunciation, but extend also to the vocabulary, word-formation and syntax. Such interchanges are found as *l* for *r*, ϭ (*k*, *ch*) for ϫ (*dj*), final *i* for final *e*, *a* for *e*, *a* for *o*. Early in the 2nd century A.D., pagan Egyptians, or perhaps foreigners settled in Egypt, essayed, as yet unskilfully, to write the native language in Greek letters. This *Old Coptic*, as it is termed, was still almost entirely free from Greek loan-words, and its strong archaisms are doubtless accounted for by the literary language, even in its most "vulgar" forms, having moved more slowly than the speech of the people. Christian Coptic, though probably at first contemporary with some documents of Old Coptic, contrasts strongly with the latter. The monks whose task it was to perfect the adaptation of the alphabet to the dialects of Egypt and translate the Scriptures out of the Greek, flung away all pagan traditions. It is clear that the basis which they chose for the new literature was the simplest language of daily life in the monasteries, charged as it was with expressions taken from Greek, pre-eminently the language of patristic Christianity. There is evidence that the amount of stress on syllables, and the consequent length of vowels, varied greatly in spoken Coptic, and that the variation gave much trouble to the scribes; the early Christian writers must have taken as a model for each dialect the deliberate speech of grave elders or preachers, and so secured a uniform system of accentuation. The remains of Old Coptic, though very instructive in their marked peculiarities, are as yet too few for definite classification. The main divisions of Christian Coptic as recognized and named at present are: Sahidic (formerly called Theban), spoken in the upper Thebais; Akhmimic, in the neighbourhood of Akhmim, but driven out by Sahidic about the 5th century; Fayumic, in the Fayum (formerly named wrongly "Bashmuric," from a province of the Delta); Bohairic, the dialect of the "coast district" (formerly named "Memphite"), spoken in the north-western Delta. Coptic, much alloyed with Arabic, was spoken in Upper Egypt as late as the 15th century, but it has long been a dead language.[2] Sahidic and Bohairic are the most important dialects, each of these having left abundant remains; the former spread over the whole of Upper Egypt, and the latter since the 14th century has been the language of the sacred books of Christianity throughout the country, owing to the hierarchical importance of Alexandria and the influence of the ancient monasteries established in the north-western desert.

The above stages of the Egyptian language are not defined with absolute clearness. Progress is seen from dynasty to dynasty or from century to century. New Egyptian shades off almost imperceptibly into demotic, and it may be hoped that gaps which now exist in the development will be filled by further discovery.

Coptic is the only stage of the language in which the spelling gives a clear idea of the pronunciation. It is therefore the mainstay of the scholar in investigating or restoring the word-forms of the ancient language. Greek transcriptions of Egyptian names and words are valuable as evidence for the vocalization of Egyptian. Such are found from the 6th century B.C. in the inscription of Abu Simbel, from the 5th in Herodotus, &c., and abound in Ptolemaic and later documents from the beginning of the 3rd century B.C. onwards. At first sight they may seem inaccurate, but on closer examination the Graecizing is seen to follow definite rules, especially in the Ptolemaic period. A few cuneiform transcriptions, reaching as far back as the XVIIIth Dynasty, give valuable hints as to how Egyptian was pronounced in the 15th century B.C. Coptic itself is of course quite inadequate to enable us to restore Old Egyptian. In it the Old Egyptian verbal forms are mostly replaced by periphrases; though the strong roots are often preserved entire, the weaker consonants and the ꜣ have largely or entirely disappeared, so that the language appears as one of biliteral rather than triliteral roots. Coptic is strongly impregnated with Greek words adopted late; moreover, a certain number of Semitic loan-words flowed into Egyptian at all ages, and especially from the 16th century B.C. onwards, displacing earlier words. It is only by the most careful scrutiny, or the exercise of the most piercing insight, that the imperfectly spelled Egyptian has been made to yield up one grammatical secret after another in the light brought to bear upon it from Coptic. Demotic grammar ought soon to be thoroughly comprehensible in its forms, and the study of Late Egyptian should not stand far behind that of demotic. On the other hand, Middle Egyptian, and still more Old Egyptian, which is separated from Middle Egyptian by a wide gap, will perhaps always be to us little more than consonantal skeletons, the flesh and blood of their vocalization being for the most part irretrievably lost.[3]

In common with the Semitic languages, the Berber languages of North Africa, and the Cushite languages of North-East Africa, Egyptian of all periods possesses grammatical gender, expressing masculine and feminine. Singularly few language groups have this peculiarity; and our own great Indo-European group, which possesses it, is distinguished from those above mentioned by having the neuter gender in addition. The characteristic triliteral roots of all the Semitic languages seemed to separate them widely from others; but certain traits have caused the Egyptian, Berber and Cushite groups to be classed together as three subfamilies of a Hamitic group, remotely related to the Semitic. The biliteral character of Coptic, and the biliteralism which was believed to exist in Egyptian, led philologists to suspect that Egyptian might be a surviving witness to that far-off stage of the Semitic languages when triliteral roots had not yet been formed from presumed original biliterals; Sethe's investigations, however, prove that the Coptic biliterals are themselves derived from Old Egyptian triliterals, and that the triliteral roots enormously preponderated in Egyptian of the earliest known form; that view is, therefore, no longer tenable. Many remarkable resemblances have been observed in the grammatical structure of the Berber and Cushite groups with Semitic (cf. H. Zimmern, *Vergleichende Grammatik d. semitischen Sprachen*, Berlin, 1898, especially pronouns and verbs); but the relationship must be very distant, and there are no ancient documents that can take back the history of any one of those languages more than a few centuries. Their connexion with Semitic and Egyptian, therefore, remains at present an obscure though probable hypothesis. On the other hand, Egyptian is certainly related to Semitic. Even before the triliterality of Old Egyptian was recognized, Erman showed that the so-called pseudo-participle had been really in meaning and in form a precise analogue of the Semitic perfect, though its original employment was almost obsolete in the time of the earliest known texts. Triliteralism is considered the most essential and most peculiar feature of Semitic. But there are, besides, many other resemblances in structure between the Semitic languages and Egyptian, so that, although the two vocabularies present few points of clear contact, there is reason to believe that Egyptian was originally a characteristic member of the Semitic family of languages. See Erman, "Das Verhältnis d. ägyptischen zu d. semitischen Sprachen" (*Zeitschrift d. deutschen morgenl. Gesellschaft*, 1892); Zimmern, *Vergl. Gram.*, 1898; Erman, "Flexion d. ägyptischen Verbums" (*Sitzungsberichte d. Berl. Akad.*, 1900). The Egyptians proper are not, and so far as we can tell never were, Semitic in physical feature. As a possible explanation of the facts, Erman supposes that a horde of conquering Semites, like the Arabs of a later day, imposed their language on the country, but disappeared, being weakened by the climate or absorbed by the native population. The latter acquired the Semitic language imperfectly from their conquerors; they expressed the verbal conjugations by periphrases, mispronounced the consonants, and so changed greatly the appearance of the vocabulary, which also would certainly contain a large proportion of native non-Semitic roots. Strong consonants gave place to weak consonants (as ق has done to ء, in the modern Arabic of Egypt), and then the weak consonants disappearing altogether produced biliterals from the triliterals. Much of this must have taken place, according to the theory, in the prehistoric period; but the loss of weak consonants, of ʿ, and of one of two repeated consonants, and the development of periphrastic conjugations continued to the end. The typical Coptic root thus became biliteral rather than triliteral, and the verb, by means of periphrases, developed tenses of remarkable precision. Such verbal resemblances as exist between Coptic and Semitic are largely due to late exchanges with Semitic neighbours.

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[1] In the temple of Philae, where the worship of Isis was permitted to continue till the reign of Justinian, Brugsch found demotic inscriptions with dates to the end of the 5th century.

[2] The Arabic dialects, which gradually displaced Coptic as Mahommedanism supplanted Christianity, adopted but few words of the old native stock.

[3] In the articles referring to matters of Egyptology in this edition, Graecized forms of Old Egyptian names, where they exist, are commonly employed; in other cases names are rendered by their actual equivalents in Coptic or by analogous forms. Failing all such means, recourse is had to the usual conventional renderings of hieroglyphic spelling, a more precise transcription of the consonants in the latter being sometimes added.

The following sketch of the Egyptian language, mainly in its earliest form, which dates from some three or four thousand years B.C., is founded upon Erman's works. It will serve to contrast with Coptic grammar on the one hand and Semitic grammar on the other.

THE EGYPTIAN ALPHABET

𓇋 =*ỉ*; so conventionally transcribed since it unites two values, being sometimes *y* but often *א* (especially at the beginning of words), and from the earliest times used in a manner corresponding to the Arabic *hamza*, to indicate a prosthetic vowel. Often lost.

𓏭 and 𓇌 are frequently employed for *y*.

𓄿 =ʾ(א); easily lost or changes to *y*.

𓂝 =ʿ(ע); lost in Coptic. This rare sound, well known in Semitic, occurs also in Berber and Cushite languages.

𓅱 =*w*; often changes to *y*.

𓃀 =*b*.

𓊪 =*p*.

𓆑 =*f*.

𓅓 =*m*.

𓈖 =*n*.

𓂋 =*r*; often lost, or changes to *y*. *r* and *l* are distinguished in later demotic and in Coptic.

𓉔 =*h*
𓎛 =*ḥ*
} distinction lost in Coptic.

𓐍 =*ḫ*; in Coptic ϣ (*sh*) or ϧ (*kh*) correspond to it.

𓄡 =*ẖ*; generally written with 𓈙 (*š*) in the Old Kingdom, but 𓄡 corresponds to *kh* in Coptic.

𓊃 =*s*
𓋴 =*ś*
} distinction lost at the end of the Old Kingdom.

𓈙 =*š* (*sh*).

𓈎 =*ḳ*; Coptic ⲕ.

𓎡 =*k* } Coptic ⲕ; or ϭ, ϫ, according to dialect.
𓎼 =*g* } Coptic ⲕ; or ϭ.

𓏏 =*t*; often lost at the end of words.

𓍿 =*ṯ* (*θ*); often changes to *t*, otherwise Coptic ⲧ; or ϫ, ϭ.

𓂧 =*d*; in Coptic reduced to *t*.

𓆓 =*ḏ* (*z*); often changes to *d*, Coptic ⲧ; otherwise in Coptic ϫ.

ROOTS

Egyptian roots consist of consonants and semi-consonants only, the inflexion being effected by internal vowel-change and the addition of consonants or vowels at the beginning or end. The Egyptian system of writing, as opposed to the Coptic, showed only the consonantal skeletons of words: it could not record internal vowel-changes; and semi-consonants, even when radicals, were often omitted in writing.

PERSONAL PRONOUNS

Sing.		Pl.		Du.	
1. c.	*ỉw* (?) later *wỉ*.	1. c.	*n*.		
2. m.	*ṯw*.	2. c.	*ṯn*.	2. c.	*ṯny*.
f.	*ṯn*.				
3. m.	**fy*, surviving only in a special verbal form.	3. m.	*śn*, early lost, except as suffix.	3. c.	*śny*.
f.	*śy*.	f.	**śt* surviving as 3. c.		

From these are derived the suffixes, which are shortened forms attached to nouns to express the possessor, and to verbs to express the subject. In the latter case the verb was probably in the participle, so that *śdmỉỉ-śn*, "they hear," is literally "hearing are they." The singular suffixes are: (1) c.-*ỉ*; (2) m. -*k*, f. -*ṯ*; (3) m. -*f*, f. -*ś*;—the dual and plural have no special forms.

Another series of absolute pronouns is: (2) m. *ṯwt*, *ṯw*; f. *ṯmt*, *ṯm*; (3) m. *śwt*, *św*; f. *śỉt*, *śt*. Of these *ṯwt*, *ṯmt*, &c., are emphatic forms. Many of the above absolute pronouns were almost obsolete even in the Old Kingdom. In ordinary texts some survive, especially as objects of verbs, namely, *wỉ*, *tw*, *tn*, *sw*, *st*. The suffixes of all numbers and persons except the dual were in full use throughout, to Coptic; *sn*, however, giving way to a new suffix, -*w*, which developed first in the New Kingdom.

Another absolute pronoun of the first person is *ỉnk*, ⲀⲚⲞⲔ, like Heb. אנכי. It is associated with a series for the second and third persons: *nt-k*, *nt-ṯ*, *nt-f*; *nt-śn*, &c.; but from their history, use and form, it seems probable that the last are of later formation, and are not to be connected with the Semitic pronouns (chiefly of the 2nd person) resembling them.

DEMONSTRATIVE PRONOUNS

There are several series based on m. *p*; f. *t*; pl. *n*; but *n* as a plural seems later than the other two. From them are developed a weak demonstrative to which possessive suffixes can be attached, producing the definite and possessive articles (*pʾ*, *tʾ*, *nʾ*, "the," *pʾy-f*, "his," *pʾy-s* "her," &c.) of Middle Egyptian and the later language.

NOUNS

Two genders, m. (ending *w*, or nothing), f. (ending *t*). Three numbers: singular, dual (m. *wỉ*, f. *tỉ*, gradually became obsolete), plural (m. *w*; f. *wt*). No case-endings are recognizable, but construct forms—to judge by Coptic—were in use. Masculine and feminine nouns of instrument or material are formed from verbal roots by prefixing *m*; *e.g.* *m·sdm·t*, "stibium," from *sdm*, "paint the eye." Substantives and adjectives are formed from substantives and prepositions by the addition of *y* in the masculine; *e.g.* *nỉt*, "city," *nỉ·y*, "belonging to a city," "citizen"; *ḥr*, "upon," *ḥr·y* (f. *ḥr·t*; pl. *ḥr·w*), "upper." This is not unlike the Semitic *nisbe* ending *iy*, *ay* (*e.g.* Ar. *beled*, "city," *beledi*, "belonging to a city"). Adjectives follow the nouns they qualify.

NUMERALS

1, *w'*; 2, *sn*; 3, *ḫmt*; 4, *fdw*; 5, *dw'*; 6, *sis* (or *sw·?*); 7, *sfḫ*; 8, *ḫmn*; 9, *psḏ*; 10, *mt*. 2, 6, 7, 8 and 9 (?) resemble Semitic numerals. 20 and 30 (*m·b*) had special names; 40-90 were named as if plurals of the units 4-9, as in Semitic. 100, *šnt*; 1000, *ḫ'*; 10,000, *ḏb'*; 100,000, *ḥfnw*.

VERBS

The forms observable in hieroglyphic writing lead to the following classification:—

Strong Verbs.	Biliteral . .	Often showing traces of an original III. inf.; in early times very rare.
	Triliteral . .	Very numerous.
	Quadriliteral Quinqueliteral	Generally formed by reduplication. In Late Egyptian they were no longer inflected, and were conjugated with the help of *iry*, "do."
Weak Verbs.	II. geminatae	Properly triliterals, but, with the 2nd or 3rd radical alike, these coalesced in many forms where no vowel intervened, and gave the word the appearance of a biliteral.
	III. gem. . . .	Rare.
	III. inf. . . .	Numerous. III. *w*, and III. *i* were unified early. Some very common verbs, "do," "give," "come," "bring" are irregular.
	IV inf. . . .	Partly derived from adjectival formations in *y*, from nouns and infinitives:—*e.g.* *s·ip*, inf. *sipt*; adj. *sipty*; verb (4 lit.), *sipty*.

Many verbs with weak consonants—I *y*, I *w*, II. inf. (*m[w]i*), and those with *n*—are particularly difficult to trace accurately, owing to defective writing.

It seems that all the above classes may be divided into two main groups, according to the form of the infinitive:—with masculine infinitive the strong triliteral type, and with feminine infinitive the type of the III. inf. The former group includes all except III. inf., IV. inf., and the causative of the biliterals, which belong to the second group.

It is probable that the verb had a special form denoting condition, as in Arabic. There was a causative form prefixing *s*, and traces of forms resembling *Pi'el* and *Niphal* are observed. Some roots are reduplicated wholly or in part with a frequentative meaning, and there are traces of gemination of radicals.

Pseudo-Participle.—In very early texts this is the past indicative, but more commonly it is used in sentences such as, *gm-n-f wi 'ḥ'·kwi*, "he found me I stood," *i.e.* "he found me standing." The indicative use was soon given up and the pseudo-participle was employed only as predicate, especially indicating a state; *e.g.* *ntr·t šm·ti*, "the goddess goes"; *tw-k wḏ·ti*, "thou art prosperous." The endings were almost entirely lost in New Egyptian. For early times they stand thus:—

Sing.	3. masc.	*i*, late *w*.	Dual *wii*.	Pl.	*w*.
	fem.	*ti*.	*tiw*		*ti*.
	2. masc.	*ti*			*tiwny*.
	fem.	*ti*			
	1. c.	*kwi*.			*wyn*.

The pseudo-participle seems, by its inflexion, to have been the perfect of the original Semitic conjugation. The simplest form being that of the 3rd person, it is best arranged like the corresponding tense in Semitic grammars, beginning with that person. There is no trace of the Semitic imperfect in Egyptian. The ordinary conjugation is formed quite differently. The verbal stem is here followed by the subject-suffix or substantive—*sḏm-f*, "he hears"; "*sḏmw stn*, "the king hears." It is varied by the addition of particles, &c., *n*, *in*, *ḫr*, *tw*, thus:—

sḏm-f, "he hears"; *sḏm-w-f*, "he is heard" (*pl.* *sḏm-ti-sn*, "they are heard"); *sḏm-tw-f*, "he is heard"; *sḏm-n-f*, "he heard"; *sḏm-n-tw-f*, "he was heard"; also, *sḏm-in-f*, *sḏm-ḫr-f*, *sḏm-k'-f* Each form has special uses, generally difficult to define. *sḏm-f* seems rather to be imperfect. *sḏm-n-f* perfect, and generally to express the past. Later, *sḏm-f* is ordinarily expressed by periphrases; but by the loss of *n*, *sḏm-n-f* became itself *sdm-f*, which is the ordinary past in demotic. Coptic preserves *sḏm-f* forms of many verbs in its causative (*e.g.* ⲦⲀⲚϨⲞϤ "cause him to live," from Egyptian *di·t·nḫ-f*), and, in its periphrastic conjugation, the same forms of *wn*, "be," and *iry*, "do." With *sḏm-f* (*sedmo-f*) was a more emphatic form (*esḏomef*), at any rate in the weak verbs.

The above, with the relative forms mentioned below, are supposed by Erman to be derived from the participle, which is placed first for emphasis: thus, *sḏm-w stn*, "hearing is the king", *sḏm-f*, for *sḏm-fy*, "hearing he is." This Egyptian paraphrase of Semitic is just like the Irish paraphrase of English, "It is hearing he is."

The *imperative* shows no ending in the singular; in the plural it has *y*. and later *w*; cf. Semitic imperative.

The *infinitive* is of special importance on account of its being preserved very fully in Coptic. It is generally of masculine form, but feminine in III. inf. (as in Semitic), and in causatives of biliterals.

There are relative forms of *sḏm-f* and *sḏm-n-f*, respectively *sḏm·w-f* (masc.), *sḏm·t-n-f* (fem.), &c. They are used when the relative is the object of the relative sentence, or has any other position than the subject. Thus *sḏm·t-f* may mean "she whom he hears," "she who[se praises] he hears," "she [to] whom he hears [someone speaking]," &c. There are close analogies between the function of the relative particles in Egyptian and Semitic; and the Berber languages possess a relative form of the verb.

Participles.—These are active and passive, perfect and imperfect, in the old language, but all are replaced by periphrases in Coptic.

Verbal Adjectives.—There is a peculiar formation, *sḏm·ty-fy*, "he who shall hear," probably meaning originally "he is a hearer," *sḏm·ty* being an adjective in *y* formed from a feminine (*t*) form of the infinitive, which is occasionally found even in triliteral verbs; the endings are: sing., masc. *ty-fy*, fem. *ty-sy*; pl., masc. *ty-sn*, fem, *ty·st*. It is found only in Old Egyptian.

Particles.—There seems to be no special formation for adverbs, and little use is made of adverbial expressions. Prepositions, simple and compound, are numerous. Some of the commonest simple prepositions are *n* "for," *r* "to," *m* "in, from," *ḥr* "upon." A few enclitic conjunctions exist, but they are indefinite in meaning—*swt* a vague "but," *grt* a vague "moreover," &c.

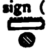
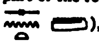
Coptic presents a remarkable contrast to Egyptian in the precision of its periphrastic conjugation. There are two present tenses, an imperfect, two perfects, a pluperfect, a present and a past frequentative, and three futures besides future perfect; there are also conjunctive and optative forms. The negatives of some of these are expressed by special prefixes. The gradual growth of these new forms can be traced through all the stages of Egyptian. Throughout the history of the language we note an increasing tendency to periphrasis; but there was no great advance towards *precision* before demotic. In demotic there are distinguishable a present tense, imperfect, perfect, frequentative, future, future perfect, conjunctive and optative; also present, past and future negatives, &c. The passive was extinct before demotic; demotic and Coptic express it, clumsily it must be confessed, by an impersonal "they," *e.g.* "they bore him" stands for "he was born."

It is worth noting how, in other departments besides the verb, the Egyptian language was far better adapted to practical ends during and after the period of the Deltaic dynasties (XXII.–XXX.) than ever it was before. It was both simplified and enriched. The inflexions rapidly disappeared and little was left of the distinctions between masculine and feminine, singular, dual and plural—except in the pronouns. The dual number had been given up entirely at an earlier date. The pronouns, both personal and demonstrative, retained their forms very fully. As prefixes, suffixes and articles, they, together with some auxiliary verbs, provided the principal mechanism of the renovated language. An abundant supply of useful adverbs was gradually accumulated, as well as conjunctions, so far as the functions of the latter were not already performed by the verbal prefixes. These great improvements in the language correspond to great changes in the economic condition of the country; they were the result of active trade and constant intercourse of all classes of Egyptians with foreigners from Europe and Asia. Probably the best stage of Egyptian speech was that which immediately preceded Coptic. Though Coptic is here and there more exactly expressive than the best demotic, it was spoilt by too much Greek, duplicating and too often expelling native expressions that were already adequate for its very simple requirements. Above all, it is clumsily pleonastic.

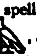
THE WRITING

The ancient Egyptian system of writing, so far as we know, originated, developed and finally expired strictly within the limits of the Nile Valley. The germ of its existence may have come from without, but, as we know it, it is essentially Egyptian and intended for the expression of the Egyptian language. About the 1st century B.C., however, the semi-barbarous rulers of the Ethiopian kingdoms of Meroe and Napata contrived the "Meroitic" alphabet, founded on Egyptian writing, and comprising both a hieroglyphic and a cursive form (see ETHIOPIA). As yet both of these kinds of Nubian writing are undeciphered. Egyptian hieroglyphic was carried by conquest into Syria, certainly under the XVIIIth Dynasty, and again under the XXVIth for the engraving of Egyptian inscriptions; but in the earlier period the cuneiform syllabary, and in the later the "Phoenician" alphabet, had obtained a firm hold there, and we may be sure that no attempt was made to substitute the Egyptian system for the latter. Cuneiform tablets in Syria, however, seem almost confined to the period of the XVIIIth Dynasty. Although it cannot be proved it seems quite possible that the traders of Phoenicia and the Aegean adopted the papyrus and Egyptian hieratic writing together, before the end of the New Kingdom, and developed their "Phoenician" alphabet from the latter about 1000 B.C. In very early times a number of systems of writing already reigned in different countries forming a compact and not very large area—perhaps from South Arabia to Asia Minor, and from Persia to Crete and Egypt. Whether they all sprang from one common stock of picture-writing we shall perhaps never know, nor can we as yet trace the influence which one great system may have had on another, owing to the poverty of documents from most of the countries concerned.

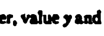
It is certain that in Egypt from the IVth Dynasty onwards the mode of writing was essentially the same as that which was extinguished by the fall of paganism in the 4th century A.D. Its elements in the hieroglyphic form are pictorial, but each hieroglyph had one or more well-defined functions, fixed by convention in such a manner that the Egyptian language was expressed in writing word by word. Although a picture sign may at times have embarrassed the skilled native reader by offering a choice of fixed values or functions, it was never intended to convey merely an idea, so as to leave to him the task of putting the idea into his own words. How far this holds good for the period before the IVth Dynasty it is difficult to say. The known inscriptions of the earlier times are so brief and so limited in range that the system on which they were written cannot yet be fully investigated. As far back as the Ist Dynasty, phonograms (see below) were in full use. But the spelling then was very concise: it is possible that some of the slighter words, such as prepositions, were omitted in the writing, and were intended to be supplied from the context. As a whole we gain the impression that a really distinct and more primitive stage of hieroglyphic writing by a substantially vaguer notation of words lay not far behind the time of the Ist Dynasty.

The employment of the signs are of three kinds: any given sign represents either (1) a whole word or root; or (2) a sound as part of a word; or (3) pictorially defines the meaning of a word the sound of which has already been given by a sign or group of signs preceding. The number of phonograms is very restricted, but some signs have all these powers. For instance, is the conventional picture of a draughtboard (shown in plan) with the draughtsmen (shown in elevation) on its edge:—this sign (1) signifies the root *mn*, "set," "firm"; or (2) in the group , represents the same sound as part of the root *mnḫ*, "good"; or (3) added to the group *snt* (thus: ), shows that the meaning intended is "draughtboard," or "draughts," and not any of the other meanings of *snt*. Thus signs, according to their employment, are said to be (1) "word-signs," (2) "phonograms," or (3) "determinatives."

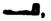
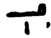
Word-signs.—The word-sign value of a sign is, in the first place, the name of the object it represents, or of some material, or quality, or action, or idea suggested by it. Thus is *ḥr*, "face"; , a vase of ointment, is *mrḥ.t*, "ointment"; is *wdb*, "turn." Much investigation is still required to establish the origins of the values of the signs; in some cases the connexion between the pictures and the *primary* values seems to be curiously remote. Probably all the signs in the hieroglyphic signary can be employed in their primary sense. The *secondary* value expresses the consonantal root of the name or other primary value, and any, or almost any, derivative from that root: as when , a mat with a cake upon it, is not only *ḥtp*, an "offering-mat," but also *ḥtp* in the sense of "conciliation," "peace," "rest," "setting" (of the sun), with many derivatives. In the third place, some signs may be *transferred* to express another root having the same consonants as the first: thus , the ear, by a play upon words can express not only *sdm*, "hear," but also *sdm*, "paint the eyes."

Phonograms.—Only a limited number of signs are found with this use, but they are of the greatest importance. By searching throughout the whole mass of normal inscriptions, earlier than the periods of Greek and Roman rule when great liberties were taken with the writing, probably no more than one hundred different phonograms can be found. The number of those commonly employed in good writing is between seventy and eighty. The most important phonograms are the *uniliteral* or *alphabetic* signs, twenty-four in number in the Old Kingdom and without any homophones: later these were increased by homophones to thirty. Of *biliteral* phonograms—each expressing a combination of two consonants—there were about fifty commonly used: some fifteen or twenty were rarely used. As Egyptian roots seldom exceeded three letters, there was no need for *triliteral* phonograms to spell them. There is, however, one triliteral phonogram, the eagle, , *tyw*, or *tiw* (?), used for the plural ending of adjectives in *y* formed from words ending in *t* (whether radical or the feminine ending).

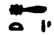
The phonetic values of the signs are derived from their word-sign values and consist usually of the bare root, though there are rare examples of the retention of a flexional ending; they often ignore also the weaker consonants of the root, and on the same principle reduce a repeated consonant to a single one, as when the hoe , *ḥnn*, has the phonetic value *ḥn*. The history of some of the alphabetic signs is still very obscure, but a sufficient number of them have been explained to make it nearly certain that the values of all were obtained on the same principles.[1] Some of the ancient words from which the phonetic values were derived probably fell very early into disuse, and may never be discoverable in the texts that have come down to us. The following are among those most easily explained:—

, reed flower, value *y* and *ỉ*; from , *y'*, "reed."

(It seems as if the two values *y* and *ỉ* were obtained by choosing first one and then the other of the two semi-consonants composing the name. They are much confused, and a conventional symbol *ỉ* has to be adopted for rendering .)

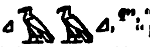
, forearm, value ʿ(*y*); from , ʿ(*y*), "hand."

, mouth, value *r*; from , *r*, "mouth."

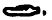
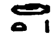
, belly and teats, value *ẖ*; from , *ẖ.t*, "belly."

(The feminine ending is here, as usual, neglected.)

, tank, value *š*; from , *š*, "tank."

, slope of earth or brickwork, value *ḳ*; " , *ḳ'''*, "slope," "height."

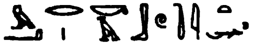
(The doubled weak consonant is here neglected.)

, hand, value *d*; from , *d.t*, "hand."

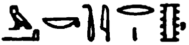
, cobra, value *ḏ*; from , *ḏ.t*, "cobra."

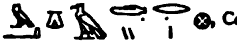
For some alphabetic signs more than one likely origin might be found, while for others, again, no clear evidence of origin is yet forthcoming.

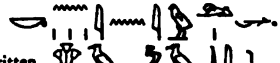
It has already been explained that the writing expresses only consonants. In the Graeco-Roman period various imperfect attempts were made to render the vowels in foreign names and words by the semi-vowels as also by , the consonant *y* which originally represented having been reduced in speech by that time to the power of *ỉ*, only. Thus, Πτολεμαῖος is spelt *Ptwrmys*, Antoninus, *'Nt'nynws* or *Intnyns*, &c. &c. Much earlier, throughout the New Kingdom, a special "syllabic" orthography, in which the alphabetic signs for the consonants are generally replaced by groups or single signs having the value of a consonant followed by a semi-vowel, was used for foreign names and words, *e.g.*

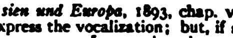
מרכבה, "chariot," was written 

in Coptic ⲂⲈⲢⲈϬⲰⲞⲨⲦ.

מגדל, "tower," was written ,

, Coptic ⲙⲉϭⲧⲟⲗ.

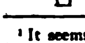
כנור, "harp," was written .

חמת, "Hamath," was written .

According to W. Max Müller (*Asien und Europa*, 1893, chap. v.), this represents an endeavour to express the vocalization; but, if so, it was carried out with very little system. In practice, the semi-vowels are generally negligible. This method of writing can be traced back into the Middle Kingdom, if not beyond, and it greatly affected the spelling of native words in New Egyptian and demotic.

Determinatives.—Most signs can on occasion be used as determinatives, but those that are very commonly employed as phonograms or as secondary word-signs are seldom employed as determinatives; and when they are so used they are often somewhat differentiated. Certain generic determinatives are very common, *e.g.*:—

; of motion.

; of acts involving force.

; of divinity.

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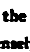
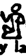
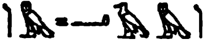
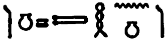
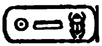
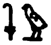
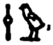
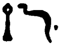
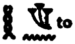
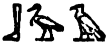
[1] It seems that "acrophony" (giving to a sign the value of the first letter of its name) was indulged in only by priests of the latest age, inventing fantastic modes of writing their "vain repetitions" on the temple walls.

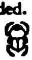
; of a person or a man's name.
; of buildings.
; of inhabited places.
; of foreign countries.
; club; of foreigners.
; of all actions of the mouth—eating and speaking, likewise silence and hunger.
; ripple-lines; of liquid.
; hide; of animals, also leather, &c.
; of plants and fibres.
; of flesh.
; a sealed papyrus-roll; of books, teaching, law, and of abstract ideas generally.

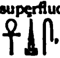
In the earliest inscriptions the use of determinatives is restricted to the , , &c., after proper names, but it developed immensely later, so that few words beyond the particles were written without them in the normal style after the Old Kingdom.

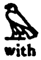
Some few signs ideographic of a group of ideas are made to express particular words belonging to that group by the aid of phonograms which point out the special meaning. In such cases the ideogram is not merely a determinative nor yet quite a word-sign. Thus  "Semite,"  "Libyan," &c., but cannot stand by itself for the name of any particular foreign people. So also in monogram is *šm* "go," is "conduct."

Orthography.—The most primitive form of spelling in the hieroglyphic system would be by one sign for each word, and the monuments of the Ist Dynasty show a decided tendency to this mode. Examples of it in later times are preserved in the royal cartouches, for here the monumental style demanded special consciseness. Thus, for instance, the name of Tethmosis III.—MN-ḪPR-Rʿ—is spelled  (as Rʿ is the name of the sun-god, with customary deference to the deity it is written first though pronounced last) A number of common words—prepositions, &c.—with only one consonant are spelled by single alphabetic signs in ordinary writing. Word-signs used singly for the names of objects are generally marked with I in classical writing, as , *ib*, "heart," , *ḥr*, "face," &c.

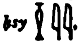
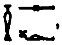
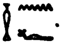
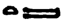
But the use of bare word-signs is not common. Flexional consonants are almost always marked by phonograms, except in very early times; as when the feminine word = *s.t*, "cobra," is spelled . Also, if a sign had more than one value, a phonogram would be added to indicate which of its values was intended: thus in  is *sw*, "he," but in it is *stn*, "king." Further, owing to the vast number of signs employed, to prevent confusion of one with another in rapid writing they were generally provided with "phonetic complements," a group being less easily misread than a single letter. *E.g.* , *wḏ*, "command," is regularly written , *wḏ (w)*; but , *ḥz*, "white," is written , *ḥz(z)*. This practice had the advantage also of distinguishing determinatives from phonograms. Thus the root or syllable *ḥn* is regularly written  to avoid confusion with the determinative . Redundance in writing is the rule; for instance, *b* is often spelled  *(b)bʿ(ʿ)*. Biliteral phonograms are very rare as phonetic complements, nor are two biliteral phonograms employed together in writing the radicals of a word.

Spelling of words purely in phonetic or even alphabetic characters is not uncommon, the determinative being generally added. Thus in the pyramidal texts we find *ḫpr*, "become," written  in one copy of a text, in another . Such variant spellings are very important for fixing the readings of word-signs. It is noteworthy that though words were so freely spelled in alphabetic characters, especially in the time of the Old Kingdom, no advance was ever made towards excluding the cumbersome word-signs and biliteral phonograms, which, by a judicious use of determinatives, might well have been rendered quite superfluous.

Abbreviations.—We find , strictly *ʿnḫ s· š* standing for the ceremonial *vival ʿnḫ wḏ, šnb.* "Life, Prosperity and Health," and in course of time was used in accounts instead of *dmḏ*, "total."

Monograms are frequent and are found from the earliest times. Thus , mentioned above are monograms, the association of and having no pictorial meaning. Another common monogram is , *i.e.* and  for *Ḥ·t-Ḥrw* "Hathor." A word-sign may be compounded with its phonetic complement, as *ḥs* "white," or with its determinative, as *ḥs* "silver."

The table on the opposite page shows the uses of a few of the commoner signs.

The decorative value of hieroglyphic was fully appreciated in Egypt. The aim of the artist-scribe was to arrange his variously shaped characters into square groups, and this could be done in great measure by taking advantage of the different ways in which many words could be spelt. Thus *ḥs* could be written , *ḥsy* , *ḥs-f* , *ḥs-n-f* . But some words in the classical writing were intractable from this point of view. It is obvious that the alphabetic signs played a very important part in the formation of the groups, and many words could only be written in alphabetic signs. A great advance was therefore made when several homophones were introduced into the alphabet in the Middle and New Kingdoms, partly as the result of the wearing away of old phonetic distinctions, giving the choice between and ,  and , and , and , and . In later times the number of homophones in use increased greatly throughout the different classes, the tendency being much helped by the habit of fanciful writing; but few of these homophones found their way into the cursive script. Occasionally a scribe of the old times indulged his fancy in "sportive" or "mysterious" writing, either inventing new signs or employing old ones in unusual meanings. Short sportive inscriptions are found in tombs of the XIIth Dynasty; some groups are so written cursively in early medical papyri, and certain religious inscriptions in the royal tombs of the XIXth and XXth Dynasties are in secret writing. Fanciful writing abounds on the temples of the Ptolemaic and Roman periods.

PALAEOGRAPHY

Hieroglyphic.—The main division is into monumental or epigraphic hieroglyphs and written hieroglyphs. The former may be rendered by the sculptor or the painter in stone, on wood, &c., with great delicacy of detail, or may be simply sunk or painted in outline. When finely rendered they are of great value to the student investigating the origins of their values. No other system of writing bears upon its face so clearly the history of its development as the Egyptian; yet even in this a vast amount of work is still required to detect and disentangle the details. Monumental hieroglyphic did not cease till the 3rd century A.D. (Temple of Esna). The written hieroglyphs, formed by the scribe with the reed pen on papyrus, leather, wooden tablets, &c., have their outlines more or less abbreviated, producing eventually the cursive scripts hieratic and demotic. The written hieroglyphs were employed at all periods, especially for religious texts.

Hieratic.—A kind of cursive hieroglyphic or hieratic writing is found even in the Ist Dynasty. In the Middle Kingdom it is well

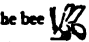
Sign.	Description.	Name.	Word-sign Value.	Phonetic Value.	Determinative Value.
	child	hrd (khrod)			youth
	face	ḥr (ḥor)	ḥr	[ḥr]	
	eye	ỉr.t (yori.t)	ỉr	ỉr	see, &c.
	mouth	r (ro)	r	r	
	forearm	·(·ei)	·.	·	[action of hand or arm]
	arm with stick	nḫt " be strong "	nḫt		violent action
	man with stick	nḫt " be strong "	nḫt		violent action
	lungs and windpipe	sm;	sm;		
	heart	ỉb			heart
	heart and windpipe	?	nfr		
	sparrow	?	šr		evil, worthlessness, smallness
	widgeon	s;.t	s;	s;	
	bolti-fish	ỉn.t	ỉn	ỉn	
	tusk	(1) ỉbḥ " tooth " (2) ḥw " taste "	bḥ ḥw	bḥ	bite, &c.
	cut branch	ḫt	ḫt	[ḫt]	wood, tree
	threshing-floor	sp.t	sp		
	sun	(1) r· " sun " (2) hrw " day "			(1) sun (2) division of time
	chamber, house	pr	pr		
	flat land	t·	t·	t·	(boundless horizon, eternity
	libation vase	ḥs.t	ḥs	ḥs	
	cord on stick	wz	wz	wz	
	basket	nb.t	nb		
	looped basket	?	k	k	
	sickle	?	m·	m·	
	composite hoe	[mr ?]	mr	mr	tillage
	fire-drill	z·.t(?)	z·	z·	
	attendant's equipment	šmś " follow "	šmś		
	knife	dś	dś		cut, prick, cutting instrument

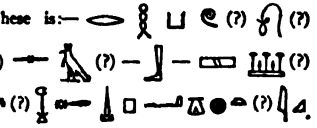
characterized, and in its most cursive form seems hardly to retain any definable trace of the original hieroglyphic pictures. The style varies much at different periods.

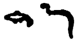
Demotic.—Widely varying degrees of cursiveness are at all periods observable in hieratic; but, about the XXVIth Dynasty, which inaugurated a great commercial era, there was something like a definite parting between the uncial hieratic and the most cursive form afterwards known as demotic. The employment of hieratic was thenceforth almost confined to the copying of religious and other traditional texts on papyrus, while demotic was used not only for all business but also for writing literary and even religious texts in the popular language. By the time of the XXVth Dynasty the cursive of the conservative Thebais had become very obscure. A better form from Lower Egypt drove this out completely in the time of Amasis II. and is the true demotic. Before the Macedonian conquest the cursive ligatures of the old demotic gave birth to new symbols which were carefully and distinctly formed, and a little later an epigraphic variety was engraved on stone, as in the case of the Rosetta stone itself. One of the most characteristic distinctions of later demotic is the minuteness of the writing.

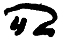
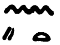
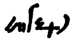
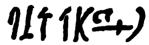
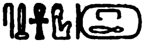
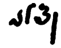
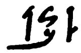
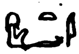
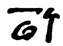
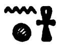
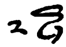
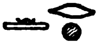
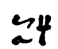
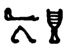
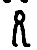
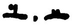
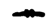
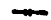
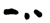
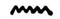
Hieroglyphic is normally written from right to left, the signs facing to the commencement of the line; hieratic and demotic follow the same direction. But monumental hieroglyphic may also be written from left to right, and is constantly so arranged for purposes of symmetry, *e.g.* the inscriptions on the two jambs of a door are frequently turned in opposite directions; the same is frequently done with the short inscriptions scattered over a scene amongst the figures, in order to distinguish one label from another.

In modern founts of type, the hieroglyphic signs are made to run from left to right, in order to facilitate the setting where European text is mixed with the Egyptian. The table on next page shows them in their more correct position, in order to display more clearly their relation to the hieratic and demotic equivalents.

Clement of Alexandria states that in the Egyptian schools the pupils were first taught the "epistolographic" style of writing (*i.e.* demotic), secondly the "hieratic" employed by the sacred scribes, and finally the "hieroglyphic" (*Strom.* v. 657). It is doubtful whether they classified the signs of the huge hieroglyphic syllabary with any strictness. The only native work on the writing that has come to light as yet is a fragmentary papyrus of Roman date which has a table in parallel columns of hieroglyphic signs, with their hieratic equivalents and words written in hieratic describing them or giving their values or meanings. The list appears to have comprised about 460 signs, including most of those that occur commonly in hieratic. They are to some extent classified. The bee  heads the list as a royal sign, and is followed by figures of nobles and other human figures in various attitudes, more or less grouped among themselves, animals, reptiles and fishes, scorpion, animals again, twenty-four alphabetic characters, parts of the human body carefully arranged from to , thirty-two in number, parts of animals, celestial signs, terrestrial signs, vases. The arrangement down to this point is far from strict, and beyond it is almost impossible to describe concisely, though there is still a rough grouping of characters according to resemblance of form, nature or meaning. It is a curious fact that not a single bird is visible on the fragments, and the trees and plants, which might easily have been collected in a compact and well-defined section, are widely scattered. Why the alphabetic characters are introduced where they are is a puzzle; the order of these is:—

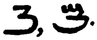


Three others,  and , had already occurred amongst the fish and reptiles. There seems to be no logical aim in this arrangement of the alphabetic characters and the series is incomplete. Very probably the Egyptians never constructed a really systematic list of hieroglyphs. In modern lists the signs are classified according to the nature of the objects they depict, as human figures, plants, vessels, instruments, &c. Horapollon's *Hieroglyphica* may be cited as a native work, but its author, if really an Egyptian, had no knowledge of good writing. His production consists of two elaborate complementary lists: the one describing sign-pictures and giving their meanings, the other cataloguing ideas in order to show how they could be expressed in hieroglyphic. Each seems to us to be made up of curious but perverted reminiscences eked out by invention; but they might some day prove to represent more truly the usages of mystics and magicians in designing amulets, &c., at a time approaching the middle ages.

	Demotic.	Hieratic.	Hieroglyphic.	
ent, "who" . . .				*nty*
Perso ("Pharaoh") .				*Perso snḫ wz, šnb*
yôt, "father" . .				*itf*
ʽônkh, "live" . .				*snḫ*
ekh, "know" . .				*rḫ*
ahe, "stand" . .				*ꜥḥꜥ*
eine, "carry" . .				*in*
ms (phon.) . . .				*ms*
s (alph.)				*ś*
s (alph.)				*š*
m (alph.) . . .				*m*
n (alph.) . . .				*n*

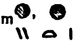
The early scribe's outfit, often carried slung over his shoulder, is seen in the hieroglyph . It consisted of frayed reed pens or brushes, a small pot of water, and a palette with two circular cavities in which black and red ink were placed, made of finely powdered colour solidified with gum. In business and literary documents red ink was used for contrast, especially in headings; in demotic, however, it is very rarely seen. The pen became finer in course of time, enabling the scribe to write very small. The split reed of the Greek penman was occasionally adopted by the late demotic scribes.

Egypt had long been bilingual when, in papyri of the 2nd century A.D., we begin to find transcripts of the Egyptian language into Greek letters, the latter reinforced by a few signs borrowed from the demotic alphabet: so written we have a magical text and a horoscope, probably made by foreigners or for their use. The infinite superiority of the Greek alphabet with its full notation of vowels was readily seen, but piety and custom as yet barred the way to its full adoption. The triumph of Christianity banished the old system once and for all; even at the beginning of the 4th century the native Egyptian script scarcely survived north of the Nubian frontier at Philae; a little later it finally expired. The following eight signs, however, had been taken over from demotic by the Copts:

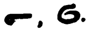
ϣ = š, from š;, dem. .

ϩ = h, probably from ḥw (or ḥ;), dem. .

ϧ (Boh.) = ḫ, from ḫ;, dem. .

ⳉ (Akhm.) = ḫ, from  ḫy, ḫt, dem. .

ϥ = f, from f, dem. .

ϭ = č, from k (or ḳ), dem. .

ϫ = ǧ, from d; (or t;), dem. .

ϯ = ti, from dy·t, dem. .

For origins of hieroglyphs, see Petrie's *Medum* (1892): F. Ll. Griffith, *A Collection of Hieroglyphs* (1898); N. de G. Davies, *The Mastaba of Ptahhetep and Akhethetep*, pt. i. (1900); M. A. Murray, *Saqqara Mastabas* (London, 1905); also Petrie and Griffith, *Two Hieroglyphic Papyri from Tanis* (London, 1889) (native sign-list); G. Möller, *Hieratische Paläographie* (Leipzig, 1909); Griffith, *Catalogue of Demotic Papyri in the J. Rylands Collection* (Manchester, 1909). (F. Ll. G.)

E. ***Art and Archaeology.***—In the following sections a general history of the characteristics of Ancient Egyptian art is first given, showing the variation of periods and essentials of style; and this is followed by an account of the use made of material products, of the tools and instruments employed, and of the monuments. For further details see also the separate topographical headings (for excavations, &c.), and the general articles on the various arts and art-materials (for references to Egypt); also PYRAMIDS; MUMMY, &c.

General Characteristics.

The wide and complex subject of Egyptian art will be treated here in six periods: Prehistoric, Early Kings, Pyramid Kings, XIIth Dynasty, XVIIIth-XXth Dynasties, XXVIth Dynasty and later. In each age will be considered the (A) statuary, (B) reliefs, (C) painting.

Prehistoric.—The earliest civilized population of Egypt was highly skilled in mechanical accuracy and regularity, but had little sense of organic forms. They kept the unfinished treatment of the limbs and extremities which is so characteristic of most barbaric art; and the action was more considered than the form.

(A) In the round there are in the earlier graves female figures of two races, the Bushman type and European, both probably representing servants or slaves. These have the legs always united, sloping to a point without feet (Plate I. fig. 1); the arms are only stumps. The face has a beaky nose and some indication of eyes. Upon the surface is colouring; red for the Bushman, with black whisker though female; white for the European type, with black tattoo patterns. Other female figures are modelled in a paste, upon a stick, and the black hair is sometimes made separately to fit on as a wig over the red head, showing that wigs were then used. Male figures are generally only heads in the earlier times. Tusks with carved heads (Plate I. figs. 2, 3) are the earliest, beginning at S.D. (sequence date) 33;[1] heads on the top of combs are found, from S.D. 42 to the close of such combs in the fifties. All of these heads show a high forehead and a pointed beard; and such expression as may be discovered is grave but not savage. In later times whole figures of ivory, stone and clay are found, with the legs united, and the arms usually joined to the body. A favourite way of indicating the eyes was by drilling two holes and inserting a white shell bead in each. The figures of animals (Plate I. figs. 4, 5) are quite as rude as the human figures: they only summarily indicate the mature, and often hardly express the genus. They are most usual on combs and pins; but sacred animals are also found. The lion is the most usual (Plate I. fig. 7), but the legs are roughly marked, if at all: the leonine air is given, but the attitude is more distinct than the form. The hawk (Plate I. fig. 6) is modelled in block without any legs. The slate palettes in the form of animals are even more summary, and continually degraded until they lost all trace of their origin. There are also curious figures of animals chipped in flint, which show some character, but no detail.

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[1] In the prehistoric age when absolute dating is out of reach a "sequence dating" by means of the sequence of types in pottery, tools, &c., has been proposed in Petrie's *Diospolis Parva*, pp. 4 et sqq. The earliest prehistoric graves yet known are placed at S.D. 30, and shortly before S.D. 80 the period of the first historic dynasty is entered.

(B) Reliefs with animal figures belong to the later part of the prehistoric age. The relief is low, and the form hatched across with lines (Plate I. fig. 8), a style copied from drawing. There is more animation than in the round figures. At the close of this age the fashion of long processions of animals appears (Plate I. fig. 9); some character is shown in these, but no sense of action.

(C) Drawing is found from the earliest civilization, done in white slip on red vases. Figures of men are very rare (Plate I. fig. 10); they have the body triangular, the waist being very narrow; the legs are two lines linked by a zigzag, as if to express that they move to and fro. The usual figures are goats and hippopotami; always having the body covered with cross lines to express the connexion of the outlines (Plate I. fig. 11). This technique is in every way closely akin to that of the modern Kabyle. An entirely different mode is common at a later time when designs were painted in thin red colour on a light brown ware. The subjects of the earlier of these examples are imitations of cordage, of marbling, and of basket-work; later there are rows of men and animals, and ships (Plate I. figs. 12, 13), with various minor signs. The figures are never cross-hatched as in earlier drawing, but always filled in altogether. The fact that the ships have oars and not sails makes it probable that they were rather for the sea than for Nile traffic, and a starfish among the motives on such pottery also points to the sea connexion. The ulterior meaning of the decoration is probably religious and funereal, but the objects which are figured must have been familiar.

For this whole period see Jean Capart, *Débuts de l'art en Égypte* (1904; trans. *Primitive Art in Ancient Egypt*).

The Early Kings.—The dynastic race wrought an entire transformation in the art of Egypt; in place of the clumsy and undetailed representations, there suddenly appears highly artistic work, full of character, action and anatomical detail.

(A) The earliest statues of this age are the colossi of the god Min from Coptos; that they belong to the artistic race is evident from the spirited reliefs upon them (see below, B), but the figures were very rude, the legs and arms being joined all in the mass. The main example of this early art is a limestone head of a king (Plate I. figs. 15, 16), which is a direct study from life, to serve as a model. For the accuracy of the facial curves, and the grasp of character and type, it is equal to any later work; and in its entire absence of conventions and its pure naturalism there is no later sculpture so good: as Prof. A. Michaelis says, "it renders the race type with astounding keenness, and shows an excellent power of observation in the exact representation of the eyes." By the portrait, it is probably of King Narmer or some king related to him, that is, about the beginning of the Ist Dynasty. The ivory statuette of an aged king (Plate I. fig. 14) is probably slightly later. It shows the same subtle sense of character, and is unsurpassed in its reality. Many ivory figures of men, women and animals are known from Nekhen (Hieraconpolis) and Abydos; and they all show the same school of work, simple, dignified, observant, and with an air which places them on a higher plane of truthfulness and precision than later art. There is none of the mannerism of a long tradition, but a nobility pervades them which has no self-consciousness. The lower class of work of this age is shown by great numbers of glazed pottery figures both human and animal. Later in the IInd Dynasty, the head of Khasekhem (Plate I. fig. 17) shows the beginning of convention, but yet has a delicacy about the mouth which surpasses later works.

(B) Reliefs abound at this age, and include the most important evidences of the development of the art. The earliest examples are those of animals (Plate II. fig. 18) and shells on the colossi of Coptos. They show a keen sense of form, and the stag's head, which is probably the earliest, already bears an artistic feeling wholly different to that of any of the prehistoric works (P.K. iii. iv.). The carvings on slate palettes appear to begin with work crudely accurate and forceful, the heavy limbs being ridged with tendons and muscles (Plate II. fig. 19), but there is more proportion, with the same massive strength (Plate II. fig. 20). Soon after, with a leap, the artist produced the first pure work of art that is known (Plate II. fig. 21), a design for its own sake without the tie of symbolism or history. The group of two long-necked gazelles facing a palm tree is of extraordinary refinement, and shows the artistic consciousness in every part; the symmetric rendering of the palm tree, reduced to fit the scale of the animals, the dainty grace of the smooth gazelles contrasted with the rugged stem, the delicacy of the long flowing curves and the fine indications of the joints, all show a sense of design which has rarely been equalled in the ceaseless repetitions of the tree and supporters motive during every age since. Passing the various palettes with hunting scenes and animals (Plate II. fig. 22), we come to the great historical carving of King Narmer (Plate II. fig. 23). Here the anatomy has reached its limits for such work; the precision of the muscles on the inner and outer sides of the leg, of the uniform grip in the left arm, and the tense muscle upholding the right arm, prove that the artist knew that part of his work perfectly. The large ceremonial mace-heads recording the *Sed* festivals of the king Narmer and another, belong also to this school; but owing to their smaller size they have not such artistic detail. With them were found many reliefs in ivory, on tusks, wands and cylinders. The main motive in these is a long procession of animals (Plate II. figs. 24, 25) often grotesquely crowded; but there is much observation shown and the figures are expressive. No drawing of this age has survived.

The Pyramid Kings.—A different ideal appears in the pyramid times; in place of the naturalism of the earlier work there is more regularity, some convention, and the sense of a school in the style. The prevailing feeling is a noble spaciousness both in scale and in form, an equanimity based upon knowledge and character, a grandeur of conception expressed by severely simple execution. There is nothing superfluous, nothing common, nothing trivial. The smallest as well as the largest work seems complete, inevitable, immutable, without limitations of time, or labour or thought.

(A) The statuette of Khufu or Cheops (Plate III. fig. 29) though only a minute figure in ivory, shows the character of immense energy and will; the face is an astonishing portrait to be expressed in a quarter of an inch. The life-size statue of Khafre or Chephren (Plate III. fig. 30) is a majestic work, serene and powerful; carved in hard diorite, yet unhesitating in execution. The muscular detail is full, but yet kept in harmony with the massive style of the figure. The private persons have entirely different treatment according to the character of their position. In place of the awful dignity of the kings there is the placid high-bred Princess Nofri (Plate II. fig. 27, Plate III. fig. 31), the calm conscientious dignitary Hemset (Plate III. fig. 32), the bustling, active, middle-class official, Ka-aper (Plate II. fig. 28, Plate III. fig. 33), and the kneeling figure of a servitor. The differences of character are very skilfully rendered in all the sculpture of this age. The whole figures are stiff in the earlier time, as the figure of Nes; then square and massive, but true in form, as Rahotp and Nofri (Plate II. fig. 27); and afterwards easier and less monumental, as Ka-aper (Plate II. fig. 28). The skill in beaten copper work is shown by the portrait of the Prince Mer-en-ra (Plate III. fig. 35).

(B) The reliefs are quite equal to the statuary. The wooden panels of Hesi (Plate II. fig. 26) show the archaic style of great detail, with a bold, stark vigour of attitude. Later work is abundant in the tomb-sculptures of this age, with a fulness of variety and detail which makes them the most interesting of all branches of the art. The general effect cannot be judged without a large scene, but the figures of two men and an ox (Plate III. fig. 37) show the freshness and vigour of the style, which is even higher than this in some examples. The clear, noble spacing of the surface work is well shown by a group of offerings and inscribed titles (Plate III. fig. 36).

(C) Flat drawings of this age are rare. Some fine examples, such as the geese from Mēdūm, show that such work kept pace with the reliefs; but most of the fresco-work has perished, and there are few instances of line drawing.

The XIIth Dynasty.—This age overlaps the previous in its style. The end of the last age was in the very degraded tomb work of the early XIth Dynasty.

(A) The new style begins with the royal statues, which it seems we must attribute to the foreign kings from whom the XIIth Dynasty was descended. These statues were later appropriated by the Hyksos, and so came to be called by their name, which is a misnomer. The type of face (Plate III. fig. 38) is thick-featured, full of force, with powerful masses of facial muscle covering the skull. The style is very vigorous and impassioned, without any trace of relenting towards conventional work. The surfaces are not in the least subdued by a general breadth of style, as in the last period; but, on the contrary, revel in the full detail of variety. There is perhaps no age where nature is so little controlled by convention in either the living character or its sculptured expression. One of these kings might well be the founder of the IXth Dynasty, "Achthoes (Kheti), who did much injury to all the inhabitants," "Khuther Taurus the tyrant"; the expression is that of a Chlodwig or an Alboin. From this type evidently descended the milder and more civilized kings of the XIIth Dynasty, the resemblance being so strong that the fierce figures have even been identified with that dynasty by some. A good example is that of the statue of Amenemhat (Amenemhē) III. (Plate III. fig. 39). The style of the XIIth Dynasty may be summed up as clean, highly-finished work, strong in facial detail; but with neither the grandeur of the IVth nor the vivacity of the XVIIIth Dynasty. This passed in the XIIIth Dynasty into a graceful but weak manner, as in the statues of Sebkhotp (Sebek-hotep) III. and Neferhotp.

(B) The relief work shows most clearly the rise of the new style. In the middle of the XIth Dynasty an entirely fresh treatment appears; the Old Kingdom work had died out in very bad sunk-reliefs, the fresh style (Plate III. fig. 41) was a low relief with sharp edges above the field. It was full of delicate variety in the surfaces, and of elaborated close-packed lines of hair and ornaments. By the time of the early XIIth Dynasty, this reached a perfection of refinement in the detail of facial curves, with an ostentatiously low relief (P.K. ix. i.), rather on the lines of modern French work; but the whole with clean, firm outlines, severely restrained in the expression, and without any trace of emotion. It is the work of a school, in which high training took the place of the reliance on nature. Sunk relief was also well used, as by Senusert (Senwosri) I. (Plate III. fig. 40). There was a steady decline during the XIIth Dynasty and onward, but the same tone was followed.

(C) In some tombs painting only was used, and it followed the general character of the relief treatment, being more rigid, detailed, and scholastic than the older style.

The XVIIIth-XXth Dynasties.—The obvious, not to say superficial, character of this age has rendered it one of the most popular in Egyptian art. The older breadth, fulness, and vigour have vanished, those great qualities which stamp the immortal works of early times. The difference is much like that between the Parthenon and the Niobids, or between Jacopo Avanzi and Caracci. In this change is the whole difference between the art of character and the art of emotion; and though the emotional side is the more popular, as needing less thought to understand it, yet the unfailing canon is that in every age and land the true quality of art is proportionate to the expression of character as apart from transient emotion. This may perhaps apply to other arts as well as to sculpture and painting. If we accept frankly the emotional nature of this age, we may admire its graceful outlines, its vivacious manner, its romantic style, with an occasional sauciness which is amusing and attractive. It revelled in rich detail, and close masses of lines, as in wigs and ribbed dresses. It sported with a seductive Syrian type of face, especially under Amenophis (Amenhotep) III.; but we find the anatomy giving way to mere smoothness of surface, for the sake of contrast with the masses of detail. The romantic element increased, solemn funereal statues show husband and wife hand in hand; and it culminated under Akhenaton, who is seen kissing his wife in the chariot, or dancing her on his knee. An overwhelming naturalism swamped the older reserves of Egyptian art, and the expression of the postures, actions and familiarities of daily life, or the instantaneous attitudes of animals, became the *dernier cri* of fashion. It was all charming and wonderful, but it was the end,—nothing could come after it. The XIXth Dynasty, at its best under Seti I., could only excel in high finish of smoothness and graceful curves; life, character, meaning, had vanished. And soon after, under Rameses II., mere mechanical copying, hard lifeless routine of stone-cutting, regardless of truth and of nature, dominated the whole.

(A) In sculpture there is a certain baldness of style at first, as in the Amenophis I. at Turin or Mutnefert at Cairo. More fulness and richness of character succeeded, as in Tahutmes (Tethmosis) III. and Amenophis III. (Plate IV. fig. 42, British Museum). And the feeling of the age finds greater scope in private statues, many of which have a personal fascination about them, as in the seated figures at Cairo and Florence, and the freer work in wood, of which the ebony negress (Plate IV. fig. 45) is the best example. The burst of naturalism under Akhenaton resulted in some marvellous portraiture, of which the fragment of a queen's head (Plate IV. fig. 43) is perhaps the most brilliant instance; the fidelity in the delicate curves of the nose and around the mouth is enhanced by the touch of artistic convention in the facing of the lips. The only work of ability in the XIXth Dynasty is the black granite figure (Plate IV. fig. 44) of Rameses II. at Turin. The ordinary statuary of his reign is painfully stiff and poor, and there is no later work in the period worth notice.

(B) The reliefs of the early XVIIIth Dynasty are closely like the scenes of the tombs in the pyramid age, but soon carving was superseded by the cheaper painting, and but few tombs in relief are known. The temples were the principal places for reliefs; and they steadily deteriorate from the first great example, Deir el Bahri (see **Architecture**: *Egyptian*), down to the late Ramessides. The portraiture is strong and clear-cut (Plate IV. fig. 46), but somewhat mechanical and without muscular detail: the sameness is rather more than is probable. There is a good deal of repetition for mere effect, even in the fine work of Kha-em-hat (Plate IV. fig. 47), under Amenophis III. That the artists were conscious of their poverty of thought is shown by some precise imitations of the style of early monuments. On reaching the age of Akhenaton, the peculiar style of that school is obvious in every relief; the older conventions were deserted, and, for good or for bad, a new start from nature was attempted. After that the smooth finish of the Seti reliefs at Abydos (Plate IV. fig. 48) shows no life or observation; and only occasionally the artist triumphed over the stone-worker, as in the portrait of Bantanta at Memphis, which is precisely like another head of her found in Sinai. The innumerable reliefs of the XIXth-XXth Dynasty temples are only of historic interest, and are all despicable in comparison with earlier works.

(C) Painting was the art most congenial to this age; the lightness of touch, abundance of incident, and even comedy, of the scenes are familiar in the frescoes in the British Museum. And under Akhenaton this was pervaded by an entire naturalism of posture, as seen in the two little princesses (Plate IV. fig 49). Drawing continued to be the strong point of the art after the more laborious sculpture had lost all vitality. The tomb of Seti shows exquisitely firm line drawing; and the heads of four races (Plate IV. fig. 50), Western, Syrian, and two Negro, here show the unfailing line-work which has never been matched in later times. The artist habitually drew the long lines of whole limbs without a single hesitation or revoke; and the drawing of a tumbling girl (Plate IV. fig. 51) shows how credibly such contortions could be represented. The comic papyri of the XXth Dynasty have also a very strong sense of character, even through coarse drawing and some childish combinations.

The subsequent centuries show continuous decline, and in whatever branch we compare the work, we see that each dynasty was poorer than that which preceded it. The XXVIth Dynasty is often looked on as a renaissance; but when we compare similar work we see that it was poorer than the XXIInd, as that was poorer than the XIXth. The alabaster statue of Amenardus of the XXVth is faulty in pose, and perfunctory in modelling; the resemblance between this and the head of her nephew Tirhaka is perhaps the best evidence of truthful work. After this there was a strong archaistic fashion, much like that under Hadrian; in both cases it may have arrested decay, but it did not lift the art up again. The work of this age can always be detected by the faulty jointing (Plate IV. fig. 52) and muscular treatment. The elements are right enough, but there was not the vital sense to combine them properly. Hence the monstrous protuberances (Plate IV. fig. 53) on relief figures of this age; a fault which the Greek fell into in his decline, as shown in the Farnese Hercules.

Portraiture, with its limited demand on imagination and lack of ideals, was the form of art which flourished latest. The Saitic heads in basalt show a school of close observation, with fair power of rendering the personal character; and even in Roman times there still were provincial artists who could model a face very truthfully, as is shown in one case in which the stucco head (Plate IV. fig. 54) from a coffin is here superposed on the view of the actual skull to show the accuracy of the work. The school of portrait-painting belongs entirely to Greek art, and is therefore not touched upon here. (See Edgar, *Catalogue of Graeco-Egyptian Coffins*, 48 plates, for this subject.)

Lastly we must recognize the different schools of Egyptian sculpture which are as distinct as those of recent painting. The black-granite school in every age is the finest; its seat we do not know, but its vitality and finish always exceed those of contemporary works. The limestone school was probably the next best, to judge from the reliefs, but hardly any statues of this school have survived; it probably was seated at Memphis. The quartzite work from Jebel Ahmar near Cairo stands next, as often very fine design is found in this hard material. The red granite school of Assuan comes lower, the work being usually clumsy and with unfinished corners and details. And the lowest of all was the sandstone school of Silsila, which is always the worst. Broadly speaking, the Lower Egyptian was much better than the Upper Egyptian; a conclusion also evident in the art of the tombs done on the spot. But the secret of the black granite school, and its excellence, is the main problem unsolved in the history of the art. (W. M. F. P.)

Tools and Material Products.

Tools (see Illustrations 1 to 111).—The history of tools is a very large subject which needs to be studied for all countries; the various details of form are too numerous to specify here, but the general outline of tools used in Egypt may be briefly stated under *general* and *special* types. The *general* include tools for striking, slicing and scraping; the *special* tools are for fighting, hunting, agriculture, building and thread-work.

Striking Tools.—The wooden mallet of club form (1) was used in the VIth and XIIth Dynasties; of the modern mason's form (2) in the XIIth and XVIIIth. The stone mace head was a sharp-edged disk (3), in the prehistoric from 31–40 sequence date; of the pear shape (4) from S.D. 42, which was actually in use till the IVth Dynasty, and represented down to Roman time. The metal or stone hammer with a long handle was unknown till Greek or Roman times; but, for beating out metal, hemispherical stones (5) were held in the hand, and swung at arm's length overhead. Spherical hard stone hammers (6) were held in the hand for dressing down granite. The axe was at the close of the prehistoric age a square slab of copper (7) with one sharp edge; small projecting tails then appeared at each end of the back (8), and increased until the long tail for lashing on to the handle is more than half the length of the axe in an iron one of Roman (?) age (13). Flint axes were made in imitation of metal in the XIIth Dynasty (9). Battle-axes with rounded outline started as merely a sharp edge of metal (10) inserted along a stick (10, 11); they become semicircular (12) by the VIth Dynasty, lengthen to double their width in the XIIth, and then thin out to a waist in the middle by the XVIIIth Dynasty. Flint hoes (14) are common down to the XIIth Dynasty. Small copper hoes (15) with a hollow socket are probably of about the XXIInd Dynasty. Long iron picks (16), like those of modern navvies, were made by Greeks in the XXVIth Dynasty.

Slicing Tools.—The knife was originally a flint saw (17), having minute teeth; it must have been used for cutting up animals, fresh or dried, as the teeth break away on soft wood. The double-edged straight flint knife dates from S.D. 32-45. The single-edged knife (18) is from 33–65. The flint knives of the time of Menes are finely curved (19), with a handle-notch; by the end of the IInd Dynasty they were much coarser (20) and almost straight in the back. In the XIth-XIIth Dynasty they were quite straight in the back (21), and without any handle-notch. The copper knives are all one-edged with straight back (22) down to the XVIIIth Dynasty, when two-edged symmetrical knives (23) become usual. Long thin one-edged knives of iron begin about 800 B.C. Various forms of one-edged iron knives, straight (24) and curved (25), belong to Roman times. A cutting-out knife, for slicing through textiles, began double-edged (26) in the Ist Dynasty, and went through many single-edged forms (27-29) until it died out in the XXth Dynasty (*Man*, 1901, 123). A small knife hinged on a pointed backing of copper (31) seems to have been made for hair curling and toilet purposes. Razors (30) are known of the XIIth Dynasty, and became common in the XVIIIth. A curious blade of copper (32), straight sided, and sharpened at both ends, belongs to the close of the prehistoric age. Shears are only known of Roman age and appear to have been an Italian invention: there is a type in Egypt with one blade detachable, so that each can be sharpened apart. Chisels of bronze began of very small size (33) at S.D. 38, and reached a full size at the close of the prehistoric age. In historic times the chisels are about 1 × ½, × 6 to 8 in. long (34). Small chisels set in wooden handles are found (35) of the XIIth and XVIIIth Dynasties. Ferrules first appear in the Assyrian iron of the 7th century B.C. The rise of stone work led to great importance of heavy chisels (36) for trimming limestone and Nubian sandstone; such chisels are usually round rods about ¾ in. thick and 6 in. long. The cutting edge was about ½ in. wide for flaking tools (36), which were not kept sharp, and 1 in. wide for facing tools (37) which had a good edge. In Greek times the iron chisels are shorter and merge into wedges (39). The socketed or mortising chisel (38) is unknown till the Italian bronze of the 8th century B.C., and the Naucratis iron of the 6th century. Adzes begin in S.D. 56, as plain slips of copper (40) 4 to 6 in. long, about 1 wide and ⅛th thick. The square end was rounded in the early dynastic times, and went through a series of changes down to the XIXth Dynasty. Adzes of iron are probably of Greek times. A fine instance of a handle about 4 ft. long is represented in the IIIrd Dynasty (P.M. XI.). The adze (41) was used not only for woodwork but also for dressing limestone.

Scraping Tools.—Flint scrapers are found from S.D. 40 and onward. The rectangular scraper (42) began in S.D. 63, and continued into the IInd Dynasty: the flake with rounded ends (43) was used from the Ist to the IVth Dynasty (P. Ab. i. xiv., xv.). Round scrapers were also made (44). Flint scrapers were used in dressing down limestone sculpture in the IIIrd Dynasty. Rasps of conical form (45), made of a sheet of bronze punched and coiled round, were common in the XVIIIth Dynasty, apparently as personal objects, possibly used for rasping dried bread. In the Assyrian iron tools of the 7th century B.C. the long straight rasp (46) is exactly of the modern type. The saw is first found as a notched bronze knife of the IIIrd Dynasty. Larger toothed saws (47) are often represented in the IVth-VIth Dynasty, as used by carpenters. There are no dated specimens till the Assyrian iron saws (48) of the 7th century B.C. Drills were of flint (49) for hard material and bead-making, of bronze for woodwork. In the Assyrian tools iron drills are of slightly twisted scoop form (50), and of centre-bit type with two scraping edges (51). In Roman times the modern V drill (52) is usual. The drill was worked by a stock with a loose cap (53), rotated by a drill bow, in the XIIth to Roman dynasties. The pump drill with cords twisted round it was in Roman use. The bow drill (56) was used as a fire drill to rotate wood (55) on wood (57); and the cap (54) for such use was of hard stone with a highly polished hollow. The drill brace appears to have been used by Assyrians in the 7th century B.C. Piercers of bronze tapering (58), to enlarge holes in leather, &c., were common in all ages.

Fighting Weapons.—The battle-axe has been described above with axes. The flint dagger (59) is found from S.D. 40-56. A very finely made copper dagger (60) with deep midrib is dated to between 55 and 60 S.D. Copper daggers with parallel ribbing (61) down the middle are common in the XIth-XIVth Dynasties; and in the XVIIIth-XXth Dynasties they are often shown in scenes and on figures. The falchion with a curved blade (62) belongs to the XVIIIth-XXth Dynasty. The rapier (63) or lengthened dagger is rarely found, and is probably of prehistoric Greek origin. The sword is of Greek and Roman age, always double-edged and of iron. The spear is not commonly found in Egypt, until the Greek age, but it is represented from the XIth Dynasty onward; it belonged to the Semitic people (L.D. ii. 133). The bow was always of wood, in one piece in the prehistoric and early times, also of two horns in the Ist Dynasty; but the compound bow of horn is rarely found, only as an importation, in the XVIIIth Dynasty. The arrow-heads of flint (64-66) and of bone (68–69) were pointed, and also square-ended (67) for hunting (P.R.T. ii. vi.; vii. A., 7; xxxiv.). The copper arrow-heads appear in the XIXth Dynasty, of blade form with tang (70); the triangular form (72), and leaf form with socket (71), are of the XXVIth Dynasty. Triangular iron arrows with tang are of the same age. Tangs show that the shaft was a reed, sockets show that it was of wood. Many early arrows (XIIth) have only hard wood points of conical form. The sling is rarely shown in the XIXth-XXth Dynasties; and the only known example is probably of the XXVIth.

Hunting Weapons.—The forked lance of flint was at first wide with slight hollow (73) from S.D. 32-43; then the hollow became a V notch (74) in 38 S.D. and onward. The lance was fixed in a wooden shaft for throwing, and held in by a check-cord from flying too far if it missed the animal (P.N. LXXIII.). The harpoon for fishing was at first of bone (75), and was imitated in copper (76, 77) from S.D. 36 onwards. The boomerang or throw-stick (78) was used from the Ist to the XXIInd Dynasty, and probably later. Fish-hooks of copper (79-82) are found from the Ist Dynasty to Roman times. A trap for animals' legs, formed by splints of palm stick radiating round a central hole, is figured in S.D. 60, and one was found of probably the XXth Dynasty. Fishing nets were common in all historic times, and the lead sinkers (83) and stone sinkers (84) are often found under the XVIIIth-XXth Dynasties.

Agricultural Tools.—The hoe of wood (85) is the main tool from the late prehistoric time, and many have been found of the XVIIIth Dynasty. With the handle lengthened (86) and turned forward, this became the plough (87 is the hieroglyph, 88 the drawing, of a plough); this was always sloping, and never the upright post of the Italic type. The rake of wood (89) is usual in the XIIth and XVIIIth Dynasties. The fork (90), used for tossing straw, was common in the Old Kingdom, but none has been found. The sickle was of wood (92), with flints (91) inserted, apparently a copy of the ox-jaw and teeth. The notched flints for it are common from the Ist to the XVIIIth Dynasty. In Roman times the same principle was followed, by making an iron sickle with a deep groove, in which was inserted the cutting blade of steel (P.E. XXIX.). Shovel-boards, to hold in right (93) or left hand for scraping up the grain in winnowing, are usual in the XVIIIth Dynasty, and are figured in use in the Old Kingdom. Pruning knives with curved blades (94) are Italic, and were made of iron by the Romans. Corn grinders were flat oval stones, with a smaller one lying cross-ways (95), and slid from end to end. Such were used from the Old Kingdom down to late times. In the Roman period a larger stone was used, with a rectangular slab (96) sliding on it, in which a long trough held the grain and let it slip out below for grinding. The quern with rotary motion is late Roman, and still used by Arabs. The large circular mill-stones of Roman age worked by horse-power are usually made from slices of granite columns.

Building Tools.—The adze described above was used for dressing blocks of limestone. The brick-mould was an open frame, with one side prolonged into a handle (97), exactly as the modern mould. The plasterers' floats (98) were entirely cut out of wood. The mud rake for mixing mortar is rather narrower than the modern form. The square (99) and plummet (100,101) have remained unchanged since the XIXth Dynasty. For dressing flat surfaces three wooden pegs (102) of equal length were used; a string was stretched between the tops of two, and the third peg was set on the point to be tested and tried against the string.

Thread-Work.—Stone spindle whorls (103) are common in the prehistoric age; wooden ones were usual, of a cylindrical form (104) in the XIIth, and conical (105) in the XVIIIth Dynasty. The thread was secured by a spiral notch in the stick. In Roman times an iron hook on the top held the thread (106) as in modern spindles. Needles of copper were made in the prehistoric, as early as S.D. 48, and very delicate ones by S.D. 71. Gold needles are found of the Ist Dynasty. Fine ones of bronze are common in the XVIIIth Dynasty, and some with two eyes at right angles, one above the other, to carry two different threads. The copper bodkin is found in S.D. 70. Netters are common, of rib bones, pointed (107); the thread was wound round them. Long netting needles were probably brought in by the dynastic people as they figure in the hieroglyphs. Finely-made ones are found in the XVIIIth Dynasty and later. Reels were also commonly used for net making, of pottery (108) or even pebbles (109) with a groove chipped around. The flint vase-grinders were used in the early dynasties (110), and also sandstone grinders for hollowing larger vases (111).

Stone-Work.—In the prehistoric ages stone building was unknown, but many varieties of stones were used for carving into vases, amulets and ornaments. The stone vases were at first of cylindrical forms, with a foot, and ears for hanging. These are worked in brown basalt, syenite, porphyry, alabaster and limestone. In the second prehistoric civilization barrel-shaped vases became usual; and to the former materials were added slate, grey limestone and breccia. Serpentine appears later, and diorite towards the close of the prehistoric ages. Flat dishes were used in earlier times; gradually deeper forms appear, and lastly the deep bowl with turned-in edge belongs to the close of the prehistoric time and continued common in the earlier dynasties (P.D.P. 19). This stone-work was usually formed on the outside with rotary motion, but sometimes the vase was rotated upon the grinder (Q.H. 17). The interior was ground out by cutters (figs. 110,111) fixed in the end of a stick and revolved with a weight on the top, as shown in scenes on the tombs of the Vth Dynasty. The cutters were sometimes flints of a crescent shape (P. Ab. ii. liii. 24), but more usually grinders blocks of quartzite sandstone (26-34), and occasionally of diorite (Q. H. xxxii. lxii.). These blocks were fed with sand and water to give the bite on the stone (P. Ab. i. 26). The outsides of the vases were entirely wrought by handwork, with the polishing lines crossing diagonally. Probably the first forming was done by chipping and hammer-dressing, as in later times; the final facing of the hard stones was doubtless by means of emery in block or powder, as emery grinding blocks are found.

In the early dynasties the hard stones were still worked, and the Ist dynasty was the most splendid age for vases, bowls, and dishes of the finest stones. The royal tombs have preserved an enormous quantity of fragments, from which five hundred varied forms have been drawn (P.R.T. ii. xlvi.-liii. 6). The materials are quartz crystal, basalt, porphyry, syenite, granite, volcanic ash, various metamorphics, serpentine, slate, dolomite marble, alabaster, many coloured marbles, saccharine marble, grey and white limestones. The most splendid vase is one from Nekhen (Hieraconpolis), of syenite, 2 ft. across and 16 in. high, hollowed so as to be marvellously light and highly polished (Q. H. xxxvii). Another branch of stone-work, surface carving, was early developed by the artistic dynastic race. The great palettes of slate covered with elaborate reliefs are probably all of the pre-Menite kings; the most advanced of them having the figure of Narmer, who preceded Menes. Other carving full of detail is on the great mace-heads of Narmer and the Scorpion king, where scenes of ceremonials are minutely engraved in relief. In the Ist Dynasty the large tombstones of the kings are of bold work, but the smaller stones of private graves vary much in the style, many being very coarse. All of this work was by hammer-dressing and scraping. The scrapers seem to have always been of copper.

The earliest use of stone in buildings is in the tomb of King Den (Ist Dynasty), where some large flat blocks of red granite seem to have been part of the construction. The oldest stone chamber known is that of Khasekhemui (end of the IInd Dynasty). This is of blocks of limestone whose faces follow the natural cleavages, and only dressed where needful; part is hammer-dressed, but most of the surfaces are adze-dressed. The adze was of stone, probably flint, and had a short handle (P.R.T. ii. 13). The same king also wrought granite with inscriptions in relief. In the close of the IIIrd Dynasty a great impetus was given to stone-work, and the grandest period of refined masonry is at the beginning of the IVth Dynasty under Cheops. The tombs of Mēdūm under Snefru are built with immense blocks of limestone of 20 and 33 tons weight. The dressing of the face between the hieroglyphs was done partly with copper and partly with flint scrapers (P.M. 27). The most splendid masonry is that of the Great Pyramid of Cheops. The blocks of granite for the roofing are 56 in number, of an average weight of 54 tons each. These were cut from the water-worn rocks at the Cataract—the soundest source for large masses, as any incipient flaws are well exposed by wear. The blocks were quarried by cleavage; a groove was run along the line intended, and about 2 ft. apart holes about 4 in. wide were jumped downward from it in the intended plane; this prevented a skew fracture (P.T. 93). In shallower masses a groove was run, and then holes, apparently for wedges, were sunk deeper in the course of it; whether wetted wood was used for the expansive force is not known, but it is probable, as no signs are visible of crushing the granite by hard wedges. The facing of the cloven surfaces was done by hammer-dressing, using rounded masses of quartzose hornstone, held in the hand without any handle. In order to get a hold for moving the blocks without bruising the edges, projecting lumps or bosses were left on the faces, about 6 or 8 in. across and 1 or 2 in. thick. After the block was in place the boss was struck off and the surface dressed and polished (P.T. 78, 82). In the pyramid of Cheops the blocks were all faced before building; but the later granite temple of Chephren and the pyramid of Mycerinus (Menkaura, Menkeurē) show a system of building with an excess of a few inches left rough on the outer surface, which was dressed away when in position (P.T. 110, 132).

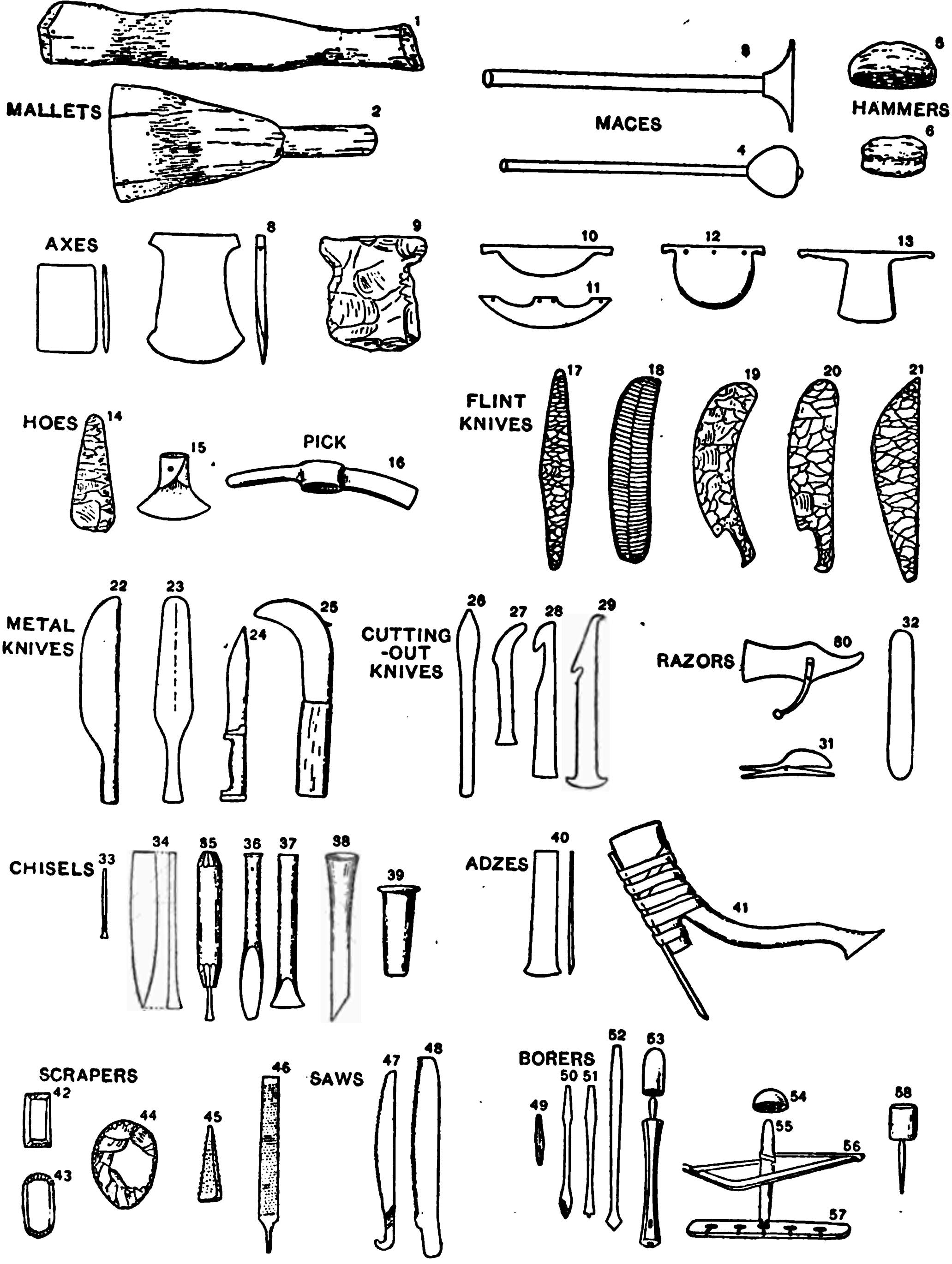
The flatness of faces of stone or rock (both granite and limestone) was tested by placing a true-plane trial plate, smeared with red ochre, against the dressed surface, as in modern engineering. The contact being thus reddened showed where the face had to be further dressed away; and this process was continued until the ochre touched points not more than an inch apart all over the joint faces, many square feet in area. On stones too large for facing-plates a diagonal draft was run, so as to avoid any wind in the plane (P.T. 83).

The cutting of granite was not only by cleavage and hammer dressing, but also by cutting with harder materials than quartz such as emery. Long saws of copper were fed with emery powder, and used to saw out blocks as much as 7½ ft. long (P.T. Plate XIV.). In other cases the very deep scores in the sides of the saw-cut suggest that fixed cutting points were inserted in the copper saws; and this would be parallel to the saw-cuts in the very hard limestone of the Palace of Tiryns, in which a piece of a copper saw has been broken, and where may be yet found large chips of emery, too long and coarse to serve as a powder, but suited for fixed teeth. A similar method was common for circular holes, which were cut by a tube, either with powder or fixed teeth. These tubular drills were used from the IVth Dynasty down to late times, in all materials from alabaster up to carnelian. The resulting cores are more regular than those of modern rock-drilling.

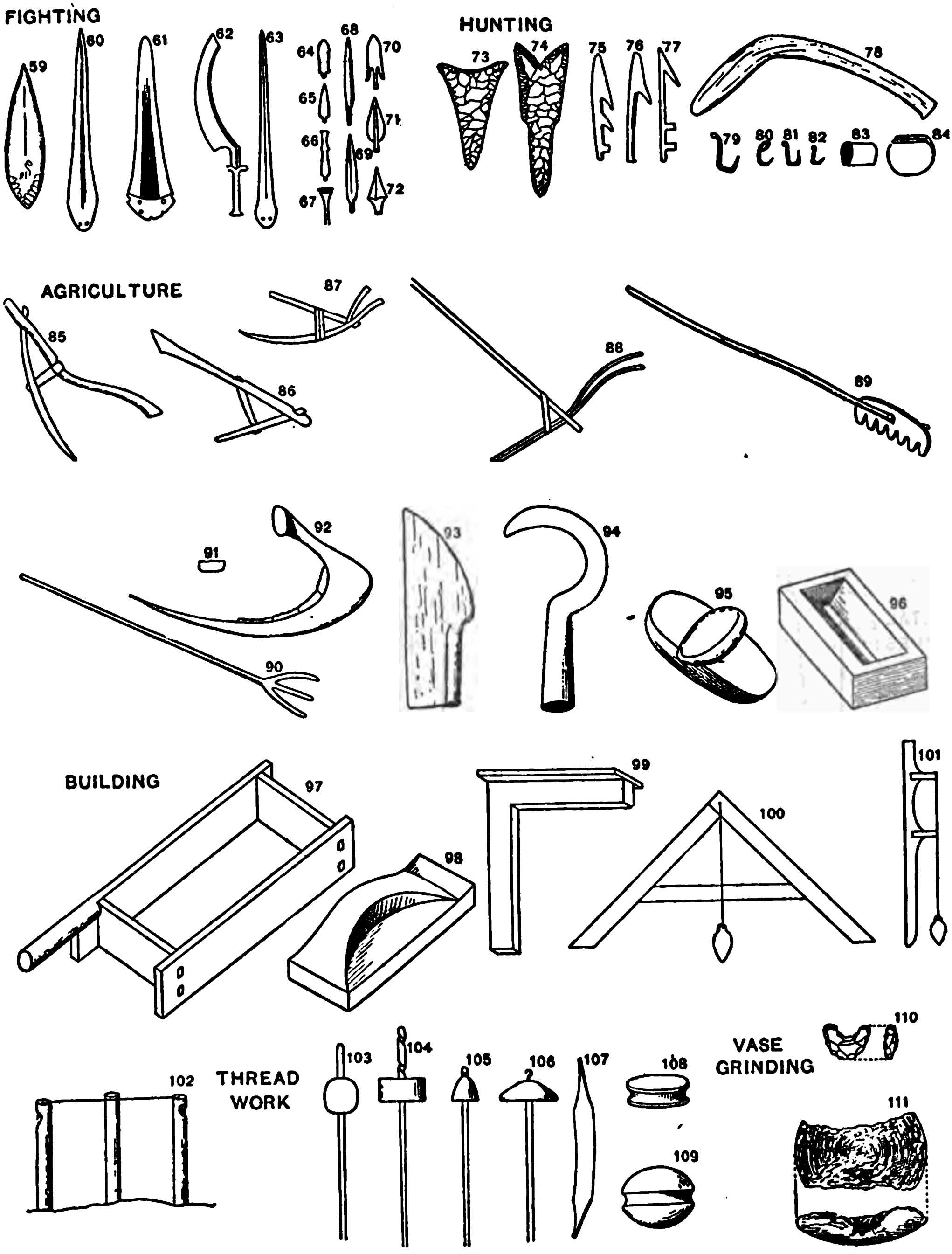
Limestone in the Great Pyramid, as elsewhere, was dressed by chopping it with an adze, a tool used from prehistoric to Roman times for all soft stones and wood. This method was carried on up to the point of getting contact with the facing-plate at every inch of the surface; the cuts cross in various directions. For removing rock in reducing a surface to a level, or in quarrying, cuts were made with a pick, forming straight trenches, and the blocks were then broken out between these. In quarrying the cuts are generally 4 or 5 in. wide, just enough for the workman's arm to reach in; for cutting away rock the grooves are 20 in. wide, enough to stand in, and the squares of rock about 9 ft. wide between the grooves (P.T. 100). The accuracy of the workmanship in the IVth Dynasty is astonishing. The base of the pyramid of Snefru had an average variation of 6 in. on 5765 and 10′ of squareness. But, immediately after, Cheops improved on this with a variation of less than 6 in. on 9069 in. and 12″ of direction. Chephren fell off, having 1·5 error on 8475, and 33″ of variation; and Mycerinus (Menkeurē) had 3 in. error on 4154 and 1′ 50″ variation of direction (P.M. 6; P.T. 39, 97, 111). Of perhaps later date the two south pyramids of Dahshur show errors of 3·7 on 7459 and 1·1 on 2065 in., and variation of direction of 4′ and 10′ (P.S. 28, 30). The above smallest error of only 1 in 16,000 in lineal measure, and 1 in 17,000 of angular measure, is that of the rock-cutting for the foundation of Khufu, and the masonry itself (now destroyed) was doubtless more accurate. The error of flatness of the joints from a straight line and a true square is but $\frac{1}{100}$th in. on 75 in. length; and the error of level is only $\frac{1}{50}$th in. along a course, or about 10″ on a long length (P.T. 44). We have entered thus fully on the details of this period, as it is the finest age for workmanship in every respect. But in the XIIth Dynasty the granite sarcophagus of Senwosri II. is perhaps the finest single piece of cutting yet known; the surfaces of the granite are all dull-ground, the errors from straight lines and parallelism are only about $\frac{1}{500}$th inch (P. 1, 3)

In later work we may note that copper scrapers were used for facing the limestone work in the VIth, the XIIth and the XVIIIth Dynasties. In the latter age granite surfaces were ground, hieroglyphs were chipped out and polished by copper tools fed with emery; outlines were graved by a thick sheet of copper held in the hand, and sawed to and fro with emery. Corners of signs and intersections of lines were first fixed by minute tube-drill holes, into which the hand tool butted, so that it should not slip over the outer surface.

The marking out of work was done by fine black lines; and supplemental lines at a fixed distance from the true one were put in to guard against obliteration in course of working (P.T. 92); similarly in building a brick pyramid the axis was marked, and there were supplemental marks two cubits to one side (P.K. 14). When cutting a passage in the rock a rough drift-way was first made, the roof was smoothed, a red axis line was drawn along it, and then the sides were cut parallel to the axis. For setting out a mastaba with sloping sides, on an irregular foundation at different levels, hollow corner walls were built outside the place of each corner; the distances of the faces at the above-ground level were marked on the inner faces of the walls; the above-ground level was also marked; then sloping lines at the intended angle of the face were drawn downward from the ground-level measures, and each face was set out so as to



Ancient Egyptian Tools.



Ancient Egyptian Tools.

lie in the plane thus defined by two traces at the ends (P.M. VIII.).

Metal-Work.—Copper was wrought into pins, a couple of inches long, with loop heads, as early as the oldest prehistoric graves, before the use of weaving, and while pottery was scarcely developed. The use of harpoons and small chisels of copper next arose, then broad flaying knives, needles and adzes, lastly the axe when the metal was commoner. On these prehistoric tools, when in fine condition, the original highly-polished surface remains. It shows no trace of grinding lines or attrition, nor yet of the blows of a hammer. Probably it was thus highly finished by beating between polished stone hammers which were almost flat on the face. Most likely the forms of the tools were cast to begin with, and then finished and polished by fine hammering. A series of moulds for casting in the XIIth Dynasty show that the forms were carved out in thick pieces of pottery, and then lined with fine ashy clay. The mould was single, so that one side of the tool was the open face of metal. As early as the pyramid times solid casting by *cire perdue* was already used for figures: but the copper statues of Pepi and his son seem, by their thinness and the piecing together of the parts, to have been entirely hammered out. The portraiture in such hammer work is amazingly life-like. By the time of the XIIth Dynasty, and perhaps earlier, *cire perdue* casting over an ash core became usual. This was carried out most skilfully, the metal being often not $\frac{1}{50}$th in. thick, and the core truly centred in the mould. Casting bronze over iron rods was also done, to gain more stiffness for thin parts.

In gold work the earliest jewelry, that of King Zer of the Ist Dynasty, shows a perfect mastery of working hollow balls with minute threading holes, and of soldering with no trace of excess nor difference of colour. Thin wire was hammered out, but there is no ancient instance of drawn wire. Castings were not trimmed by filing or grinding, but by small chisels and hammering (P.R.T. ii. 17). In the XIIth Dynasty the soldering of the thin cells for the *cloisonnée* inlaid pectorals, on to the base plate, is a marvellous piece of delicacy; every cell has to be perfectly true in form, and yet all soldered, apparently simultaneously, as the heat could not be applied to successive portions (M.D. i.). Such work was kept up in the XVIIIth and XXVIth Dynasties. There is nothing distinctive in later jewelry different from Greek and Roman work elsewhere.

Glaze and Glass.—From almost the beginning of the prehistoric age there are glazed pottery beads found in the graves: and glazing on amulets of quartz or other stones begins in the middle of the prehistoric. Apparently then glazing went together with the working of the copper ores, and probably accidental slags in the smelting gave the first idea of using glaze intentionally The development of glazing at the beginning of the dynasties was sudden and effective. Large tiles, a foot in length, were glazed completely all over, and used to line the walls of rooms; they were retained in place by deep dovetails and ties of copper wire. Figures of glazed ware became abundant; a kind of visiting card was made with the figure of a man and his titles to present in temples which he visited; and glazed ornaments and toggles for fastening dresses were common (P Ab. ii.). Further, besides thus using glaze on a large scale, differently coloured glazes were used, and even fused together. A piece of a large tile, and part of a glazed vase, have the royal titles and name of Menes, originally in violet inlay in green glaze. There was no further advance in the art until the great variety of colours came into use about 4000 years later. In the XIIth Dynasty a very thin smooth glaze was used, which became rather thicker in the XVIIIth. The most brilliant age of glazes was under Amenophis III. and his son Akhenaton. Various colours were used; beside the old green and blue, there were purple, violet, red, yellow and white. And a profusion of forms is shown by the moulds and actual examples, for necklaces, decorations, inlay in stone and applied reliefs on vases. Under Seti II. cartouches of the king in violet and white glaze are common; and under Rameses III. there were vases with relief figures, with painted figures, and tiles with coloured reliefs of captives of many races. The latter development of glazing was in thin delicate apple-green ware with low relief designs. which seem to have originated under Greek influence at Naucratis. The Roman glaze is thick and coarse, but usually of a brilliant Prussian blue, with dark purple and apple-green; and high reliefs of wreaths, and sometimes figures, are common.

Though glaze begins so early, the use of the glassy matter by itself does not occur till the XVIIIth Dynasty; the earlier reputed examples are of stone or frit. The first glass is black and white under Tethmosis (Tahutmes) III. It was not fused at a high point, but kept in a pasty state when working. The main use of it was for small vases; these were formed upon a core of sandy paste, which was modelled on a copper rod, the rod being the core for the neck. Round this core threads of glass were wound of various colours; the whole could be reset in the furnace to soften it for moulding the foot or neck, or attaching handles, or dragging the surface into various patterns. The colours under later kings were as varied as those of the glazes. Glass was also wheel-cut in patterns and shapes under Akhenaton. In later times the main work was in mosaics of extreme delicacy. Glass rods were piled together to form a pattern in cross-section. The whole was then heated until it perfectly adhered, and the mass was drawn out lengthways so as to render the design far more minute, and to increase the total length for cutting up. The rod was then sliced across, and the pieces used for inlaying. Another use of coloured glass was for cutting in the shapes of hieroglyphs for inlaying in wooden coffins to form inscriptions. Glass amulets were also commonly placed upon Ptolemaic mummies. Blown glass vessels are not known until late Greek and Roman times, when they were of much the same manufacture as glass elsewhere. The supposed figures of glass-blowers in early scenes are really those of smiths, blowing their fires by means of reeds tipped with clay. The variegated glass beads belonging to Italy were greatly used in Egypt in Roman times, and are like those found elsewhere. A distinctively late Egyptian use of glass was for weights and vase-stamps, to receive an impress stating the amount of the weight or measure. The vase-stamps often state the name of the contents (always seeds or fruits), probably not to show what was in them, but to show for what kind of seed the vessel was a true measure. These measure stamps bear names dating them from A.D. 680 to about 950. The large weights of ounces and pounds are disks or cuboid blocks; they are dated from 720 to 785 for the lesser, and to A.D. 915 for larger, weights. The greater number are, however, small weights for testing gold and silver coins of later caliphs from A.D. 952 to 1171. The system was not, however, Arab, as there are a few Roman vase-stamps and weights. Of other medieval glass may be noted the splendid glass vases for lamps, with Arab inscriptions fused in colours on the outsides. No enamelling was ever done by Egyptians, and the few rare examples are all of Roman age due to foreign work.

The manufacture of glass is shown by examples in the XVIIIth Dynasty. The blue or green colour was made by fritting together silica, lime, alkaline carbonate and copper carbonate; the latter varied from 3% in delicate blues to 20% in deep purple blues. The silica was needed quite pure from iron, in order to get the rich blues, and was obtained from calcined quartz pebbles; ordinary sand will only make a green frit. These materials were heated in pans in the furnace so as to combine in a pasty, half-fused condition. The coloured frit thus formed was used as paint in a wet state, and also used to dissolve in glass or to fuse over a surface in glazing. The brown tints often seen in glazed objects are almost always the result of the decomposition of green glazes containing iron. The blue glazes, on the other hand, fade into white. The essential colouring materials are, for blue, copper; green, copper and iron; purple, cobalt; red, haematite; white, tin. An entirely clear colourless glass was made in the XVIIIth Dynasty, but coloured glass was mainly used. After fusing a panful of coloured glass, it was sampled by taking pinches out with tongs; when perfectly combined it was left to cool in the pan, as with modern optical glass. When cold the pan was chipped away, and the cake of glass broken up into convenient pieces, free of sediment and of scum. A broken lump would then be heated to softness in the furnace; rolled out under a bar of metal, held diagonally across the roll; and when reduced to a rod of a quarter of an inch thick, it was heated and pulled out into even rods about an eighth of an inch thick. These were used to wind round glass vases, to form lips, handles, &c.; and to twist together for spiral patterns. Glass tube was similarly drawn out. Beads were made by winding thin threads of glass on copper wires, and the greater contraction of the copper freed the bead when cold. The coiling of beads can always be detected by (1) the little tails left at the ends, (2) the streaks, (3) the bubbles, seen with a magnifier. Roman glass beads are always drawn out, and nicked off hot, with striation lengthways; except the large opaque variegated beads which are coiled. Modern Venetian beads are similarly coiled. In the XXIIIrd Dynasty beads of a rich transparent Prussian blue glass were made, until the XXVIth. About the same time the eyed beads, with white and brown eyes in a blue mass, also came in (P.A. 25-27, Plate XIII.).

Pottery (see fig. 112).—The earliest style of pottery is entirely hand made, without any rotary motion; the form being built up with a flat stick inside and the hand outside, and finally scraped and burnished in a vertical direction. The necks of vases were the first part finished with rotation, at the middle and close of the prehistoric age. Fully turned forms occur in the Ist Dynasty; but as late as the XIIth Dynasty the lower part of small vases is usually trimmed with a knife. In the earlier part of the prehistoric age there was a soft brown ware with haematite facing, highly burnished. This was burnt mouth-down in the oven, and the ashes on the ground reduced the red haematite to black magnetic oxide of iron; some traces of carbonyl in the ash helped to rearrange the magnetite as a brilliant mirror-like surface of intense black. The lower range of jars in the oven had then black tops, while the upper ranges were entirely red. A favourite decoration was by lines of white clay slip, in crossing patterns, figures of animals, and, rarely, men. This is exactly of the modern Kabyle style in Algeria, and entirely disappeared from Egypt very early in the prehistoric age. Being entirely hand made, various oval, doubled and even square forms were readily shaped.

The later prehistoric age is marked by entirely different pottery, of a hard pink-brown ware, often with white specks in it, without any applied facing beyond an occasional pink wash, and no polishing. It is decorated with designs in red line, imitating cordage and marbling, and drawings of plants, ostriches and ships. The older red polished ware still survived in a coarse and degraded character, and both kinds together were carried on into the next age (P.D.P.).

The early dynastic pottery not only shows the decadent end of the earlier forms, but also new styles, such as grand jars of 2 or 3 ft. high which were slung in cordage, and which have imitation lines of cordage marked on them. Large ring-stands also were brought in, to support jars, so that the damp surfaces should not touch the dusty ground. The pyramid times show the great jars reduced to short rough pots, while a variety of forms of bowls are the most usual types (P.R.T.; P.D.; P. Desh.)

In the XIIth Dynasty a hard thin drab ware was common, like the modern *gulleh* water flasks. Drop-shaped jars with spherical bases are typical, and scrabbled patterns of incised lines. Large jars of light brown pottery were made for storing liquids and grain, with narrow necks which just admit the hand (P.K.).

The XVIIIth Dynasty used a rather softer ware, decorated at first with a red edge or band around the top, and under Tethmosis (Tahutmes) III. black and red lines were usual. Under Amenophis III. blue frit paint was freely used, in lines and bands around vases; it spread to large surfaces under Amenophis IV., and continued in a poor style into the Ramesside age. In the latter part of the XVIIIth and the XIXth Dynasties a thick hard light pottery, with white specks and a polished drab-white facing, was generally used for all fine purposes. The XIXth and XXth Dynasties only show a degradation of the types of the XVIIIth; and even through to the XXVth Dynasty there is no new movement (P.K.; P.I; P.A.; P.S.T.).

The XXVIth Dynasty was largely influenced by Greek amphorae imported with wine and oil. The native pottery is of a very fine paste, smooth and thin, but poor in forms. Cylindrical cups, and jars with cylindrical necks and no brim, are typical. The small necks and trivial handles begin now, and are very common in Ptolemaic times (P.T. ii.).

The great period of Roman pottery is marked by the ribbing on the outsides. The amphorae began to be ribbed about A.D. 150, and then ribbing extended to all the forms. The ware is generally rather rough, thick and brown for the amphorae, thin and red for smaller vessels. At the Constantine age a new style begins, of hard pink ware, neatly made, and often with "start-patterns" made by a vibrating tool while the vessel rotated: this was mainly used for bowls and cups (P.E.). Of the later pottery of Arab times we have no precise knowledge.

The abbreviations used above refer to the following sources of information:—

M.D.	Morgan,	*Dahshur*;
P.A.	Petrie,	*Tell el Amarna*;
P. Ab.	„	*Abydos*;
P.D.	„	*Dendereh*;
P. Desh.	„	*Deshasheh*;
P.D.P.	„	*Diospolis Parva*;
P.E.	„	*Ehnasya*;
P.I.	„	*Illahun*;
P.K.	„	*Kahun*;
P.M.	„	*Medum*;
P.N.	„	*Naqada*;
P.R.T.	„	*Royal Tombs*;
P.S.	„	*Season in Egypt*;
P.S.T.	„	*Six Temples*;
P.T.	„	*Pyramids and Temples of Gizeh*;
P.T. ii.	„	*Tanis, ii.*;
Q.H.	Quibell,	*Hieraconpolis*.

(W. M. F. P.)

Monuments.—The principal monuments that are yet remaining to illustrate the art and history of Egypt may be best taken in historical order. Of the prehistoric age there are many rock carvings, associated with others of later periods: they principally remain on the sandstone rocks about Silsila, and their age is shown by the figures of ostriches which were extinct in later times. One painted tomb was found at Nekhen (Hieraconpolis), now in the Cairo Museum; the brick walls were colour-washed and covered with irregular groups of men, animals and ships, painted with red, black and green. The cemeteries otherwise only contain graves, cut in gravel or brick lined, and formerly roofed with poles and brushwood. The Ist to IIIrd Dynasties have left at Abydos large forts of brickwork, remains of two successive temples, and the royal tombs (see ABYDOS). Elsewhere are but few other monuments; at Wadi Maghâra in Sinai is a rock sculpture of Semerkhet of the Ist Dynasty in perfect state, at Giza is a group of tombs of a prince and retinue of the Ist Dynasty, and at Giza and Bêt Khallaf are two large brick mastabas with extensive passages closed by trap-doors, of kings of the IIIrd Dynasty. The main structure of this age is the step-pyramid of Sakkara, which is a mastaba tomb with eleven successive coats of masonry, enlarging it to about 350 by 390 ft. and 200 ft. high. In the interior is sunk in the rock a chamber 24×23 ft. and 77 ft. high, with a granite sepulchre built in the floor of it, and various passages and chambers branching from it. The doorway of one room (now in Berlin Museum) was decorated with polychrome glazed tiles with the name of King Neterkhet. The complex original work and various alterations of it need thorough study, but it is now closed and research is forbidden.

The IVth to VIth Dynasties are best known by the series of pyramids (see PYRAMID) in the region of Memphis. Beyond these tombs, and the temples attached to them, there are very few fixed monuments; of Cheops and Pepi I. there are temple foundations at Abydos (*q.v.*), and a few blocks on other sites; of Neuserre (Raenuser) there is a sun temple at Abusîr; and of several kings there were tablets in Sinai, now in the Cairo Museum. A few tablets of the IXth Dynasty have been found at Sakkâra, and a tomb of a prince at Asiût. Of the XIth Dynasty is the

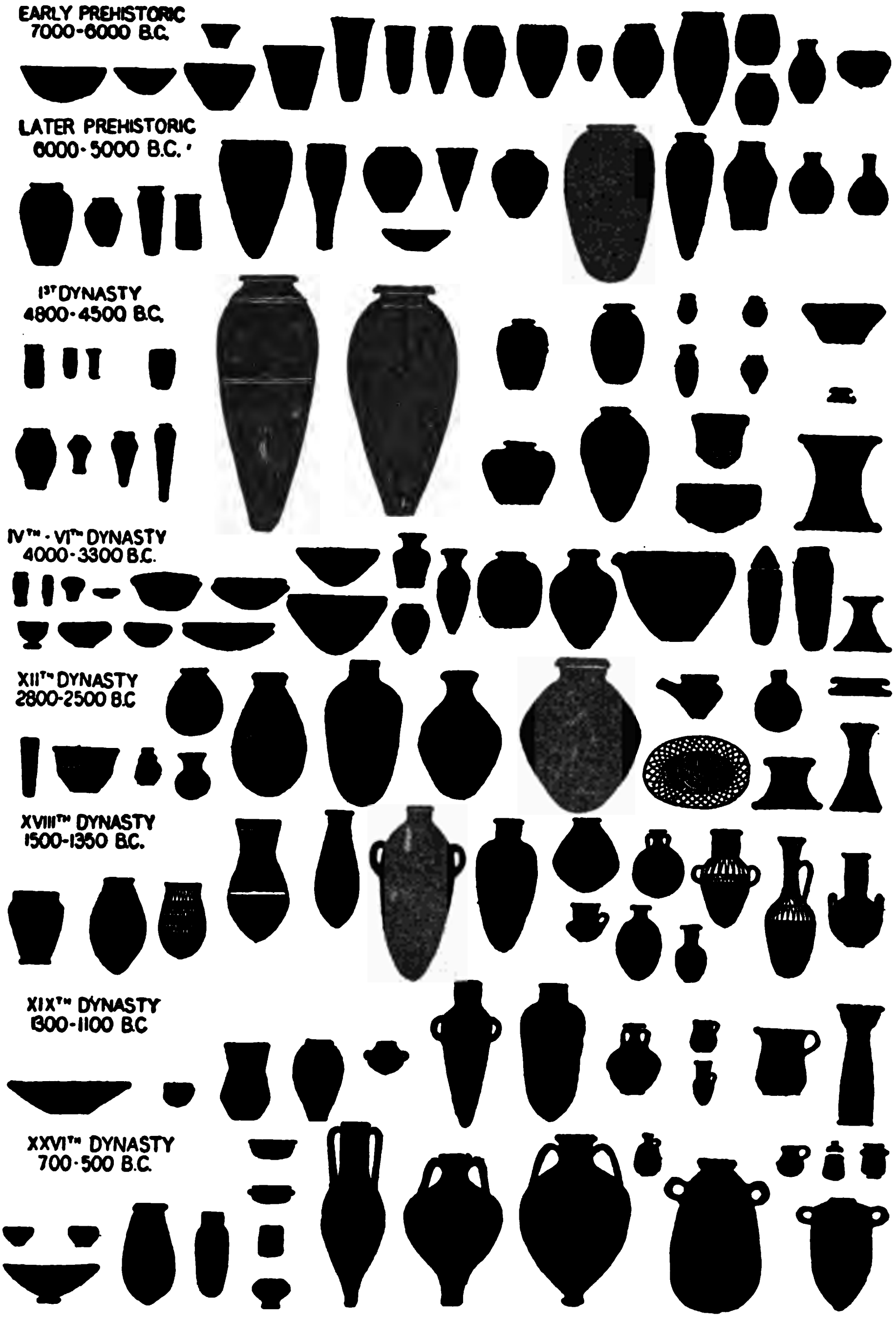

EARLY PREHISTORIC
7000-6000 B.C.
LATER PREHISTORIC
6000-5000 B.C.
IST DYNASTY
4800-4500 B.C.
IVTH - VITH DYNASTY
4000-3300 B.C.
XIITH DYNASTY
2800-2500 B.C.
XVIIITH DYNASTY
1500-1350 B.C.
XIXTH DYNASTY
1300-1100 B.C.
XXVITH DYNASTY
700-500 B.C.

FIG. 112.—Principal Types of Pottery of Ancient Egypt.

terrace-temple of Menthotp III. recently excavated at Thebes: also foundations of this king and of Sankhkerē at Abydos. In the XIIth Dynasty there is the celebrated red granite obelisk of Heliopolis, one of a pair erected by Senwosri (Senusert) I. in front of his temple which has now vanished. Another large obelisk of red granite, 41 ft. high, remains in the Fayūm. The most important pictorial tombs of Beni Hasan belong to this age; the great princes appear to have largely quarried stone for their palaces, and to have cut the quarry in the form of a regular chamber, which served for the tomb chapel. These great rock chambers were covered with paintings, which show a large range of the daily life and civilization. The pyramids and temples of Senwosri II. and III. and Amenemhē III. remain at Illahūn, Dahshūr and Hawāra. The latter was the celebrated Labyrinth, which has been entirely quarried away, so that only banks of chips and a few blocks remain. At the first of these sites is the most perfect early town, of which hundreds of houses still remain. Of Senwosri III. there are the forts and temples above the second cataract at Semna and Kumma. Of the Hyksos age there are the scanty remains of a great fortified camp at Tell el-Yehudia.

In the XVIIIth to XXth Dynasties we reach the great period of monuments. Of Amāsis (Aahmes) and Amenophis I. there are but fragments left in later buildings; and of the latter a great quantity of sculpture has been recovered at Karnak. The great temple of Karnak had existed since the XIth Dynasty or earlier, but the existing structure was begun under Tethmosis (Tahutmes) I., and two of the great pylons and one obelisk of his remain in place. He also built the simple and dignified temple of Medinet Habu at Thebes, which was afterward overshadowed by the grandiose work of Rameses III. The next generation—Tethmōsis II. and Hatshepsut—added to their father's work; they also built another pylon and some of the existing chambers at Karnak, set up the great obelisks there and carved some colossi. The obelisks are exquisitely cut in red granite, each sign being sawn in shape by copper tools fed with emery, and the whole finished with a perfection of proportion and delicacy not seen on other granite work. One obelisk being overthrown and broken we can examine the minute treatment of the upper part, which was nearly a hundred feet from the ground. The principal monument of this period is the temple of Deir el Bahri, the funeral temple of Hatshepsut, on which she recorded the principal event of her reign, the expedition to Punt. The erasures of her name by Tethmosis III., and reinsertions of names under later kings, the military scenes, and the religious groups showing the sacred kine of Hathor, all add to the interest of the remarkable temple. It stands on three successive terraces, rising to the base of the high limestone cliffs behind it. The rock-cut shrine at Speos Artemidos, and the temple of Serabīt in Sinai are the only other large monuments of this queen yet remaining. Tethmosis III. was one of the great builders of Egypt, and much remains of his work, at about forty different sites. The great temple of Karnak was largely built by him; most of the remaining chambers are his, including the beautiful botanical walls showing foreign plants. Of his work at Heliopolis there remain the obelisks of London and New York; and from Elephantine is the obelisk at Sion House. On the Nubian sites his work may still be seen at Amāda, Ellesīa, Ibrīm, Semna and in Sinai at Serabīt el Khādem. Of Amenophis II. and Tethmosis IV. there are no large monuments, they being mainly known by additions at Karnak. The well known stele of the sphinx was cut by the latter king, to commemorate his dream there and his clearing of the sphinx from sand. Amenophis III. has left several large buildings of his magnificent reign. At Karnak the temple had a new front added as a great pylon, which was later used as the back of the hall of columns by Seti I. But three new temples at Karnak, that of Month (Mentu), of Mut and a smaller one, all are due to this reign, as well as the long avenue of sphinxes before the temple of Khons; these indicate that the present Ramesside temple of Khons has superseded an earlier one of this king. The great temple of Luxor was built to record the divine origin of the king as son of Ammon; and on the western side of Thebes the funerary temple of Amenophis was an immense pile, of which the two colossi of the Theban plain still stand before the front of the site, where yet lies a vast tablet of sandstone 30 ft. high. The other principal buildings are the temples of Sedenga and of Sōlib in Nubia. Akhenaton has been so consistently eclipsed by the later kings who destroyed his work, that the painted pavement and the rock tablets of Tell el Amarna are the only monuments of his still in position, beside a few small inscriptions. Harmahib (Horemheb) resumed the work at Karnak, erecting two great pylons and a long avenue of sphinxes. The rock temple at Silsila and a shrine at Jebel Adda are also his.

In the XIXth Dynasty the great age of building continued, and the remains are less destroyed than the earlier temples, because there were subsequently fewer unscrupulous rulers to quarry them away. Seti I. greatly extended the national temple of Karnak by his immense hall of columns added in front of the pylon of Amenophis III. His funerary temple at Kurna is also in a fairly complete condition. The temple of Abydos is celebrated owing to its completeness, and the perfect condition of its sculptures, which render it one of the most interesting buildings as an artistic monument; and the variety of religious subjects adds to its importance. The very long reign and vanity of Rameses II. have combined to leave his name at over sixty sites, more widely spread than that of any other king. Yet very few great monuments were originated by him; even the Ramesseum, his funerary temple, was begun by his father. Additions, appropriations of earlier works and scattered inscriptions are what mark this reign. The principal remaining buildings are part of a court at Memphis, the second temple at Abydos, and the six Nubian temples of Bēt el-Wāli, Jerf Husein, Wadi es-Sebūa, Derr, and the grandest of all—the rock-cut temple of Abu Simbel, with its neighbouring temple of Hathor. Mineptah has left few original works; the Osireum at Abydos is the only one of which much remains, his funerary temple having been destroyed as completely as he destroyed that of Amenophis III. The celebrated Israel stele from this temple is his principal inscription. The rock shrines at Silsila are of small importance. There is no noticeable monument of the dozen troubled years of the end of the dynasty.

The XXth Dynasty opened with the great builder Rameses III. Probably he did not really exceed other kings in his activity; but as being the last of the building kings at the western side of Thebes, his temple has never been devastated for stone by the claims of later work. The whole building of Medinet Habu is about 500 ft. long and 160 wide, entirely the work of one reign. The sculptures of it are mainly occupied with the campaigns of the king against the Libyans, the Syrians and the negroes, and are of the greatest importance for the history of Egypt and of the Mediterranean lands. Another large work was the clearance and rebuilding of much of the city of Tell el Yehudia, the palace hall of which contained the celebrated coloured tiles with figures of captives. At Karnak three temples, to Ammon, Khonsu and Mut, all belong to this reign. The blighted reigns of the later Ramessides and the priest-kings did not leave a single great monument, and they are only known by usurpations of the work of others. The Tanite kings of the XXIst Dynasty rebuilt the temple of their capital, but did little else. The XXIInd Dynasty returned to monumental work. Sheshonk I. added a large wall at Karnak, covered with the record of his Judaean war. Osorkon (Uasarkon) I. built largely at Bubastis, and Osorkon II. added the great granite pylon there, covered with scenes of his festival; but at Thebes these kings only inscribed previous monuments. The Ethiopian (XXVth) dynasty built mainly in their capital under Mount Barkal, and Shabako and Tirhaka (Tahrak) also left chapels and a pylon at Thebes; and the latter added a great colonnade leading up to the temple of Karnak, of which one column is still standing.

Of the Saite kings there are very few large monuments. Their work was mainly of limestone and built in the Delta, and hence it has been entirely swept away. The square fort of brickwork at Daphnae (*q.v.*) was built by Psammetichus I. Of Apries (Haa-ab-ra, Hophra) an obelisk and two monolith shrines are the principal remains. Of Amasis (Aahmes) II. five great shrines are known; but the other kings of this age have only left minor works. The Persians kept up Egyptian monuments. Darius I. quarried largely, and left a series of great granite decrees along his Suez canal; he also built the great temple in the oasis of Kharga.

The XXXth Dynasty renewed the period of great temples. Nekhtharheb built the temple of Behbît, now a ruinous heap of immense blocks of granite. Beside other temples, now destroyed, he set up the great west pylon of Karnak, and the pylon at Kharga. Nekhtnebf built the Hathor temple and great pylon at Philae, and the east pylon of Karnak, beside temples elsewhere, now vanished. Religious building was continued under the Ptolemies and Romans; and though the royal impulse may not have been strong, yet the wealth of the land under good government supplied means for many places to rebuild their old shrines magnificently. In the Fayum the capital was dedicated to Queen Arsinoe, and doubtless Ptolemy rebuilt the temple, now destroyed. At Sharona are remains of a temple of Ptolemy I. Dendera is one of the most complete temples, giving a noble idea of the appearance of such work anciently. The body of the temple is of Ptolemy XIII., and was carved as late as the XVIth (Caesarion), and the great portico was in-building from Augustus to Nero. At Coptos was a screen of the temple of Ptolemy I. (now at Oxford), and a chapel still remains of Ptolemy XIII. Karnak was largely decorated; a granite cella was built under Philip Arrhidaeus, covered with elaborate carving; a great pylon was added to the temple of Khonsu by Ptolemy III.; the inner pylon of the Ammon-temple was carved by Ptolemy VI. and IX.; and granite doorways were added to the temples of Month and Mût by Ptolemy II. At Luxor the entire cella was rebuilt by Alexander. At Medînet Habû the temple of Tethmosis III. had a doorway built by Ptolemy X., and a forecourt by Antoninus. The smaller temple was built under Ptolemy X. and the emperors. South of Medînet Habû a small temple was built by Hadrian and Antoninus. At Esna the great temple was rebuilt and inscribed during a couple of centuries from Titus to Decius. At El Kab the temple dates from Ptolemy IX. and X. The great temple of Edfû, which has its enclosure walls and pylon complete, and is the most perfect example remaining, was gradually built during a century and a half from Ptolemy III. to XI. The monuments of Philae begin with the wall of Nekhtnebf. Ptolemy II. began the great temple, and the temple of Arhesnofer (Arsenuphis) is due to Ptolemy IV., that of Asclepius to Ptolemy V., that of Hathor to Ptolemy VI., and the great colonnades belong to Ptolemy XIII. and Augustus. The beautiful little riverside temple, called the "kiosk," was built by Augustus and inscribed by Trajan; and the latest building was the arch of Diocletian.

Farther south, in Nubia, the temples of Dabôd and Dakka were built by the Ethiopian Ergamenes, contemporary of Ptolemy IV.; and the temple of Dendûr is of Augustus. The latest building of the temple style is the White Monastery near Suhag. The external form is that of a great temple, with windows added along the top; while internally it was a Christian church. The modern dwellings in it have now been cleared out, and the interior admirably preserved and cleaned by a native Syrian architect.

Beside the great monuments, which we have now noticed, the historical material is found on several other classes of remains. These are: (1) The royal tombs, which in the Vth, VIth, XVIIIth, XIXth and XXth Dynasties are fully inscribed; but as the texts are always religious and not historical, they are less important than many other remains. (2) The royal coffins and wrappings, which give information by the added graffiti recording their removals; (3) Royal tablets, which are of the highest value for history, as they often describe or imply historical events; (4) Private tombs and tablets, which are in many cases biographical. (5) Papyri concerning daily affairs which throw light on history; or which give historic detail, as the great papyrus of Rameses III., and the trials under Rameses X. (6) The added inscriptions on buildings by later restorers, and alterations of names for misappropriation. (7) The statues which give the royal portraits, and sometimes historical facts. (8) The *ostraca*, or rough notes of work accounts, and plans drawn on pieces of limestone or pottery. (9) The scarabs bearing kings' names, which under the Hyksos and in some other dark periods, are our main source of information. (10) The miscellaneous small remains of toilet objects, ornaments, weapons, &c., many of which bear royal names.

Every object and monument with a royal name will be found catalogued under each reign in Petrie's *History of Egypt*, 3 vols., the last editions of each being the fullest. (W. M. F. P.)

F. *Chronology.*—1. *Technical.*—The standard year of the Ancient Egyptians consisted of twelve months of thirty days[1] each, with five epagomenal days, in all 365 days. It was thus an effective compromise between the solar year and the lunar month, and contrasts very favourably with the intricate and clumsy years of other ancient systems. The leap-year of the Julian and Gregorian calendars confers the immense benefit of a fixed correspondence to the seasons which the Egyptian year did not possess, but the uniform length of the Egyptian months is enviable even now. The months were grouped under three seasons of four months each, and were known respectively as the first, second, third and fourth month of (i'ḫ·t) "inundation" or "verdure," *pr·t* (*pro*) "seed-time," "winter," and *šmw* (*shôm*) "harvest," "summer," the "five (days) over the year" being outside these seasons and the year itself, according to the Egyptian expression, and counted either at the beginning or at the end of the year. Ultimately the Egyptians gave names to the months taken from festivals celebrated in them, in order as follows:—Thoth, Paophi, Athyr, Choiak, Tôbi, Mechir, Phamenôth, Pharmûthi, Pachons, Payni, Epiphi, Mesore, the epagomenal days being then called "the short year." In Egypt the agricultural seasons depend more immediately on the Nile than on the solar movements; the first day of the first month of inundation, *i.e.* nominally the beginning of the rise of the Nile, was the beginning of the year, and as the Nile commences to rise very regularly at about the date of the annual heliacal rising of the conspicuous dog-star Sothis (Sirius) (which itself follows extremely closely the slow retrogression of the Julian year), the primitive astronomers found in the heliacal rising of Sothis as observed at Memphis (on July 19 Julian) a very correct and useful starting-point for the seasonal year. But the year of 365 days lost one day in four years of the Sothic or Julian year, so that in 121 Egyptian years New Year's day fell a whole month too early according to the seasons, and in 1461 years a whole year was lost. This "Sothic period" or era of 1460 years, during which the Egyptian New Year's day travelled all round the Sothic year, is recorded by Greek and Roman writers at least as early as the 1st century B.C. The epagomenal days appear on a monument of the Vth Dynasty and in the very ancient Pyramid texts. They were considered unlucky, and perhaps this accounts for the curious fact that, although they are named in journals and in festival lists, &c., where precise dating was needed, no known monument or legal document is dated in them. It is, however, quite possible that by the side of the year of 365 days a shorter year of 360 was employed for some purposes. Lunar months were observed in the regulation of temples, and lunar years, &c., have been suspected. To find uniformity in any department in Egyptian practice would be exceptional. By the decree of Canopus, Ptolemy III. Euergetes introduced through the assembly of priests an extra day every fourth year, but this reform had no acceptation until it was reimposed by Augustus with the Julian calendar. Whether any earlier attempt was made to adjust the civil to the solar or Sothic year in order to restore the festivals to their proper places in the seasons temporarily or otherwise, is a question of great importance for chronology, but at present it remains unanswered. Probably neither the Sothic nor any other era was employed by the ancient Egyptians, who dated solely by regnal years (see below). An inscription of Rameses II. at Tanis is dated in the 400th year of the reign of the god Sēth of Ombos, probably with reference to some religious ordinance during the rule of the Seth-worshipping Hyksos; Rameses II. may well have celebrated its quatercentenary, but it is wrong to argue from this piece of evidence alone that an era of Sēth was ever observed.

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[1] Ten-day periods as subdivisions of the month can be traced as far back as the Middle Kingdom. The day consisted of twenty-four hours, twelve of day (counted from sunrise to sunset) and twelve of night; it began at sunrise.

From the Middle Kingdom onward to the Roman period, the dates upon Egyptian documents are given in regnal years. On the oldest monuments the years in a reign were not numbered consecutively but were named after events; thus in the Ist Dynasty we find "the year of smiting the Antiu-people," in the beginning of the IIIrd Dynasty "the year of fighting and smiting the people of Lower Egypt." But under the IInd Dynasty there was a census of property for taxation every two years, and the custom, continuing (with some irregularities) for a long time, offered a uniform mode of marking years, whether current or past. Thus such dates are met with as "the year of the third time of numbering" of a particular king, the next being designated as "the year after the third time of numbering." Under the Vth Dynasty this method was so much the rule that the words "of numbering" were commonly omitted. It would seem that in the course of the next dynasty the census became annual instead of biennial, so that the "times" agreed with the actual years of reign; thenceforward their consecutive designation as "first time," "second time," for "first year," "second year," was as simple as it well could be, and lasted unchanged to the fall of paganism. The question arises from what point these regnal dates were calculated. Successive regnal years might begin (1) on the anniversary of the king's accession, or (2) on the calendrical beginning in each year (normally on the first day of the nominal First month of inundation, *i.e.* 1st Thoth in the later calendar). In the latter case there would be a further consideration: was the portion of a calendar year following the accession of the new king counted to the last year of the outgoing king, or to the first year of the new king? In Dynasties I., IV. V., XVIII. there are instances of the first mode (1), in Dynasties II., VI. (?), XII., XXVI. and onwards they follow the second (2). It may be that the practice was not uniform in all documents even of the same age. In Ptolemaic times not only were Macedonian dates sometimes given in Greek documents, but there were certainly two native modes of dating current; down to the reign of Euergetes there was a "fiscal" dating in papyri, according to which the year began in Paophi, besides a civil dating probably from Thoth; later, all the dates in papyri start from Thoth.

The Macedonian year is found in early Ptolemaic documents. The fixed year of the Canopic decree under Euergetes (with 1st Thoth on Oct. 22) was never adopted. Augustus established an "Alexandrian" era with the fixed Julian year, retaining the Egyptian months, with a sixth epagomenal day every fourth year. The capture of Alexandria having taken place on the 1st of August 30 B.C., the era began nominally in 30 B.C., but it was not actually introduced till some years later, from which time the 1st Thoth corresponded with the 29th of August in the Julian year. The vague "Egyptian" year, however, continued in use in native documents for some centuries along with the Alexandrian "Ionian" year. The era of Diocletian dates from the 29th of August 284, the year of his reforms; later, however, the Christians called it the era of the Martyrs (though the persecution was not until 302), and it survived the Arab conquest. The dating by indictions, *i.e.* Roman tax-censuses, taking place every fifteenth year, probably originated in Egypt, in A.D. 312, the year of the defeat of Maxentius. The indictions began in Payni of the fixed year, when the harvest had been secured.

See F K Ginzel, *Handbuch der mathematischen und technischen Chronologie*, Bd. i. (Leipzig, 1906), and the bibliography in the following section.

2. *Historical.*[1]—As to absolute chronology, the assigning of a regnal year to a definite date B.C. is clear enough (except in occasional detail) from the conquest by Alexander onwards. Before that time, in spite of successive efforts to establish a chronology, the problem is very obscure. The materials for reconstructing the absolute chronology are of several kinds: (1) Regnal dates as given on contemporary monuments may indicate the *lengths of individual reigns*, but not with accuracy, as they seldom reach to the end of a reign and do not allow for co-regencies. Records of the time that has elapsed between two regnal dates in the reigns of different kings are very helpful; thus stelae from the Serapeum recording the ages of the Apis bulls with the dates of their birth and death have fixed the chronology of the XXVIth Dynasty. Traditional evidence for the lengths of reigns exists in the Turin Papyrus of kings and in Manetho's history; unfortunately the papyrus is very fragmentary and preserves few reign-lengths entire, and Manetho's evidence seems very untrustworthy, being known only from late excerpts. (2) The duration of a period may be calculated by *generations* or the probable average lengths of reigns, but such calculations are of little value, and the succession of generations even when the evidence seems to be full is particularly difficult to ascertain in Egyptian, owing to adoptions and the repetition of the same name even in one family of brothers and sisters. (3) *Synchronisms* in the histories of other countries furnish reliable dates—Greek, Persian, Babylonian and Biblical dates for the XXVIth Dynasty, Assyrian for the XXVth; less precise are the Biblical date of Rehoboam, contemporary with the invasion of Shishak (Sheshonk) in the XXIInd Dynasty, and the date of the Babylonian and Assyrian kings contemporary with Amenhotp IV. in the XVIIIth Dynasty. The last, about 1400 B.C., is the earliest point to which such coincidences reach. (4) *Astronomical data*, especially the heliacal risings of Sothis recorded by dates of their celebration in the vague year. These are easily calculated on the assumption first that the observations were correctly made, secondly that the calendrical dates are in the year of 365 days beginning on 1st Thoth, and thirdly that this year subsequently underwent no readjustment or other alteration before the reign of Euergetes. The assumption may be a reasonable one, and if the results agree with probabilities as deduced from the rest of the evidence it is wise to adopt it; if on the other hand the other evidence seems in any serious degree contrary to those results it may be surmised that the assumption is faulty in some particular. The harvest date referred to below helps to show that the first part of the assumption is justified.

The duration of the reigns in several dynasties is fairly well known from the incontrovertible evidence of contemporary monuments. The XXVIth Dynasty, which lasted 139 years, is particularly clear, and synchronisms fix its regnal dates to the years B.C. within an error of one or two years at most. The lengths of several reigns in the XIIth, XVIIIth and XIXth Dynasties are known, and the sum total for the XIIth Dynasty is preserved better than any other in the Turin Papyrus, which was written under the XIXth Dynasty. The succession and number of the kings are also ascertained for other dynasties, together with many regnal dates, but very serious gaps exist in the records of the Egyptian monuments, the worst being between the XIIth and the XVIIIth Dynasties, between the XIth and the VIth, and at Dynasties I.-III. For the chronology before the time of the XXVIth Dynasty Herodotus's history

[1] For the "sequence" dating (S.D.) used by archaeologists for the prehistoric period see above (§ *Art and Archaeology, ad init.* note).

Dynasty.	Meyer 1887 (minimum date).	Petrie 1894, &c.	Meyer 1904–1908.	Sethe 1905.	Breasted 1906.	Petrie 1906.
I.	3180	4777	3315	3360	3400	5510
II.		4514		3110		5247
III.		4212	2895	2810	2980	4945
IV.	2830	3998	2840	2720	2900	4731
V.		3721	2680	2630	2750	4454
VI.	2530	3503	2540	2480	2625	4206
VII.		3322		2300	2475	4003
VIII.		3252				3933
IX.		3106	2360		2445	3787
X.		3006				3687
XI.		2821	2160	2100	2160	3502
XII.	2130	2778	2000	2000	2000	3459
XIII.	1930	2565	1791		1788	3246
XIV.		2112				2793
XV.	1780		1680[1]			2533
XVI.		1928				2249
XVII.		1738				1731
XVIII.	1530	1587	1580		1580	1580
XIX.	1320	1327	1321		1350	1322

is quite worthless. Manetho alone of all authorities offers a complete chronology from the Ist Dynasty to the XXXth. In the case of the six kings of the XXVIth Dynasty, Africanus, the best of his excerptors, gives correct figures for five reigns, but attributes six instead of sixteen years to Necho; the other excerptors have wrong numbers throughout. For the XIXth Dynasty Manetho's figures are wrong wherever we can check them; the names, too, are seriously faulty. In the XVIIIth Dynasty he has too many names and few are clearly identifiable, while the numbers are incomprehensible. In the XIIth Dynasty the number of the kings is correct and many of the names can be justified, but the reign-lengths are nearly, if not quite, all wrong. The summations of years for the Dynasties XII. and XVIII. are likewise wrong. It seems, therefore, that the known texts of Manetho, serviceable as they have been in the reconstruction of Egyptian history, cannot be employed as a serious guide to the early chronology, since they are faulty wherever we can check them, even in the XXVIth Dynasty whose kings were so celebrated among the Greeks. There remain the astronomical data. Of these, the Sothic date furnished by a calendar in the Ebers Papyrus of the 9th year of Amenophis I. (when interpreted on the assumption stated above), and another at Elephantine of an uncertain year of Tethmosis III., tally well with each other (1550–1546, 1474–1470 B.C.) and with the Babylonian synchronism (not yet accurately determined) under Amenhotp IV. (Akhenaton). Another Sothic date of the 7th year of Senwosri III. on a Berlin papyrus from Kahūn, similarly interpreted (1882–1878 B.C.), gives for the XIIth Dynasty a range from 2000 to 1788 B.C. This (discovered by L. Borchardt in 1899) seems to offer a welcome ray, piercing the obscurity of early Egyptian chronology; guided by it the historian Ed. Meyer, and K. Sethe have framed systems of chronology in close agreement with each other, reaching back to the Ist Dynasty at about 3400 B.C. To Meyer is further due a calculation that the Egyptian calendar was introduced in 4241–4238 B.C.[2] Their results in general have been adopted by the "Berlin school," including Erman, Steindorff (in Baedeker's *Egypt*) and Breasted in America. Nevertheless many Egyptologists are unwilling to accept the new chronology, the chief obstacle being that it allows so short an interval for the six dynasties between the XIIth and the XVIIIth. If the XIIth Dynasty ended about 1790 B.C. and the XVIIIth began about 1570 B.C., taking what seems to be the utmost interval that it permits, 220 years have to contain a crowd of kings of whom nearly 100 are already known by name from monuments and papyri, while fresh names are being added annually to the long list; the shattered fragments of the last columns in the Turin Papyrus show space for 150 or perhaps 180 kings of this period, apparently without reaching the XVIIth Dynasty. An estimate of 160 to 200 kings would therefore not be excessive. The dates that have come down to us are very few; the only ones known from the Hyksos period are of a 12th and a 33rd year. In the Turin Papyrus two reign-lengths of less than a year, seven others of less than five years each, one of ten years and one of thirteen seem attributable to the XIIIth and XIVth Dynasties. Probably most of the reigns were short, as Manetho also decidedly indicates. It is possible that the compiler of the Turin Papyrus, who excluded contemporary reigns in the period between the VIth and the XIIth Dynasties, here admitted such; nor is a correspondingly large number of kings in so short a period without analogies in history. Professor Petrie, however, thinks it best, while accepting the evidence of the Sirius date, to suppose further that a whole Sothic period of 1460 years had passed in the interval, making a total of 1650 years for the six dynasties in place of 220 years. This, however, seems greatly in excess of probability, and several Egyptologists familiar with excavation are willing to accept Meyer's figures on archaeological grounds. To the present writer it seems that Meyer's chronology provides a convenient working theory, but involves such an improbability in regard to the interval between the XIIth and the XVIIIth Dynasties that the interpretation of the Sothic date on which it is founded must be viewed with suspicion until clear facts are found to corroborate it. Corroboration has been sought by Mahler, Sethe and Petrie in the dates of new moons, of warlike and other expeditions, and of high Nile, but their evidence so far is too vague and uncertain to affect the question seriously. It is remarkable that no records of eclipses are known from Egyptian documents. The interesting date of the harvest at El Bersha, quoted by Meyer in Breasted, *Records*, i. p. 48, confirms the Sothic date for the XIIth Dynasty in some measure, but it belongs to the same age, and therefore its evidence would be equally vitiated with the other by any subsequent alteration in the Egyptian calendar. Before the discovery of the Kahun Sothic date, Professor Petrie put the end of the XIIth Dynasty at 2565 B.C., in 1884 even Meyer had suggested 1930 B.C. as its *minimum* date, thus allowing 400 years at the least for the period from the XIIIth Dynasty to the XVIIth.

Dynasty.	Wiedemann 1884.	Meyer 1884.	Petrie 1905-1906.	Breasted 1906.	Maspero 1904.
XIX.	1490	1320	(1328), 1322	1350	
XX.	1280	1180	1202	1200	
XXI.	1100	1060	1102	1090	
XXII.	975	930	952	945	
XXIII.	810		755	745	
XXIV.	720		721	718	
XXV.	715	728	715	712	
XXVI.	664	663	664	663	
XXVII.	525	525	525	525	425
XXVIII.	415		405		c. 405
XXIX.	408		399		399
XXX.	387		378		380
Ochus	350		342		342

Beyond the XIIth Dynasty estimates must again be vague. The spacing of the years on the Palermo stone has given rise to some calculations for the early dynasties. Others are grounded on the dates of certain operations which are likely to have taken place at particular seasons of the year so that they can be roughly calculated on the Sothic basis, others on Manetho's figures, average lengths of reigns, evidence of the Turin Papyrus, &c.

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[1] Meyer makes XIII. overlap XV. (Hyksos), and XIV. (Xoite), contemporary with XVI. (Hyksos) and XVII. (Theban).

[2] Reisner (*Early Dynastic Cemeteries*, p. 126), from his work in the prehistoric cemeteries, believes that Egypt was too uncivilized at that early date to have performed this scientific feat.

Table I. page 79 shows the chronology of the first nineteen dynasties, according to recent authorities, before and after the discovery of the Kahun Sothic date.

The dates of the earlier dynasties in this table are always intended to be only approximate; for instance, Meyer in 1904 allowed an error of 100 years either of excess or deficiency in the dates he assigned to the dynasties from the Xth upwards.

The other dynasties are dated as in Table II. by different authorities.

See Ed. Meyer, *Geschichte des Altertums*, Bd. i. (Stuttgart, 1884), *Geschichte des alten Ägyptens* (1887), *Ägyptische Chronologie* (*Abhandl.* of Prussian Academy) (Berlin, 1904, with the supplement *Nachträge zur ägypt. Chronologie*, *ib.* 1907); K. Sethe, "Beiträge zur ältesten Geschichte Ägyptens" (in his *Untersuchungen*, Bd. iii.) (Leipzig, 1905); J. H. Breasted, *Ancient Records of Egypt*, "Historical Documents," vol. i. (Chicago, 1906); W. M. F. Petrie, *A History of Egypt*, vol. i. (London, 1884), vol. iii. (1905), *Researches in Sinai* (London, 1906); G. Maspero, *Histoire ancienne des peuples de l'orient* (Paris, 1904); A. Wiedemann, *Ägyptische Geschichte* (Gotha, 1884); articles by Mahler and others in the *Zeitschrift für ägyptische Sprache* and *Orientalistische Literaturzeitung* (recent years). (F. Ll. G.)

III. HISTORY

1. *From the Earliest Times to the Moslem Conquest.*

In the absence of a strict chronology, the epochs of Pharaonic history are conveniently reckoned in dynasties according to Manetho's scheme, and these dynasties are grouped into longer periods:—the Old Kingdom (Dynasties I. to VIII.), including the Earliest Dynasties (I. to III.) and the Pyramid Period (Dynasties IV. to VI.); the Middle Kingdom (Dynasties IX. to XVII.), including the Heracleopolite Dynasties (IX. to X.) and the Hyksos Period (Dynasties XV. to XVII.); the New Empire (Dynasties XVIII. to XX.); the Deltaic Dynasties (Dynasties XXI. to XXXI.), including the Saite and Persian Periods (Dynasties XXVI. to XXXI.). The conquest by Alexander ushers in the Hellenistic age, comprising the periods of Ptolemaic and Roman rule.

The Prehistoric Age.—One of the most striking features of recent Egyptology is the way in which the earliest ages of the civilization, before the conventional Egyptian style was formed, have been illustrated by the results of excavation. Until 1895 there seemed little hope of reaching the records of those remote times, although it was plain that the civilization had developed in the Nile valley for many centuries before the IVth Dynasty, beyond which the earliest known monuments scarcely reached. Since that year, however, there has been a steady flow of discoveries in prehistoric and early historic cemeteries, and, partly in consequence of this, monuments already known, such as the annals of the Palermo stone, have been made articulate for the beginnings of history in Egypt.

It is probable that certain rudely chipped flints, so-called eoliths, in the alluvial gravels (formed generally at the mouth of wadis opening on to the Nile) at Thebes and elsewhere, are the work of primitive man; but it has been shown that such are produced also by natural forces in the rush of torrents. On the surface of the desert, at the borders of the valley, palaeolithic implements of well-defined form are not uncommon, and bear the marks of a remote antiquity. In some cases they appear to lie where they were chipped on the sites of flint factories. Geologists and anthropologists are not yet agreed on the question whether the climate and condition of the country have undergone large changes since these implements were deposited. As yet none have been found in such association with animal remains as would help in deciding their age, nor have any implements been discovered in rock-shelters or in caves.

Of neolithic remains, arrowheads and other implements are found in some numbers in the deserts. In the Fayūm region, about the borders of the ancient Lake of Moeris and beyond, they are particularly abundant and interesting in their forms. But their age is uncertain; some may be contemporary with the advanced culture of the XIIth Dynasty in the Nile valley. Definite history on the other hand has been gained from the wonderful series of "prehistoric" cemeteries excavated by J. de Morgan, Petrie, Reisner and others on the desert edgings of the cultivated alluvium. The succession of archaeological types revealed in them has been tabulated by Petrie in his *Diospolis Parva*, and the detailed publication of Reisner's unusually careful researches is bringing much new light on the questions involved, amongst other things showing the exact point at which the "prehistoric" series merges into the Ist Dynasty, for, as might be surmised, in many cases the prehistoric cemeteries continued in use under the earliest dynasties. The finest pottery, often painted but all hand-made without the wheel, belongs to the prehistoric period; so also do the finest flint implements, which, in the delicacy and exactitude of their form and flaking, surpass all that is known from other countries. Metal seems to be entirely absent from the earliest type of graves, but immediately thereafter copper begins to appear (bronze is hardly to be found before the XIIth Dynasty). The paintings on the vases show boats driven by oars and sails rudely figured, and the boats bear emblematic standards or ensigns. The cemeteries are found throughout Upper and Middle Egypt, but as yet have not been met with in the Delta or on its borders. This might be accounted for by the inhabitants of Lower Egypt having practised a different mode of disposing of the dead, or by their cemeteries being differently placed.

Tradition, mythology and later customs make it possible to recover a scrap of the political history of that far-off time. Menes, the founder of the Ist Dynasty, united the two kingdoms of Upper and Lower Egypt. In the prehistoric period, therefore, these two realms were separate. The capital of Upper Egypt was Nekheb, now represented by the ruins of El Kab, with the royal residence across the river at Nekhen (Hieraconpolis); that of Lower Egypt was at Buto (Putŏ or Dep) in the marshes, with the royal residence in the quarter called Pe. Nekhĕbi, goddess of El Kab, represented the Upper or Southern Kingdom, which was also under the tutelage of the god Seth, the goddess Buto and the god Horus similarly presiding over the Lower Kingdom. The royal god in the palace of each was a hawk or Horus. The spirits of the deceased kings were honoured respectively as the jackal-headed spirits of Nekhen and the hawk-headed spirits of Pe. As we hear also of the "spirits of On" it is probable that Heliopolis was at one time capital of a kingdom. In after days the prehistoric kings were known as "Worshippers of Horus" and in Manetho's list they are the νέκυες "Dead," and ἥρωες "Heroes," being looked upon as intermediate between the divine dynasties and those of human kings. It is impossible to estimate the duration of the period represented by the prehistoric cemeteries; that the two kingdoms existed throughout unchanged is hardly probable.

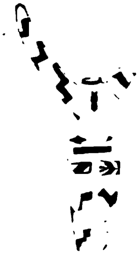
According to the somatologist Elliott Smith, the most important change in the physical character of the people of Upper Egypt, in the entire range of Egyptian archaeology, took place at the beginning of the dynastic period; and he accounts for this by the mingling of the Lower with the Upper Egyptian population, consequent on the uniting of the two countries under one rule. From remains of the age of the IVth Dynasty he is able to define to some extent the type of the population of Lower Egypt as having a better cranial and muscular development than that of Upper Egypt, probably through immigration from Syria. The advent of the dynasties, however, produced a quickening rather than a dislocation in the development of civilization.

It is doubtful whether we possess any writing of the prehistoric age. A few names of the kings of Lower Egypt are preserved in the first line of the Palermo stone, but no annals are attached to them. Petrie considers that one of the kings buried at Abydos, provisionally called Nar-mer and whose real name may be Mer or Beza, preceded Menes; of him there are several inscribed records, notably a magnificent carved and inscribed

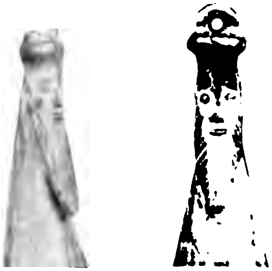
EGYPT

Plate I.

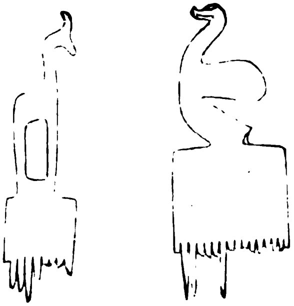
Earliest Egyptian Art



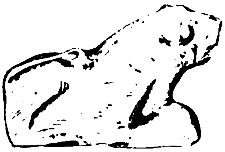
1. Tattooed Female, Limestone Slag.



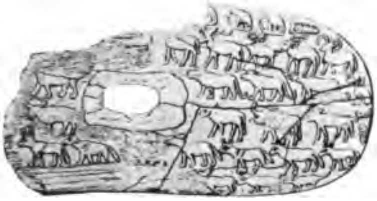
2. Heads on Ivory Tusks. 3.



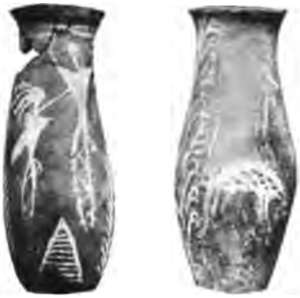
4. Animals on Bone Combs. 5.



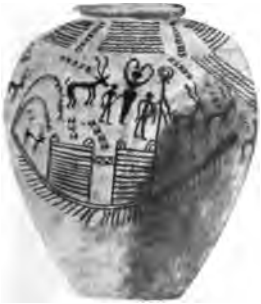
6. Ivory Hawk.
7. Limestone Lion.



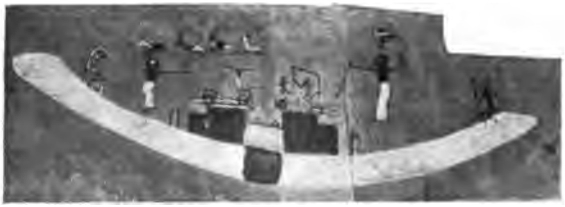
8. Ivory Dog and Gazelle.
9. Ivory Handle of Knife.



10. } White on Red Vases;
11. } Men and Animals.

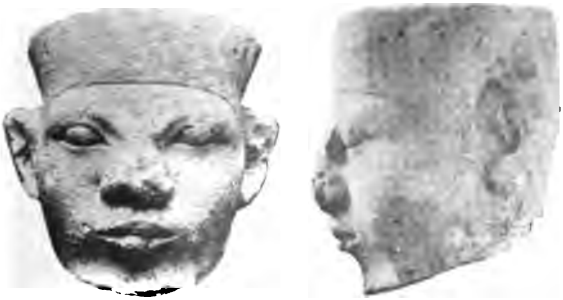


12. Ship on a Vase.

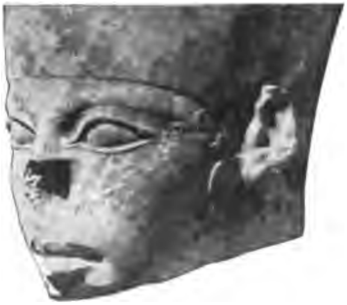


13. Ship on a Wall Painting.

14. Ivory King.



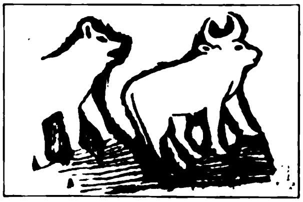
15. Archaic King's Head, Study in Limestone. 16.

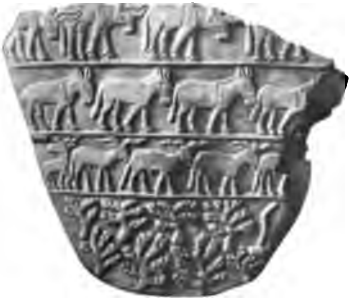


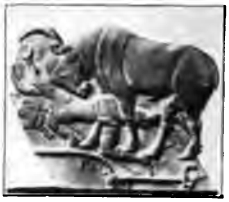
17. Head of Khasekhem.

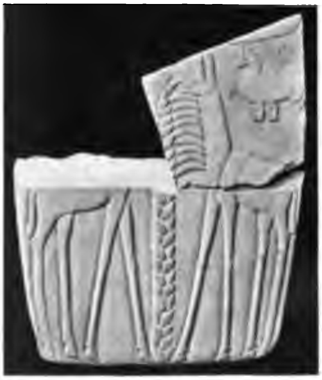
EGYPT

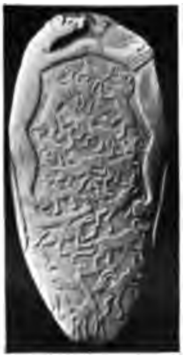
Early Egyptian Art

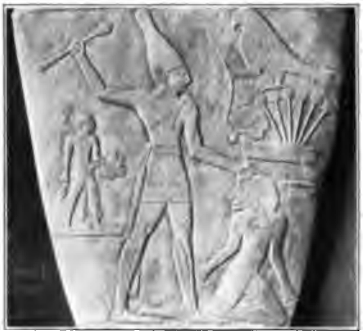

18. Limestone Relief.

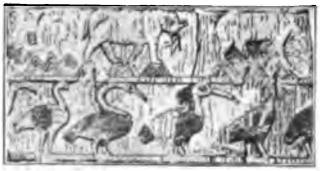

Photo, Mansell.
19. Animals on Slate Palette.

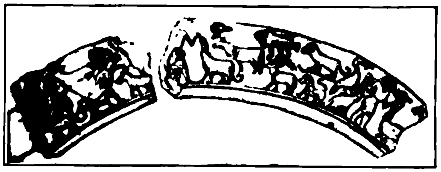

20. Conqueror as a Bull.

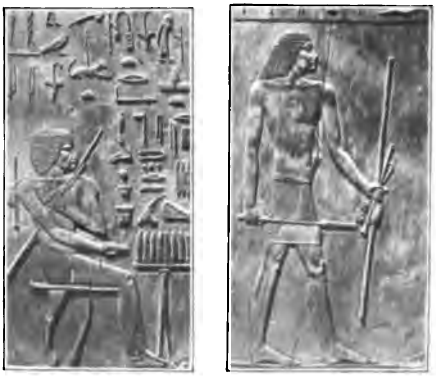

21. Gazelles and Palm, Slate.

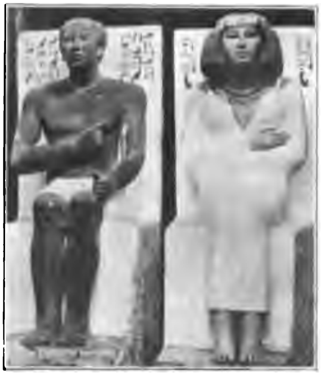

22. Animals, Slate.

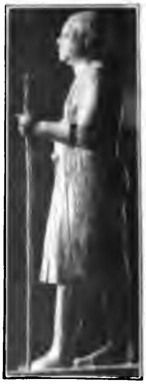

23. King Narmer, Slate Palette.


24. Ivory Tusk, with Animals.


25. Ivory Wand, with Animals.


26. Wooden Panels of Hesi.

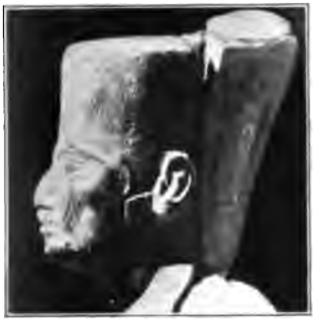

27. Rahotp and Nefert.


28. Wooden Figure.

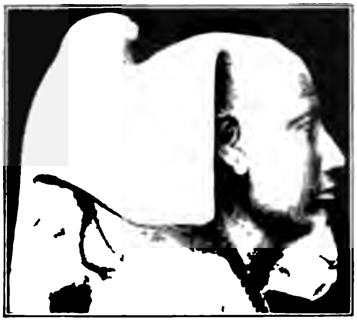
EGYPT

Plate III.

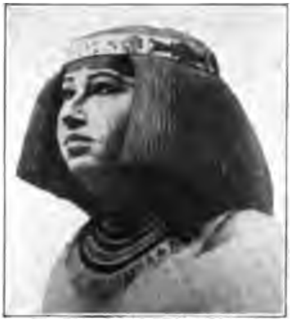
Pyramid Period.



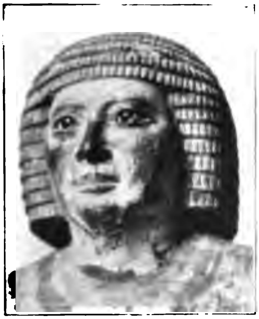
29.—Ivory of Cheops.



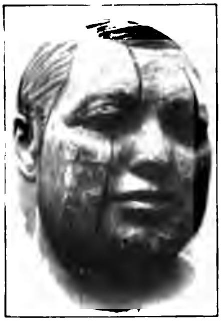
30.—Diorite of Chephren.



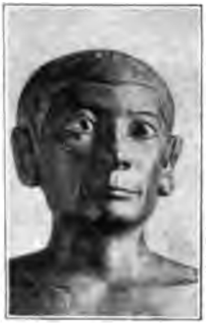
31.—Limestone of Nefert.



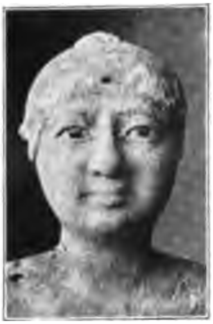
32.—Hemset: Limestone.



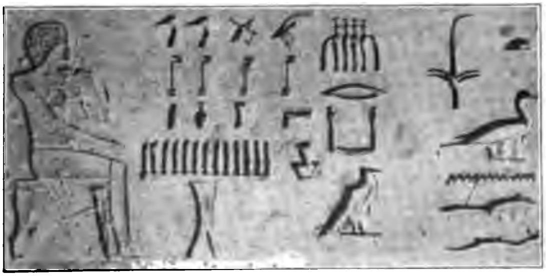
33.—Wood (see Fig. 28).



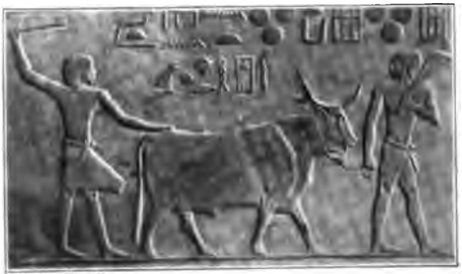
34.—Scribe: Limestone.



35.—Mer-en-ra: Copper.

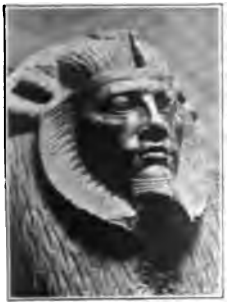


36.—Limestone Slab of Khent-er-ka.

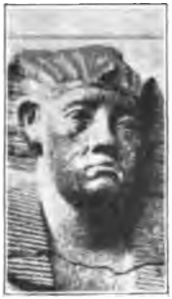


Photo, Bonfils.

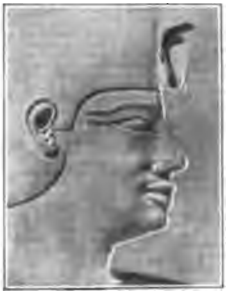
37.—The Oxherds: Limestone.



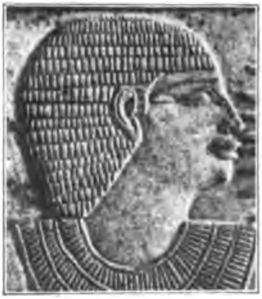
38.—Granite Sphinx.



39.—Amenemhē III.



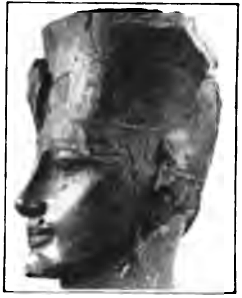
40.



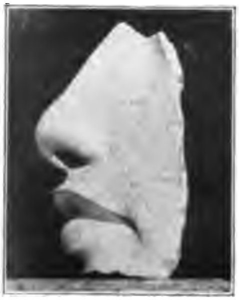
Senwosri I.: Limestone Reliefs: Hotepa. 41.

EGYPT

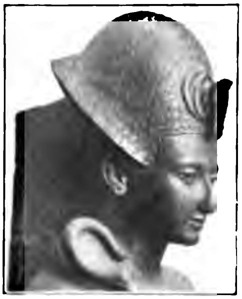
1400 B. C. to Roman.



Photo, Mansell.
42. Amenophis III. : Granite.

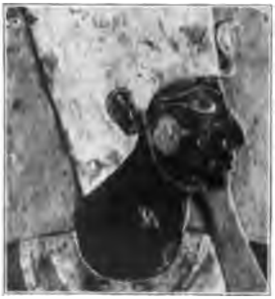


43. Queen Taia : Limestone.

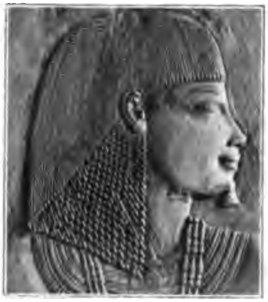


Photo, Anderson.
44. Rameses II. : Granite.

45. Negress : Ebony.

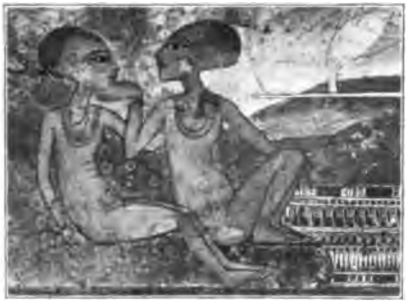


46. Queen Hatshepsut.

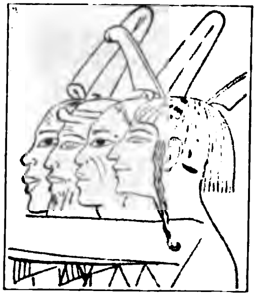


47. Kha-Em-Hat.

48. Seti I.



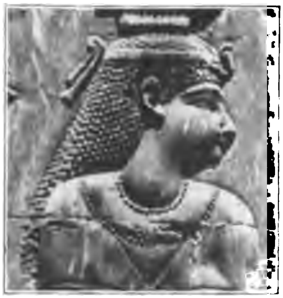
49. Princesses : Fresco.



50. Four Races of Man.

51. Tumbler.

52. Scene in XXVI. Dynasty.



53. Ptolemaic Relief.

54. Modelled Head and Skull.

slate palette found at Hieraconpolis, with figures of the king and his vizier, war-standards and prisoners. To identify him with Bezau (Boethos) of the IInd Dynasty runs counter to much archaeological evidence. Sethe places him next after Menes and some would identify him with that king. Another inscribed palette may be pre-dynastic; it perhaps mentions a king named "Scorpion."

The earliest dynasties.

The Old Kingdom.—The names of a number of kings attributable to the Ist Dynasty are known from their tombs at Abydos. Unfortunately, they are almost exclusively Horus titles , in place of the personal names by which they were recorded in the lists of Abydos and Manetho; some, however, of the latter are found, and prove that the scribes of the New Kingdom were unable to read them correctly. Important changes and improvements took place in the writing even during the Ist Dynasty. The personal name of Menes is given by one only of many relics of a king whose Horus-name was Aha, "the Fighter." Doubts have been expressed about the identification with Menes, but it is strongly corroborated by the very archaic style of the remains. The name of Aha (Menes) was found in two tombs, one at Nagâda north of Thebes and nearly opposite the road to the Red Sea, the other at Abydos. Manetho makes the Ist Dynasty Thinite, this being the capital of the nome in which Abydos lay. Upper Egypt always had precedence over Lower Egypt, and it seems clear that Menes came from the former and conquered the latter. According to tradition he founded Memphis which lay on the frontier of his conquest; probably he resided there as well as at Abydos; at any rate relics of one of the later kings of the Ist Dynasty have already been recognized in its vast necropolis. Of the eight kings of the Ist Dynasty, three—the fifth, sixth and seventh in the Ramesside list of Abydos—are positively identified by tomb-remains from Abydos, and others are scarcely less certain. Two of the kings have also left tablets at the copper and turquoise mines of Wadi Maghâra in Sinai. The royal tombs are built of brick, but one of them, that of Usaphais, had its floor of granite from Elephantine. They must have been filled with magnificent furniture and provisions of every kind, including annual record-tablets of the reigns, carved in ivory and ebony. From a fragment on the Palermo stone it is clear that material existed as late as the Vth Dynasty for a brief note of the height of the Nile and other particulars in each year of the reign of these kings.

The IInd Dynasty of Manetho appears to have been separated from the Ist even on the Palermo stone; it also was Thinite, and the tombs of several of its nine (?) kings were found at Abydos. The IIIrd Dynasty is given as Memphite by Manetho. Two of the kings built huge mastaba-tombs at Bêt Khallaf near Abydos, but the architect and learned scribe Imhôtp designed for one of these two kings, named Zoser, a second and mightier monument at Memphis, the great step-pyramid of Sakkara. In Ptolemaic times Imhôtp was deified, and the traditional importance of Zoser is shown by a forged grant of the Dodecaschoenus to the cataract god Khnûm, purporting to be from his reign, but in reality dating from the Ptolemaic age. With Snefru, at the end of this dynasty, we reach the beginning of Egyptian history as it was known before the recent discoveries. Monuments and written records are henceforth more numerous and important, and the Palermo annals show a fuller scale of record. The events in the three years that are preserved include a successful raid upon the negroes, and the construction of ships and gates of cedar-wood which must have been brought from the forests of the Lebanon. Snefru also set up a tablet at Wadi Maghâra in Sinai. He built two pyramids, one of them at Mêdûm in steps, the other, probably in the perfected form, at Dahshûr, both lying between Memphis and the Fayûm.

The pyramid period.

Pyramids did not cease to be built in Egypt till the New Kingdom; but from the end of the IIIrd to the VIth Dynasty is pre-eminently the time when the royal pyramid in stone was the chief monument left by each successive king. Zoser and Snefru have been already noticed. The personal name enclosed in a cartouche is henceforth the commonest title of the king. We now reach the IVth Dynasty containing the famous names of Cheops (*q.v.*), Chephren (Khafrê) and Mycerinus (Menkeurê), builders respectively of the Great, the Second and the Third Pyramids of Giza. In the best art of this time there was a grandeur which was never again attained. Perhaps the noblest example of Egyptian sculpture in the round is a diorite statue of Chephren, one of several found by Mariette in the so-called Temple of the Sphinx. This "temple" proves to be a monumental gate at the lower end of the great causeway leading to the plateau on which the pyramids were built. A king Dedefrê, between Cheops and Chephren, built a pyramid at Abu-Roâsh. Shepseskaf is one of the last in the dynasty. Tablets of most of these kings have been found at the mines of Wadi Maghâra. In the neighbourhood of the pyramids there are numerous mastabas of the court officials with fine sculpture in the chapels, and a few decorated tombs from the end of this centralized dynasty of absolute monarchs are known in Upper Egypt. A tablet which describes Cheops as the builder of various shrines about the Great Sphinx has been shown to be a priestly forgery, but the Sphinx itself may have been carved out of the rock under the splendid rule of the IVth Dynasty.

The Vth Dynasty is said to be of Elephantine, but this must be a mistake. Its kings worshipped Rê, the sun, rather than Horus, as their ancestor, and the title "son of the Sun" began to be written by them before the cartouche containing the personal name, while another "solar" cartouche, containing a name compounded with Rê, followed the title "king of Upper and Lower Egypt." Sahurê and the other kings of the dynasty built magnificent temples with obelisks dedicated to Rê, one of which, that of Neuserrê at Abusîr, has been thoroughly explored. The marvellous tales of the Westcar Papyrus, dating from the Middle Kingdom, narrate how three of the kings were born of a priestess of Rê. The pyramids of several of the kings are known. The early ones are at Abusîr, and the best preserved of the pyramid temples, that of Sahurê, excavated by the German Orient-Gesellschaft, in its architecture and sculptured scenes has revealed an astonishingly complete development of art and architecture as well as of warlike enterprise by sea and land at this remote period; the latest pyramid belonging to the Vth Dynasty, that of Unas at Sakkâra, is inscribed with long ritual and magical texts. Exquisitely sculptured tombs of this time are very numerous at Memphis and are found throughout Upper Egypt. Of work in the traditional temples of the country no trace remains, probably because, being in limestone, it has all perished. The annals of the Palermo stone were engraved and added to during this dynasty; the chief events recorded for the time are gifts and endowments for the temples. Evidently priestly influence was strong at the court. Expeditions to Sinai and Puoni (Punt) are commemorated on tablets.

The VIth Dynasty if not more vigorous was more articulate; inscribed tombs are spread throughout the country. The most active of its kings was the third, named Pepi or Phiops, from whose pyramid at Sakkara the capital, hitherto known as "White Walls," derived its later name of Memphis (MN-NFR, Mempi); a tombstone from Abydos celebrates the activity of a certain Una during the reigns of Pepi and his successor in organizing expeditions to the Sinai peninsula and south Palestine, and in transporting granite from Elephantine and other quarries. Herkhuf, prince of Elephantine and an enterprising leader of caravans to the south countries both in Nubia and the Libyan oases, flourished under Merenrê and Pepi II. called Neferkere. On one occasion he brought home a dwarf dancer from the Sudan, described as being like one brought from Puoni in the time of the fifth-dynasty king Assa; this drew from the youthful Pepi II. an enthusiastic letter which was engraved in full upon the façade of Herkhuf's tomb. The reign of the last-named king, begun early, lasted over ninety years, a fact so long remembered that even Manetho attributes to him ninety-four years; its length probably caused the ruin of the dynasty. The local princelings and monarchs had been growing in culture, wealth and power, and after Pepi II. an ominous gap in the monuments, pointing to civil war, marks the end of the Old Kingdom. The VIIth and VIIIth Dynasties are said to have been Memphite, but of them no record survives beyond some names of kings in the lists.

Heracleopolite period.

The Middle Kingdom.—The long Memphite rule was broken by the IXth and Xth Dynasties, of Heracleopolis Magna (Hnês) in Middle Egypt. Kheti or Achthoës was apparently a favourite name with the kings, but they are very obscure. They may have spread their rule by conquest over Upper Egypt and then overthrown the Memphite dynasty. The chief monuments of the period are certain inscribed tombs at Assiût; it appears that one of the kings, whose praenomen was Mikerê, supported by a fleet and army from Upper Egypt, and especially by the prince of Assiût, was restored to his paternal city of Heracleopolis, from which he had probably been driven out; his pyramid, however, was built in the old royal necropolis at Memphis. Later the princes of Thebes asserted their independence and founded the XIth Dynasty, which pushed its frontiers northwards until finally it occupied the whole country. Its kings were named Menthotp, from Mont, one of the gods of Thebes; others, perhaps sub-kings, were named Enyotf (Antef). They were buried at Thebes, whence the coffins of several were obtained by the early collectors of the 19th century. Nibhôtp Menthotp I. probably established his rule over all Egypt. The funerary temple of Nebhepré Menthotp III., the last but one of these kings, has been excavated by the Egypt Exploration Fund at Deir el Bahri, and must have been a magnificent monument. His successor Sankhkerê Menthotp IV. is known to have sent an expedition by the Red Sea to Puoni.

The XIIth Dynasty is the central point of the Middle Kingdom, to which the decline of the Memphite and the rise of the Heracleopolite dynasty mark the transition, while the growth of Thebes under the XIth Dynasty is its true starting-point. Monuments of the XIIth Dynasty are abundant and often of splendid design and workmanship, whereas previously there had been little produced since the VIth Dynasty that was not half barbarous. Although not much of the history of the XIIth Dynasty is ascertained, the Turin Papyrus and many dated inscriptions fix the succession and length of reign of the eight kings very accurately. The troubled times that the kingdom had passed through taught the long-lived monarchs the precaution of associating a competent successor on the throne. The nomarchs and the other feudal chiefs were inclined to strengthen themselves at the expense of their neighbours; a firm hand was required to hold them in check and distribute the honours as they were earned by faithful service. The tombs of the most favoured and wealthy princes are magnificent, particularly those of certain families in Middle Egypt at Beni Hasan, El Bersha, Assiût and Deir Rîfa, and it is probable that each had a court and organization within his nome like that of the royal palace in miniature. Eventually, in the reigns of Senwosri III. and Amenemhê III., the succession of strong kings appears to have centralized all authority very completely. The names in the dynasty are Amenemhê (Ammenemes) and Senwosri (formerly read Usertesen or Senusert). The latter seems to be the origin of the Sesostris (*q.v.*) and Sesoosis of the legends. Amenemhê I., the first king, whose connexion with the previous dynasty is not known, reigned for thirty years, ten of them being in partnership with his son Senwosri I. He had to fight for his throne and then reorganize the country, removing his capital or residence from Thebes to a central situation near Lisht about 25 m. south of Memphis. His monuments are widespread in Egypt, the quarries and mines in the desert as far as Sinai bear witness to his great activity, and we know of an expedition which he made against the Nubians. The "Instructions of Amenemhê to his son Senwosri," whether really his own or a later composition, refer to these things, to his care for his subjects, and to the ingratitude with which he was rewarded, an attempt on his life having been made by the trusted servants in his own palace. The story of Sinûhi is the true or realistic history of a soldier who, having overheard the secret intelligence of Amenemhê's death, fled in fear to Palestine or Syria and there became rich in the favour of the prince of the land, growing old, however, he successfully sued for pardon from Senwosri and permission to return and die in Egypt.

Senwosri I. was already the executive partner in the time of the co-regency, warring with the Libyans and probably in the Sudan. After Amenemhê's death he fully upheld the greatness of the dynasty in his long reign of forty-five years. The obelisk of Heliopolis is amongst his best-known monuments, and the damming of the Lake of Moeris (*q.v.*) must have been in progress in his reign. He built a temple far up the Nile at Wadi Halfa and there set up a stela commemorating his victories over the tribes of Nubia. The fine tombs of Ameni at Beni Hasan and of Hepzefa at Assiût belong to his reign. The pyramids of both father and son are at Lisht.

Amenemhê II. was buried at Dahshûr; he was followed by Senwosri II., whose pyramid is at Illahûn at the mouth of the Fayûm. In his reign were executed the fine paintings in the tomb of Khnemhotp at Beni Hasan, which include a remarkable scene of Semitic Bedouins bringing eye-paint to Egypt from the eastern deserts. In Manetho he is identified with Sesostris (see above), but Senwosri I., and still more Senwosri III., have a better claim to this distinction. The latter warred in Palestine and in Nubia, and marked the south frontier of his kingdom by a statue and stelae at Semna beyond the Second Cataract. Near his pyramid was discovered the splendid jewelry of some princesses of his family (see Jewelry *ad init.*). The tomb of Thethotp at El Bersha, celebrated for the scene of the transport of a colossus amongst its paintings, was finished in this reign.

Amenemhê III. completed the work of Lake Moeris and began a series of observations of the height of the inundation at Semna which was continued by his successors. In his long reign of forty-six years he built a pyramid at Dahshûr, and at Hawâra near the Lake of Moeris another pyramid together with the Labyrinth which seems to have been an enormous funerary temple attached to the pyramid. His name was remembered in the Fayûm during the Graeco-Roman period and his effigy worshipped there as Pera-marres, *i.e.* Pharaoh Marres (Marres being his praenomen graecized). Amenemhê IV.'s reign was short, and the dynasty ended with a queen Sebeknefru (Scemiophris), whose name is found in the scanty remains of the Labyrinth. The XIIth Dynasty numbered eight rulers and lasted for 213 years. Great as it was, it created no empire outside the Nile valley, and its most imposing monument, which according to the testimony of the ancients rivalled the pyramids, is now represented by a vast stratum of chips.

The history of the following period down to the rise of the New Empire is very obscure. Manetho gives us the XIIIth (Diospolite) Dynasty, the XIVth (Xoite from Xois in Lower Egypt), the XVth and XVIth (Hyksos) and the XVIIth (Diospolite), but his names are lost except for the Hyksos kings. The Abydos tablet ignores all between the XIIth and XVIIIth Dynasties. The Turin Papyrus preserves many names on its shattered fragments, and the monuments are for ever adding to the list, but it is difficult to assign them accurately to their places. The Hyksos names can in some cases be recognized by their foreign aspect, the peculiar style of the scarabs on which they are engraved or by resemblances to those recorded in Manetho. The kings of the XVIIth Dynasty too are generally recognizable by the form of their name and other circumstances. Manetho indicates marvellous crowding for the XIIIth and XIVth Dynasties, but it seems better to suggest a total duration of 300 or 400 years for the whole period than to adopt Meyer's estimate of about 210 years (see above, *Chronology*).

Amongst the kings of the XIIIth Dynasty (including perhaps the XIVth), not a few are represented by granite statues of colossal size and fine workmanship, especially at Thebes and Tanis, some by architectural fragments, some by graffiti on the rocks about the First Cataract. Some few certainly reigned over all Egypt. Sebkhotp (Sekhotp, Σοχωτης) is a favourite name, no doubt to be connected with the god of the Fayûm. Several of the Theban kings named Antef (Enyotf) must be placed here rather than in the XIth Dynasty. A decree of one of them degrading a monarch who had sided with his enemies,was found at Coptos engraved on a doorway of Senwosri I.

The Hyksos period.

In its divided state Egypt would fall an easy prey to the foreigner. Manetho says that the Hyksos (*q.v.*) gained Egypt without a blow. Their domination must have lasted a considerable time, the Rhind mathematical papyrus having been copied in the thirty-third year of a king Apophis. The monuments and scarabs of the Hyksos kings are found throughout Upper and Lower Egypt; those of Khian somehow spread as far as Crete and Bagdad. The Hyksos, in whom Josephus recognized the children of Israel, worshipped their own Syrian deity, identifying him with the Egyptian god Seth, and endeavoured to establish his cult throughout Egypt to the detriment of the native gods. It is to be hoped that definite light may one day be forthcoming on the whole of this critical episode which had such a profound effect on the character and history of the Egyptian people. The spirited overthrow of the Hyksos ushered in the glories in arms and arts which marked the New Empire. The XVIIth Dynasty probably began the struggle, at first as semi-independent kinglets at Thebes. Seqenenrê is here a leading name; the mummy of the third Seqenenrê, the earliest in the great find of royal mummies at Deir el Bahri, shows the head frightfully hacked and split, perhaps in a battle with the Hyksos.

XVIIIth Dynasty.

The New Empire.—The epithet "new" is generally attached to this period, and "empire" instead of "kingdom" marks its wider power. The glorious XVIIIth Dynasty seems to have been closely related to the XVIIth. Its first task was to crush the Hyksos power in the north-east of the Delta; this was fully accomplished by its founder Ahmosi (dialectically Ahmasi, Amôsis or Amâsis I.) capturing their great stronghold of Avâris. Amasis next attacked them in S.W. Palestine, where he captured Sharuhen after a siege of three years. He fought also in Syria and in Nubia, besides overcoming factious opposition in his own land. The principal source for the history of this time is the biographical inscription at El Kab of a namesake of the king, Ahmosi son of Abana, a sailor and warrior whose exploits extend to the reign of Tethmôsis I. Amenophis I. (Amenhotp), succeeding Amasis, fought in Libya and Ethiopia. Tethmosis I. (*c.* 1540 B.C.) was perhaps of another family, but obtained his title to the throne through his wife Ahmosi. After some thirty years of settled rule uninterrupted by revolt, Egypt was now strong and rich enough to indulge to the full its new taste for war and lust of conquest. It had become essentially a military state. The whole of the administration was in the hands of the king with his vizier and other court officials; no trace of the feudalism of the Middle Kingdom survived. Tethmosis thoroughly subdued Cush, which had already been placed under the government of a viceroy. This province of Cush extended from Napata just below the Fourth Cataract on the south to El Kab in the north, so that it included the first three nomes of Upper Egypt, which agriculturally were not greatly superior to Nubia. Turning next to Syria, Tethmosis carried his arms as far as the Euphrates. It is possible that his predecessor had also reached this point, but no record survives to prove it. These successful campaigns were probably not very costly, and prisoners, plunder and tribute poured in from them to enrich Egypt. Tethmosis I. made the first of those great additions to the temple of the Theban Ammon at Karnak by which the Pharaohs of the Empire rendered it by far the greatest of the existing temples in the world. The temple of Deir el Bahri also was designed by him. Towards the end of his reign, his elder sons being dead, Tethmosis associated Hatshepsut, his daughter by Ahmosi, with himself upon the throne. Tethmosis I. was the first of the long line of kings to be buried in the Valley of the Tombs of the Kings of Thebes. At his death another son Tethmosis II. succeeded as the husband of his half-sister, but reigned only two or three years, during which he warred in Nubia and placed Tethmosis III., his son by a concubine Êsi, upon the throne beside him (*c.* 1500 B.C.). After her husband's death the ambitious Hatshepsut assumed the full regal power; upon her monuments she wears the masculine garb and aspect of a king though the feminine gender is retained for her in the inscriptions. On some monuments of this period her name appears alone, on others in conjunction with that of Tethmosis III., while the latter again may appear without the queen's; but this extraordinary woman must have had a great influence over her stepson and was the acknowledged ruler of Egypt. Tethmosis, to judge by the evidence of his mummy and the chronology of his reign, was already a grown man, yet no sign of the immense powers which he displayed later has come down to us from the joint reign. Hatshepsut cultivated the arts of peace. She restored the worship in those temples of Upper and Lower Egypt which had not yet recovered from the religious oppression and neglect of the Hyksos. She completed and decorated the temple of Deir el Bahri, embellishing its walls with scenes calculated to establish her claims, representing her divine origin and upbringing under the protection of Ammon, and her association on the throne by her human father. The famous sculptures of the great expedition by water to Puoni, the land of incense on the Somali coast, are also here, with many others. At Karnak Hatshepsut laboured chiefly to complete the works projected in the reigns of Tethmosis I. and II., and set up two obelisks in front of the entrance as it then was. One of these, still standing, is the most brilliant ornament of that wonderful temple. A date of the twenty-second year of her reign has been found at Sinai, no doubt counted from the beginning of the co-regency with Tethmosis I. Not much later, in his twenty-second year, Tethmosis III. is reigning alone in full vigour. While she lived, the personality of the queen secured the devotion of her servants and held all ambitions in check. Not long after her death there was a violent reaction. Prejudice against the rule of a woman, particularly one who had made her name and figure so conspicuous, was probably the cause of this outbreak, and perhaps sought justification in the fact that, however complete was her right, she had in some degree usurped a place to which her stepson (who was also her nephew) had been appointed. Her cartouches began to be defaced or her monuments hidden up by other buildings, and the same rage pursued some of her most faithful servants in their tombs. But the beauty of the work seems to have restrained the hand of the destroyer. Then came the religious fanaticism of Akhenaton, mutilating all figures of Ammon and all inscriptions containing his name; this made havoc of the exquisite monuments of Hatshepsut; and the restorers of the XIXth Dynasty, refusing to recognize the legitimacy of the queen, had no scruples in replacing her names by those of the associate kings Tethmosis I., II. or III. These acts of vandalism took place throughout Egypt, but in the distant mines of Sinai the cartouches of Hatshepsut are untouched. In the royal lists of Seti I. and Rameses II. Hatshepsut has no place, nor is her reign referred to on any later monument.[1]

Queen Hatshepsut.

Wars of Tethmosis III.

The immense energy of Tethmosis III. now found its outlet in war. Syria had revolted, perhaps on Hatshepsut's death, but by his twenty-second year the monarch was ready to lead his army against the rebels. The revolt, headed by the city of Kadesh on the Orontes, embraced the whole of western Syria. The movements of Tethmosis in this first campaign, including a battle with the Syrian chariots and infantry at Megiddo and the capture of that city, were chronicled from day to day, and an extract from this chronicle is engraved on the walls of the sanctuary of Karnak, together with a brief record of the subsequent expeditions. In a series of five carefully planned campaigns he consolidated his conquests in southern Syria and secured the ports of Phoenicia (*q.v.*). Kadesh fell in the sixth campaign. In the next year Tethmosis revisited the Phoenician ports, chastised the rebellious and received the tribute of Syria, all the while preparing for further advance, which did not take place until another year had gone by. Then, in the thirty-third year of his reign, he marched through Kadesh, fought his way to Carchemish, defeated the forces that opposed him there and crossed over the Euphrates into the territory of the king of Mitanni. He set up a tablet by the side of that of Tethmosis I. and turned southward, following the river as far as Niy Here he stayed to hunt a herd of 120 elephants, and then, marching westwards, received the tribute of Naharina and gifts from the Hittites in Asia Minor and from the king of Babylon. In all he fought seventeen campaigns in Syria until the spirit of revolt was entirely crushed in a second capture of Kadesh. The wars in Libya and Ethiopia were of less moment. In the intervals of war Tethmosis III. proved to be a wonderfully efficient administrator, with his eye on every corner of his dominions. The Syrian expeditions occupied six months in most of his best years, but the remaining time was spent in activity at home, repressing robbery and injustice, rebuilding and adorning temples with the labour of his captives and the plunder and tribute of conquered cities, or designing with his own hand the gorgeous sacred vessels of the sanctuary of Ammon. In his later years some expeditions took place into Nubia. Tethmosis died in the fifty-fourth year of his reign. His mummy, found in the *cachette* at Deir el Bahri, is said to be that of a very old man. He was the greatest Pharaoh in the New Empire if not in all Egyptian history.

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[1] The history of Hatshepsut has been very obscure, and the mutilations of her cartouches have been variously accounted for. Recent discoveries by M. Legrain at Karnak and Prof. Petrie at Sinai have limited the field of conjecture. The writer has followed M. Naville's guidance in his biography of the queen (in T. M. Davis, *The Tomb of Hatshopsitû*, London, 1906, pp. 1 et seq.), made with very full knowledge of the complicated data.

Amenophis III.

Tethmosis III. was succeeded by his son Amenophis II., whom he had associated on the throne at the end of his reign. One of the first acts of the new king was to lead an army into Syria, where revolt was again rife; he reached and perhaps crossed the Euphrates and returned home to Thebes with seven captive kings of Tikhsi and much spoil. The kings he sacrificed to Ammon and hanged six bodies on the walls, while the seventh was carried south to Napata and there exposed as a terror to the Ethiopians. Amenophis reigned twenty-six years and left his throne to his son Tethmosis IV., who is best remembered by a granite tablet recording his clearance of the Great Sphinx. He also warred in northern Syria and in Cush. His son Amenophis III., *c.* 1400 B.C., was a mighty builder, especially at Thebes, where his reign marks a new epoch in the history of the great temples, Luxor being his creation, while avenues of rams, pylons, &c., were added on a vast scale to Karnak. He married a certain Taia, who, though apparently of humble parentage, was held in great honour by her husband as afterwards by her son. Amenophis III. warred in Ethiopia, but his sway was long unquestioned from Napata to the Euphrates. Small objects with his name and that of Taia are found on the mainland and in the islands of Greece. Through the fortunate discovery of cuneiform tablets deposited by his successor in the archives at Tell el-Amarna, we can see how the rulers of the great kingdoms beyond the river, Mitanni, Assyria and even Babylonia, corresponded with Amenophis, gave their daughters to him in marriage, and congratulated themselves on having his friendship. The king of Cyprus too courted him; while within the empire the descendants of the Syrian dynasts conquered by his father, having been educated in Egypt, ruled their paternal possessions as the abject slaves of Pharaoh. A constant stream of tribute poured into Egypt, sufficient to defray the cost of all the splendid works that were executed. Amenophis caused a series of large scarabs unique in their kind to be engraved with the name and parentage of his queen Taia, followed by varying texts commemorating like medals the boundaries of his kingdom, his secondary marriage with Gilukhipa, daughter of the king of Mitanni, the formation of a sacred lake at Thebes, a great hunt of wild cattle, and the number of lions the king slew in the first ten years of his reign. The colossi known to the Greeks by the name of the Homeric hero Memnon, which look over the western plain of Thebes, represent this king and were placed before the entrance of his funerary temple, the rest of which has disappeared. His palace lay farther south on the west bank, built of crude brick covered with painted stucco. Towards the end of his reign of thirty-six years, Syria was invaded by the Hittites from the north and the people called the Khabiri from the eastern desert; some of the kinglets conspired with the invaders to overthrow the Egyptian power, while those who remained loyal sent alarming reports to their sovereign.

Amenophis IV.

Amenophis IV., son of Amenophis III. and Taia, was perhaps the most remarkable character in the long line of the Pharaohs. He was a religious fanatic, who had probably been high priest of the sun-god at Heliopolis, and had come to view the sun as the visible source of life, creation, growth and activity, whose power was demonstrated in foreign lands almost as clearly as in Egypt. Thrusting aside all the multitudinous deities of Egypt and all the mythology even of Heliopolis, he devoted himself to the cult of the visible sun-disk, applying to it as its chief name the hitherto rare word Aton, meaning "sun"; the traditional divine name Harakht (Horus of the horizon), given to the hawk-headed sun-god of Heliopolis, was however allowed to subsist and a temple was built at Karnak to this god. The worship of the other gods was officially recognized until his fifth year, but then a sweeping reform was initiated by which apparently the new cult alone was permitted. Of the old deities Ammon represented by far the wealthiest and most powerful interests, and against this long favoured deity the Pharaoh hurled himself with fury. He changed his own name from Amenhotp, "Ammon is satisfied," to Akhenaton, "pious to Aton," erased the name and figure of Ammon from the monuments, even where it occurred as part of his own father's name, abandoned Thebes, the magnificent city of Ammon, and built a new capital at El Amarna in the plain of Hermopolis, on a virgin site upon the edge of the desert. This with a large area around he dedicated to Aton in the sixth year, while splendid temples, palaces, houses and tombs for his god, for himself and for his courtiers were rising around him; apparently also this "son of Aton" swore an oath never to pass beyond the boundaries of Aton's special domain. There are signs also that the polytheistic word "gods" was obliterated on many of the monuments, but other divine names, though almost entirely excluded from Akhenaton's work, were left untouched where they already existed. In all local temples the worship of Aton was instituted. The confiscated revenues of Ammon and the tribute from Syria and Cush provided ample means for adorning Ekhaton (Akhetaton), "the horizon of Aton," the new capital, and for richly rewarding those who adopted the Aton teaching fervently. But meanwhile the political needs of the empire were neglected; the dangers which threatened it at the end of the reign of Amenophis III. were never properly met; the dynasts in Syria were at war amongst themselves, intriguing with the great Hittite advance and with the Khabiri invaders. Those who relied on Pharaoh and remained loyal as their fathers had done sent letter after letter appealing for aid against their foes. But though a general was despatched with some troops, he seems to have done more harm than good in misjudging the quarrels. At length the tone of the letters becomes one of despair, in which flight to Egypt appears the only resource left for the adherents of the Egyptian cause. Before the end of the reign Egyptian rule in Syria had probably ceased altogether. Akhenaton died in or about the seventeenth year of his reign, *c.* 1350 B.C. He had a family of daughters, who appeared constantly with him in all ceremonies, but no son. Two sons-in-law followed him with brief reigns; but the second, Tutenkhaton, soon changed his name to Tutenkhamûn, and, without abandoning Ekhaton entirely, began to restore to Karnak its ancient splendour, with new monuments dedicated to Ammon. Akhenaton's reform had not reached deep amongst the masses of the population; they probably retained all their old religious customs and superstitions, while the priesthoods throughout the country must have been fiercely opposed to the heretic's work, even if silenced during his lifetime by force and bribes. One more adherent of his named Ay, a priest, ruled for a short time, but now Aton was only one of many gods. At length a general named Harmahib, who had served under Akhenaton, came to the throne as a whole-hearted supporter of the old religion; soon Aton and his royal following suffered the fate that they had imposed upon Ammon; their monuments were destroyed and their names and figures erased, while those of Ammon were restored. From the time of Rameses II. onwards the years of the reigns of the heretics were counted to Harmahib, and Akhenaton was described as "that criminal of Akhetaton." Harmahib had to bring order as a practical man into the long-neglected administration of the country and to suppress the extortions of the official classes by severe measures. His laws to this end were engraved on a great stela in the temple of Karnak, of which sufficient remains to bear witness to his high aims, while the prosperity of the succeeding reigns shows how well he realized the necessities of the state. He probably began also to re-establish the prestige of Egypt by military expeditions in the surrounding countries.

XIXth Dynasty.

Rameses II.

Harmahib appears to have legitimated his rule by marriage to a royal princess, but it is probable that Rameses I., who succeeded as founder of the XIXth Dynasty, was not closely related to him. Rameses in his brief reign of two years planned and began the great colonnaded hall of Karnak, proving that he was a man of great ideas, though probably too old to carry them out; this task he left to his son Seti I., who reigned one year with his father and on the latter's death was ready at once to subdue the Bedouin Shasu, who had invaded Palestine and withheld all tribute. This task was quickly accomplished and Seti pushed onward to the Lebanon. Here cedars were felled for him by the Syrian princes, and the Phoenicians paid homage before he returned home in triumph. The Libyans had also to be dealt with, and afterwards Seti advanced again through Palestine, ravaged the land of the Amorites and came into conflict with the Hittites. The latter, however, were now firmly established in the Orontes valley, and a treaty with Mutallu, the king of Kheta, reigning far away in Cappadocia, probably ended the wars of Seti. In his ninth year he turned his attention to the gold mines in the eastern desert of Nubia and improved the road thither. Meanwhile the great work at Karnak projected by his father was going forward, and throughout Egypt the injuries done to the monuments by Akhenaton were thoroughly repaired; the erased inscriptions and figures were restored, not without many blunders. Seti's temple at Abydos and his galleried tomb in the Valley of the Tombs of the Kings stand out as the most splendid examples of their kind in design and in decoration. Rameses II. succeeded at an early age and reigned sixty-seven years, during which he finished much that was begun by Seti and filled all Egypt and Nubia with his own monuments, some of them beautiful, but most, necessarily entrusted to inferior workmen, of coarse execution. The excavation of the rock temple of Abu Simbel and the completion of the great hall of Karnak were his greatest achievements in architecture. His wars began in his second year, their field comprising the Nubians, the Libyans, the Syrians and the Hittites. In his fifth year, near Kadesh on the Orontes, his army was caught unprepared and divided by a strong force of chariots of the Hittites and their allies, and Rameses himself was placed in the most imminent danger, but through his personal courage the enemy was kept at bay till reinforcements came up and turned the disaster into a victory. The incidents of this episode were a favourite subject in the sculptures of his temples, where their representation was accompanied by a poetical version of the affair and other explanatory inscriptions. Kadesh, however, was not captured, and after further contests, in his twenty-first year Rameses and the Hittite king Khattusil (Kheta-sar) made peace, with a defensive alliance against foreign aggression and internal revolt (see Hittites). Thanks to Winckler's discoveries, the cuneiform text of this treaty from Boghaz Keui can now be compared with the hieroglyphic text at Karnak. In the thirty-fourth year, *c.* 1250 B.C., Khattusil with his friend or subject the king of Kode came from his distant capital to see the wonders of Egypt in person, bringing one of his daughters to be wife of the splendid Pharaoh. Rameses II. paid much attention to the Delta, which had been neglected until the days of Seti I., and resided there constantly; the temple of Tanis must have been greatly enlarged and adorned by him; a colossus of the king placed here was over 90 ft. in height, exceeding in scale even the greatest of the Theban colossi which he had erected in his mortuary temple of the Ramesseum. Towards the end of the long reign the vigilance and energy of the old king diminished. The military spirit awakened in the struggle with the Hyksos had again departed from the Egyptian nation; mercenaries from the Sudan, from Libya and from the northern nations supplied the armies, while foreigners settled in the rich lands of the Delta and harried the coasts. It was a time too when the movements of the nations that so frequently occurred in the ancient world were about to be particularly active. Mineptah, *c.* 1225 B.C., succeeding his father Rameses II., had to fight many battles for the preservation of his kingdom and empire. Apparently most of the fighting was finished by the fifth year of his reign; in his mortuary temple at Thebes he set up a stela of that date recording a great victory over the Libyan immigrants and invaders, which rendered the much harried land of Egypt safe. The last lines picture this condition with the crushing of the surrounding tribes. Libya was wasted, the Hittites pacified, Canaan, Ashkelon (Ascalon), Gezer, Yenoam sacked and plundered: "Israel is desolated, his seed is not, Khor (Palestine) has become a widow (without protector) for Egypt." The Libyans are accompanied by allies whose names, Sherden, Shekelesh, Ekwesh, Lukku, Teresh, suggest identifications with Sardinians, Sicels, Achaeans, Lycians and Tyrseni or Etruscans. The Sherden had been in the armies of Rameses II., and are distinguished by their remarkable helmets and apparently body armour of metal. The Lukku are certainly the same as the Lycians. Probably they were all sea-rovers from the shores and islands of the Mediterranean, who were willing to leave their ships and join the Libyans in raids on the rich lands of Egypt. Mineptah was one of the most unconscionable usurpers of the monuments of his predecessors, including those of his own father, who, it must be admitted, had set him the example. The coarse cutting of his cartouches contrasts with the splendid finish of the Middle Kingdom work which they disfigure. It may be questioned whether it was due to a wave of enthusiasm amongst the priests and people, leading them to rededicate the monuments in the name of their deliverer, or a somewhat insane desire of the king to perpetuate his own memory in a singularly unfortunate manner. Mineptah, the thirteenth son in the huge family of Rameses, must have been old when he ascended the throne; after his first years of reign his energies gave way, and he was followed by a quick succession of inglorious rulers, Seti II., the queen Tuosri, Amenmesse, Siptah; the names of the last two were erased from their monuments.

XXth Dynasty.

A great papyrus written after the death of Rameses III. and recording his gifts to the temples briefly reviews the conditions of these troublous times. "The land of Egypt was in the hands of chiefs and rulers of towns, great and small slaying each other; afterwards a certain Syrian made himself chief; he made the whole land tributary before him; he united his companions and plundered their property (*i.e.* of the other chiefs). They made the gods like men, and no offerings were presented in the temples. But when the gods inclined themselves to peace . . . they established their son Setenkhot (Setnekht) to be ruler of every land." Of the Syrian occupation we know nothing further. Setenkhot, *c.* 1200 B.C., had a very short reign and was not counted as legitimate, but he established a lasting dynasty (probably by conciliating the priesthood). He was father of Rameses III., who revived the glories of the empire. The dangers that menaced Egypt now were similar to those which Mineptah had to meet at his accession. Again the Libyans and the "peoples of the sea" were acting in concert. The latter now comprised Peleset (the Cretans, ancestors of the Philistines), Thekel, Shekelesh, Denyen (Danaoi?) and Weshesh; they had invaded Syria from Asia Minor, reaching the Euphrates, destroying the Hittite cities and progressing southwards, while their ships gathered plunder from the coasts of the Delta. This fleet joined the Libyan invaders, but was overthrown with heavy loss by the Egyptians, in whose ranks there actually served many Sherden and Kehaka, Sardinian and Libyan mercenaries. Egypt itself was thus clear of enemies; but the chariots and warriors of the Philistines and their associates were advancing through Syria, their families and goods following in ox-carts, and their ships accompanying them along the shore. Rameses led out his army and fleet against them and struck them so decisive a blow that the migrating swarm submitted to his rule and paid him tribute. In his eleventh year another Libyan invasion had to be met, and his suzerainty in Palestine forcibly asserted. His vigour was equal to all these emergencies and the later years of his reign were spent in peace. Rameses III., however, was not a great ruler. He was possessed by the spirit of decadence, imitative rather than originating. It is evident that Rameses II. was the model to which he endeavoured to conform, and he did not attempt to preserve himself from the weakening influences of priestcraft. To the temples he not only restored the property which had been given to them by former kings, but he also added greatly to their wealth; the Theban Ammon naturally received by far the greatest share, more than those of all the other gods together. The land held in the name of different deities is estimated at about 15% of the whole of Egypt; various temples of Ammon owned two-thirds of this, Re of Heliopolis and Ptah of Memphis being the next in wealth. His palace was at Medinet Habu on the west bank of Thebes in the south quarter; and here he built a great temple to Ammon, adorned with scenes from his victories and richly provided with divine offerings. Although Egypt probably was prosperous on the whole, there was undoubtedly great distress amongst certain portions of the population. We read in a papyrus of a strike of starving labourers in the Theban necropolis who would not work until corn was given to them, and apparently the government storehouse was empty at the time, perhaps in consequence of a bad Nile. Shortly before the death of the old king a plot in the harem to assassinate him, and apparently to place one of his sons on the throne, was discovered and its investigation ordered, leading after his death to the condemnation of many high-placed men and women. Nine kings of the name of Rameses now followed each other ingloriously in the space of about eighty years to the end of the XXth Dynasty, the power of the high priests of Ammon ever growing at their expense. At this time the Theban necropolis was being more systematically robbed than ever before. Under Rameses IX. an investigation took place which showed that one of the royal tombs before the western cliffs had been completely ransacked and the mummies burnt. Three years later the Valley of the Tombs of the Kings was attacked and the sepulchres of Seti I. and Rameses II. were robbed.

The Deltaic Dynasties; Libyan period.

The authority of the last king of the XXth Dynasty, Rameses XII., was shadowy. Hrihor, the high priest in his reign, gradually gathered into his own hands all real power, and succeeded him at Thebes, *c.* 1100 B.C., while a prince at Tanis named Smendes (Esbentêti) founded a separate dynasty in the Delta (Dynasty XXI.). From this period dates a remarkable papyrus containing the report of an envoy named Unamûn, sent to Syria by Hrihor to obtain cedar timber from Byblus. He took with him an image of Ammon to bestow life and health on the prince of Byblus, but apparently no other provision for the journey or for the negotiations beyond a letter of recommendation to Smendes and a little gold and silver. Smendes had trading ships in the Phoenician ports, but even his influence was not greater than that of other commercial or pirate centres, while Hrihor was of no account except in so far as he might pay well for the cedar wood he required. Unamûn was robbed on the voyage, the prince of Byblus rebuffed him, and when at last the latter agreed to provide the timber it was only in exchange for substantial gifts hastily sent for from Egypt (including rolls of papyrus) and the promise of more to follow. The prince, however, seems to have acknowledged to some extent the divinity of Ammon and the debt owed by Phoenicia to Egyptian culture, and pitied the many misfortunes of Unamûn. The narrative shows the feebleness of Egypt abroad. The Tanite line of kings generally had the overlordship of the high priests of Thebes; the descendants of Hrihor, however, sometimes by marriage with princesses of the other line, could assume cartouches and royal titles, and in some cases perhaps ruled the whole of Egypt. Ethiopia may have been ruled with the Thebais, but the records of the time are very scanty. Syria was wholly lost to Egypt. The mummies from the despoiled tombs of the kings were the object of much anxious care to the kings of this dynasty; after being removed from one tomb to another, they were finally deposited in a shaft near the temple of Deir el Bahri, where they remained for nearly three thousand years, until the demand for antiquities at last brought the plunderer once more to their hiding-place; eventually they were all secured for the Cairo museum, where they may now be seen.

Libyan soldiers had long been employed in the army, and their military chiefs settled in the large towns and acquired wealth and power, while the native rulers grew weaker and weaker. The Tanite dynasty may have risen from a Libyan stock, though there is nothing to prove it; the XXIInd Dynasty are clearly from their names of foreign extraction, and their genealogy indicates distinctly a Libyan military origin in a family of rulers of Heracleopolis Magna, in Middle Egypt. Sheshonk (Shishak) I., the founder of the dynasty, *c.* 950 B.C., seems to have fixed his residence at Bubastis in the Delta, and his son married the daughter of the last king of the Tanite dynasty. Heracleopolis seems henceforth for several centuries to have been capital of Middle Egypt, which was considered as a more or less distinct province. Sheshonk secured Thebes, making one of his sons high priest of Ammon, and whereas Solomon appears to have dealt with a king of Egypt on something like an equal footing, Sheshonk re-established Egyptian rule in Palestine and Nubia, and his expedition in the fifth year of Rehoboam subdued Israel as well as Judah, to judge by the list of city names which he inscribed on the wall of the temple of Karnak. Osorkon I. inherited a prosperous kingdom from his father, but no further progress was made. It required a strong hand to curb the Libyan chieftains, and divisions soon began to show themselves in the kingdom. The XXIInd Dynasty lasted through many generations; but there were rival kings, and M. Legrain thinks that he has proof that the XXIIIrd Dynasty was contemporaneous with the end of the XXIInd. The kings of the XXIIIrd Dynasty had little hold upon the subject princes, who spent the resources of the country in feuds amongst themselves. A native kingdom had meanwhile been established in Ethiopia. Our first knowledge of it is at this moment, when the Ethiopian king Pankhi already held the Thebais. The energetic prince of Sais, Tefnakht, followed by most of the princes of the Delta, subdued most of Middle Egypt, and by uniting these forces threatened the Ethiopian border. Heracleopolis Magna, however, with its petty king Pefteuaubasti, held out against Tefnakht, and Pankhi coming to its aid not only drove Tefnakht out of Middle Egypt, but also captured Memphis and received the submission of the princes and chiefs; in all these included four "kings" and fourteen other chiefs. According to Diodorus the Ethiopian state was theocratic, ruled through the king by the priests of Ammon. The account is probably exaggerated; but even in Pankhi's record the piety of the king, especially towards Ammon, is very marked.

Ethiopian Dynasty.

The XXIVth Dynasty consisted of a single Saite king named Bocchoris (Bekerrinf), son of Tefnachthus, apparently the above Tefnakht. Another Ethiopian invader, Shabako (Sabacon), is said to have burnt Bocchoris alive. The Ethiopian rule of the XXVth Dynasty was now firmly established, and the resources of the two countries together might have been employed in conquest in Syria and Phoenicia; but at this very time the Assyrian empire, risen to the highest pitch of military greatness, began to menace Egypt. The Ethiopian could do no more than encourage or support the Syrians in their fight for freedom against Sargon and Sennacherib. Shabako was followed by Shebitku and Shebitku by Tirhaka

(Tahrak, Taracos). Tirhaka was energetic in opposing the Assyrian advance, but in 670 B.C. Esarhaddon defeated his army on the border of Egypt, captured Memphis with the royal harem and took great spoil. The Egyptian resistance to the Assyrians was probably only half-hearted; in the north especially there must have been a strong party against the Ethiopian rule. Tirhaka laboured to propitiate the north country, and probably rendered the Ethiopian rule acceptable throughout Egypt. Notwithstanding, the Assyrian king entrusted the government and collection of tribute to the native chiefs; twenty princes in all are enumerated in the records, including one Assyrian to hold the key of Egypt at Pelusium. Scarcely had Esarhaddon withdrawn before Tirhaka returned from his refuge in the south and the Assyrian garrisons were massacred. Esarhaddon promptly prepared a second expedition, but died on the way to Egypt in 668 B.C.; his son Assur-bani-pal sent it forward, routed Tirhaka and reinstated the governors. At the head of these was Necho (Niku), king of Sais and Memphis, father of Psammetichus, the founder of the XXVIth Dynasty. We next hear that correspondence with Tirhaka was intercepted, and that Necho, together with Pekrûr of Psapt (at the entrance to the Wadi Tumilat) and the Assyrian governor of Pelusium, was taken to Nineveh in chains to answer the charge of treason. Whatever may have occurred, it was deemed politic to send Necho back loaded with honours and surrounded by a retinue of Assyrian officials. Upper Egypt, however, was loyal to Tirhaka, and even at Memphis the burial of an Apis bull was dated by the priests as in his reign. Immediately afterwards he died. His nephew Tandamane, received by the Upper country with acclamations, besieged and captured Memphis, Necho being probably slain in the encounter. But in 661 (?) Assur-bani-pal drove the Ethiopian out of Lower Egypt, pursued him up the Nile and sacked Thebes. This was the last and most tremendous visitation of the Assyrian scourge.

XXVIth Dynasty.

Psammetichus (Psammêtk), 664–610 B.C., the son of Necho, succeeded his father as a vassal of Assyria in his possessions of Memphis and Sais, allied himself with Gyges, king of Lydia, and aided by Ionian and Carian mercenaries, extended and consolidated his power.[1] By the ninth year of his reign he was in full possession of Thebes. Assur-bani-pal's energies throughout this crisis were entirely occupied with revolts nearer home, in Babylon, Elam and Arabia. The Assyrian arms again triumphed everywhere, but at the cost of complete exhaustion. Under the firm and wise rule of Psammetichus, Egypt recovered its prosperity after the terrible losses inflicted by internal wars and the decade of Assyrian invasions. The revenue went up by leaps and bounds. Psammetichus guarded the frontiers of Egypt with three strong garrisons, placing the Ionian and Carian mercenaries especially at the Pelusiac Daphnae in the N.E., from which quarter the most formidable enemy was likely to appear. The Assyrians did not move against him, but a great Scythian horde, destroying all before it in its southward advance, is said by Herodotus to have been turned back by presents and entreaties. Diplomacy backed up by vigorous preparations may have deterred the Scythians from the dangerous enterprise of crossing the desert to Egypt. Before his death Psammetichus had advanced into southern Palestine and captured Azotus.

When Psammetichus began to reign the situation of Egypt was very different from what it had been under the Empire. The development of trade in the Mediterranean and contact with new peoples and new civilizations in peace and war had given birth to new ideas among the Egyptians and at the same time to a loss of confidence in their own powers. The Theban supremacy was gone and the Delta was now the wealthy and progressive part of Egypt; piety increased amongst the masses, unenterprising and unwarlike, but proud of their illustrious antiquity. Thebes and Ammon and the traditions of the Empire savoured too much now of the Ethiopian; the priests of the Memphite and Deltaic dynasty thereupon turned deliberately for their models to the times of the ancient supremacy of Memphis, and the sculptures and texts on tomb and temple had to conform as closely as possible to those of the Old Kingdom. In other than religious matters, however, the Egyptians were inventing and perhaps borrowing. To enumerate a few examples of this which are already definitely known: we find that the forms of legal and business documents became more precise; the mechanical arts of casting in bronze on a core and of moulding figures and pottery were brought to the highest pitch of excellence; and portraiture in the round on its highest plane was better than ever before and admirably lifelike, revealing careful study of the external anatomy of the individual.

Psammetichus died in the fifty-fourth year of his reign and was succeeded by his son Necho, 610–594 B.C. Taking advantage of the helpless state of the Assyrians, whose capital was assailed by the Medes and the Babylonians, the new Pharaoh prepared an expedition to recover the ancient possessions of the Empire in Syria. Josiah alone, faithful to the king of Assyria, opposed him with his feeble force at Megiddo and was easily overcome and slain. Necho went forward to the Euphrates, put the land to tribute, and, in the case of Judah at any rate, filled the throne with his own nominee (see JEHOIAKIM). The fall of Nineveh and the division of the spoil gave to Nabopolasser, king of Babylon, the inheritance of the Assyrians in the west, and he at once despatched his son Nebuchadrezzar to fight Necho. The Babylonian and Egyptian forces met at Carchemish (605), and the rout of the latter was so complete that Necho relinquished Syria and might have lost Egypt as well had not the death of Nabopolasser recalled the victor to Babylon. Herodotus relates that in Necho's reign a Phoenician ship despatched from Egypt actually circumnavigated Africa, and the attempt was made to complete a canal through the Wadi Tumilat, which connected the Mediterranean and Red Seas by way of the Lower Egyptian Nile. (See SUEZ.) The next king, Psammetichus II., 594–589 B.C., according to one account made an expedition to Syria or Phoenicia, and apparently sent a mercenary force into Ethiopia as far as Abu Simbel. Pharaoh Hophra (Apries), 589–570 B.C., fomented rebellion against the Babylonian suzerainty in Judah, but accomplished little there. Herodotus, however, describes his reign as exceedingly prosperous. The mercenary troops at Elephantine mutinied and attempted to desert to Ethiopia, but were brought back and punished. Later, however, a disastrous expedition sent to aid the Libyans against the Greek colony of Cyrene roused the suspicion and anger of the native soldiery at favours shown to the mercenaries, who of course had taken no part in it. Amasis (Ahmosi) II. was chosen king by the former (570–525 B.C.), and his swarm of adherents overcame the Greek troops in Apries' pay (see AMASIS). None the less Amasis employed Greeks in numbers, and cultivated the friendship of their tyrants. His rule was confined to Egypt (and perhaps Cyprus), but Egypt itself was very prosperous. At the beginning of his long reign of forty-four years he was threatened by Nebuchadrezzar; later he joined the league against Cyrus and saw with alarm the fall of his old enemy. A few months after his death, 525 B.C., the invading host of the Persians led by Cambyses reached Egypt and dethroned his son Psammetichus III.

The Persian period, XXVIIth Dynasty.

Cambyses at first conciliated the Egyptians and respected their religion; but, perhaps after the failure of his expedition into Ethiopia, he entirely changed his policy, and his memory was generally execrated. He left Egypt so completely crushed that the subsequent usurpation of the Persian throne was marked by no revolt in that quarter. Darius, 521–486 B.C., proved himself a beneficent ruler, and in a visit to Egypt displayed his consideration for the religion of the country. In the Great Oasis he built a temple to Ammon. The annual tribute imposed on the satrapy of Egypt and Cyrene was heavy, but it was probably raised with ease. The canal from the Nile to the Red Sea was completed or repaired, and commerce flourished. Documents dated in the thirty-fourth and thirty-fifth years of Darius are not uncommon, but apparently at the very end of his reign, some years after the disaster of Marathon, Egypt was induced to rebel. Xerxes, 486–467 B.C., who put down the revolt with severity, and his successor Artaxerxes, 466–425 B.C., like Cambyses, were hateful to the Egyptians. The disorders which marked the accession of Artaxerxes gave Egypt another opportunity to rebel. Their leaders were Inaros the Libyan of Marea and the Egyptian Amyrtaeus. Aided by an Athenian force, Inaros slew the satrap Achaemenes at the battle of Papremis and destroyed his army; but the garrison of Memphis held out and a fresh host from Persia raised the siege and in turn besieged the Greek and Egyptian forces on the island of Papremis. At last, after two years, having diverted the river from its channel, they captured and burnt the Athenian ships and quickly ended the rebellion. The reigns of Xerxes II. and Darius II. are marked by no recorded incident in Egypt until a successful revolt about 405 B.C. interrupted the Persian domination.

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[1] This, it may be remarked, is the time vaguely represented by the Dodecarchy of Herodotus.

Monuments of the Persian rule in Egypt are exceedingly scanty. The inscriptions of Pefteuauneit, priest of Neith at Sais, and from his position the native authority who was most likely to be consulted by Cambyses and Darius, tells of his relations with these two kings. For the following reigns Egyptian documents hardly exist, but some papyri written in Aramaic have been found at Elephantine and at Memphis. Those from the former locality show that a colony of Jews with a temple dedicated to Yahweh (Jehovah) had established themselves at that garrison and trading post (see ASSUAN). Herodotus visited Egypt in the reign of Artaxerxes, about 440 B.C. His description of Egypt, partly founded on Hecataeus, who had been there about fifty years earlier, is the chief source of information for the history of the Saite kings and for the manners of the times, but his statements prove to be far from correct when they can be checked by the scanty native evidence. (F Ll. G.)

Dynasties XXVIII.-XXXI.

Amyrtaeus (Amnertais) of Sais, perhaps a son of Pausiris and grandson of the earlier Amyrtaeus, revolted from Darius II. *c.* 405 B.C., and Egypt regained its independence for about sixty years. The next king Nefeurēt (Nepherites I.) was a Mendesian and founded the XXIXth Dynasty. After Hakor and Nefeurēt II. the sovereignty passed to Dynasty XXX., the last native Egyptian line. Monuments of all these kings are known, and art flourished particularly under the Mendesian kings Nekhtharheb (Nectanebes or Nectanebus I.) and Nekhtnebf (Nectanebes II.). The former came to the throne when a Persian invasion was imminent, 378 B.C. Hakor had already formed a powerful army, largely composed of Greek mercenaries. This army Nekhtharheb entrusted to the Athenian Chabrias. The Persians, however, succeeded in causing his recall and in gaining the services of his fellow-countryman Iphicrates. The invading army consisted of 200,000 barbarians under Pharnabazus and 20,000 Greeks under Iphicrates. After the Egyptians had experienced a reverse, Iphicrates counselled an immediate advance on Memphis. His advice was not followed by Pharnabazus; the Egyptian king collected his forces and won a pitched battle near Mendes. Pharnabazus retreated and Egypt was free.

Nekhtharheb was succeeded by Tachos or Teos, whose short reign was occupied by a war with Persia, in which the king of Egypt secured the services of a body of Greek mercenaries under the Spartan king Agesilaus and a fleet under the Athenian general Chabrias. He entered Phoenicia with every prospect of success, but having offended Agesilaus he was dethroned in a military revolt which gave the crown to Nekhtnebf or Nectanebes II., the last native king of Egypt. At this moment a revolt broke out. The prince of Mendes almost succeeded in overthrowing the new king. Agesilaus defeated the rival pretender and left Nekhtnebf established on the throne. But the opportunity of a decisive blow against Persia was lost. The new king, Artaxerxes III. Ochus, determined to reduce Egypt A first expedition was defeated by the Greek mercenaries of Nekhtnebf, but a second, commanded by Ochus himself, subdued Egypt with no further resistance than that of the Greek garrison of Pelusium. Nekhtnebf, instead of endeavouring to relieve them, retreated to Memphis and fled thence to Ethiopia, 340 (?) B.C. Thus miserably fell the monarchy of the Pharaohs, after an unexampled duration of 3000 years, or as some think far longer. More than 2000 years have since passed, and though Egypt has from time to time been independent, not one native prince has sat on the throne of the Pharaohs. "There shall be no more a prince of the land of Egypt" (Ezek. xxx. 13) was prophesied in the days of Apries as the final state of the land.

Ochus treated his conquest barbarously. From this brief re-establishment of Persian dominion (counted by Manetho as Dynasty XXXI.) no document survives except one papyrus that appears to be dated in the reign of Darius III.

See J. H. Breasted, *A History of Egypt from the Earliest Times to the Persian Conquest* (New York and London, 1905); *A History of the Ancient Egyptians* (New York and London, 1908); *Ancient Records of Egypt: Historical Documents from the Earliest Times to the Persian Conquest, collected, edited and translated* (5 vols., Chicago, 1906–1907); W. M. F. Petrie, *A History of Egypt* (from the earliest times to the XXXth Dynasty) (3 vols., London, 1899–1905); E. A. W. Budge, *A History of Egypt*, vols. i-vii. (London, 1902); G. Maspero, *Histoire ancienne des peuples de l'orient* (6th ed., 1904), *The Dawn of Civilization, The Struggle of the Nations, The Passing of the Empires* (London, 1904, &c.); P. E. Newberry and J. Garstang, *A Short History of Ancient Egypt* (London, 1904); G. Steindorff, *Die Blütezeit des Pharaonenreiches* (*Dyn. XVIII.*) (Bielefeld and Leipzig, 1900); H. Winckler, *The Tell el Amarna Letters* (Berlin, London and New York, 1896).

The Conquest by Alexander.—When, in 332 B.C., after the battle of Issus, Alexander entered Egypt, he was welcomed as a deliverer. The Persian governor had not forces enough to oppose him, and he nowhere experienced even the show of resistance. He visited Memphis, founded Alexandria, and went on pilgrimage to the oracle of Ammon (Oasis of Siwa). The god declared him to be his son, renewing thus an old Egyptian convention or belief; Olympias was supposed to have been in converse with Ammon, even as the mothers of Hatshepsut and Amenophis III. are represented in the inscriptions of the Theban temples to have received the divine essence. At this stage of his career the treasure and tribute of Egypt were of great importance to the Macedonian conqueror. He conciliated the inhabitants by the respect which he showed for their religion; he organized the government of the natives under two officers, who must have been already known to them (of these Petisis, an Egyptian, soon resigned his share into the charge of his colleague Doloaspis, who bears a Persian name.) But Alexander designed his Greek foundation of Alexandria to be the capital, and entrusted the taxation of Egypt and the control of its army and navy to Greeks. Early in 331 B.C. he was ready to depart, and led his forces away to Phoenicia. A granite gateway to the temple of Khnûm at Elephantine bears his name in hieroglyphic, and demotic documents are found dated in his reign.

The Ptolemaic Period.—On the division of Alexander's dominions in 323 B.C., Egypt fell to Ptolemy the son of Lagus, the founder of the Ptolemaic dynasty (see PTOLEMIES). Under these rulers the rich kingdom was heavily taxed to supply the sinews of war and to support every kind of lavish expenditure. Officials, and the higher ones were nearly all Greeks, were legion, but the whole system was so judiciously worked that there was little discontent amongst the patient peasantry. During the reign of Philadelphus the land gained from the bed of the lake of Moeris was assigned to veteran soldiers; the great armies of the Ptolemies were rewarded or supported by grants of farm lands, and men of Macedonian, Greek and Hellenistic extraction were planted in colonies and garrisons or settled themselves in the villages throughout the country. Upper Egypt, farthest from the centre of government, was probably least affected by the new influences, though the first Ptolemy established the Greek colony of Ptolemais to be its capital. Intermarriages, however, gradually had their effect; after the revolt of the natives in the reign of Ptolemy V., we find the Greek and Egyptian elements closely intermingled. Ptolemy I. had established the cult of the Memphite Serapis in a Graeco-Egyptian form, affording a common ground for native and Hellenistic worshippers. The greater number of the temples to the native deities in Upper Egypt and in Nubia (to 50 m. south of the Cataract, within the Dodecaschoenus) were built under the Ptolemies. No serious effort was made to extend the Ptolemaic rule into Ethiopia, and Ergamenes, the Hellenizing king of Ethiopia, was evidently in alliance with Philopator; in the next reign two native kings, probably supported by Ethiopia, reigned in succession at Thebes. That famous city lost all except its religious importance under the Ptolemies; after the "destruction" or dismantling by Lathyrus it formed only a series of villages. The population of Egypt in the time of Ptolemy I. is put at 7,000,000 by Diodorus, who also says that it was greater then than it ever was before; at the end of the dynasty, in his own day, it was not much less though somewhat diminished. Civil wars and revolts must have greatly injured both Upper and Lower Egypt. It is remarkable that, while the building and decoration of temples continued in the reigns of Ptolemy Auletes and the later Ptolemies and Cleopatra, papyri of those times whether Greek or Egyptian are scarcely to be found.

The Roman Period.—In 30 B.C. Augustus took Egypt as the prize of conquest. He treated it as a part of his personal domain, free from any interference by the senate. In the main lines the Ptolemaic organization was preserved, but Romans were gradually introduced into the highest offices. On Egypt Rome depended for its supplies of corn; entrenched there, a revolting general would be difficult to attack, and by simply holding back the grain ships could threaten Rome with starvation. No senator therefore was permitted to take office or even to set foot in the country without the emperor's special leave, and by way of precaution the highest position, that of prefect, was filled by a Roman of equestrian rank only. As the representative of the emperor, this officer assumed the place occupied by the king under the old order, except that his power was limited by the right of appeal to Caesar. The first prefect, Cornelius Gallus, tamed the natives of Upper Egypt to the new yoke by force of arms, and meeting ambassadors from Ethiopia at Philae, established a nominal protectorate of Rome over the frontier district, which had been abandoned by the later Ptolemies. The third prefect, Gaius Petronius, cleared the neglected canals for irrigation; he also repelled an invasion of the Ethiopians and pursued them far up the Nile, finally storming the capital of Napata. But no attempt was made to hold Ethiopia. In succeeding reigns much trouble was caused by jealousies and quarrels between the Greeks and the Jews, to whom Augustus had granted privileges as valuable as those accorded to the Greeks. Aiming at the spice trade, Aelius Gallus, the second prefect of Egypt under Augustus, had made an unsuccessful expedition to conquer Arabia Felix; the valuable Indian trade, however, was secured by Claudius for Egypt at the expense of Arabia, and the Red Sea routes were improved. Nero's reign especially marks the commencement of an era of prosperity which lasted about a century. Under Vespasian the Jewish temple at Leontopolis in the Delta, which Onias had founded in the reign of Ptolemy Philometor, was closed; worse still, a great Jewish revolt and massacre of the Greeks in the reign of Trajan resulted, after a stubborn conflict of many months with the Roman army under Marcius Livianus Turbo, in the virtual extermination of the Jews in Alexandria and the loss of all their privileges. Hadrian, who twice visited Egypt (A.D. 130, 134), founded Antinoë in memory of his drowned favourite. From this reign onwards buildings in the Graeco-Roman style were erected throughout the country. A new Sothic cycle began in A.D. 139. Under Marcus Aurelius a revolt of the Bucolic or native troops recruited for home service was taken up by the whole of the native population and was suppressed only after several years of fighting. The Bucolic war caused infinite damage to the agriculture of the country and marks the beginning of its rapid decline under a burdensome taxation. The province of Africa was now of equal importance with Egypt for the grain supply of the capital. Avidius Cassius, who led the Roman forces in the war, usurped the purple, and was acknowledged by the armies of Syria and Egypt. On the approach of Marcus Aurelius, the adherents of Cassius slew him, and the clemency of the emperor restored peace. After the downfall of the house of the Antonines, Pescennius Niger, who commanded the forces in Egypt, was proclaimed emperor on the death of Pertinax (A.D. 193). Severus overthrew his rival (A.D. 194) and, the revolt having been a military one, did not punish the province; in 202 he gave a constitution to Alexandria and the nome capitals. In his reign the Christians of Egypt suffered the first of their many persecutions. When Christianity was planted in the country we do not know, but it must very early have gained adherents among the learned Jews of Alexandria, whose school of thought was in some respects ready to welcome it. From them it rapidly passed to the Greeks. Ultimately the new religion spread to the Egyptians; their own creed was worn out, and they found in Christianity a doctrine of the future life for which their old belief had made them not unready; while the social teaching of Christianity came with special fitness to a subject race. The history of the Coptic Version has yet to be written. It presents some features of great antiquity, and, unlike all others, has the truly popular character of being written in the three dialects of the language. Side by side there grew up an Alexandrian church, philosophic, disputative, ambitious, the very centre of Christian learning, and an Egyptian church, ascetic, contemplative, mystical. The two at length influenced one another; still we can generally trace the philosophic teachers to a Greek origin, the mystics to an Egyptian.

Christianity.

Caracalla, in revenge for an affront, massacred all the men capable of bearing arms in Alexandria. His granting of the Roman citizenship to all Egyptians in common with the other provincials was only to extort more taxes. Under Decius, A.D. 250, the Christians again suffered from persecution. When the empire broke up in the weak reign of Gallienus, the prefect Aemilianus, who took the surname Alexander or Alexandrinus, was made emperor by the troops at Alexandria, but was conquered by the forces of Gallienus. In his brief reign of only a few months he had driven back an invasion of the Blemmyes. This predatory tribe, issuing from Nubia, was long to be the terror of Upper Egypt. Zenobia, queen of Palmyra, after an unsuccessful invasion, on a second attempt conquered Egypt, which she added to her empire, but lost it when Aurelian made war upon her (A.D. 272). The province was, however, unsettled, and the conquest of Palmyra was followed in the same year by the suppression of a revolt in Egypt (A.D. 273). Probus, who had governed Egypt for Aurelian and Tacitus, was subsequently chosen by the troops to succeed Tacitus, and is the first governor of this province who obtained the whole of the empire. He expelled the Blemmyes, who were dominating the whole of the Thebaid. Diocletian invited the Nobatae to settle in the Dodecaschoenus as a barrier against their incursions, and subsidized both Blemmyes and Nobatae. The country, however, was still disturbed, and in A.D. 296 a formidable revolt broke out, led by Achilleus, who as emperor took the name Domitius Domitianus. Diocletian, finding his troops unable to determine the struggle, came to Egypt, captured Alexandria and put his rival to death (296). He then reorganized the whole province, and the well-known "Pompey's Pillar" was set up by the grateful and repentant Alexandrians to commemorate his gift to them of part of the corn tribute.

The Coptic era of Diocletian or of the Martyrs dates from the accession of Diocletian (A.D. 284). The edict of A.D. 303 against the Christians, and those which succeeded it, were rigorously carried out in Egypt, where Paganism was still strong and face to face with a strong and united church. Galerius, who succeeded Diocletian in the government of the East, implacably pursued his policy, and this great persecution did not end until the persecutor, perishing, it is said, of the dire malady of Herod and Philip II. of Spain, sent out an edict of toleration (A.D. 311).

By the edict of Milan (A.D. 313), Constantine, with the agreement of his colleague Licinius, acknowledged Christianity as having at least equal rights with other religions, and when he gained sole power he wrote to all his subjects advising them, like him, to become Christians (A.D. 324). The Egyptian Church, hitherto free from schism, was now divided by a fierce controversy, in which we see two Greek parties, rather than a Greek and an Egyptian, in conflict. The council of Nicaea was called together (A.D. 325) to determine between the Orthodox and the party of the Alexandrian presbyter Arius. At that council the native Egyptian bishops were chiefly remarkable for their manly protest against enforcing celibacy on the clergy. The most conspicuous controversialist on the Orthodox side was the young Alexandrian deacon Athanasius, who returned home to be made archbishop of Alexandria (A.D. 326). After being four times expelled by the Arians, and once by the emperor Julian, he died, A.D. 373, at the moment when an Arian persecution began. So large a proportion of the population had taken religious vows that under Valens it became necessary to abolish the privilege of monks which exempted them from military service. The reign of Theodosius I. witnessed the overthrow of Arianism, and this was followed by the suppression of Paganism, against which a final edict was promulgated A.D. 390. In Egypt, the year before, the temple of Serapis at Alexandria had been captured after much bloodshed by the Christian mob and turned into a church. Generally the Coptic Christians were content to build their churches within the ancient temples, plastering over or effacing the sculptures which were nearest to the ground and in the way of the worshippers. They do not seem to have been very zealous in the work of destruction; the native religion was already dead and they had no fear of it. The prosperity of the church was the sign of its decay, and before long we find persecution and injustice disgracing the seat of Athanasius. Cyril, the patriarch of Alexandria (A.D. 415), expelled the Jews from the capital with the aid of the mob, and by the murder of the beautiful philosopher Hypatia marked the lowest depth to which ignorant fanaticism could descend. A schism now produced lengthened civil war and alienated Egypt from the empire. The distinction between religion and politics seemed to be lost, and the government grew weaker and weaker. The system of local government by citizens had now entirely disappeared. Offices, with new Byzantine names, were now almost hereditary in the wealthy land-owning families. The Greek rulers of the Orthodox faith were unable to protect the tillers of the soil, and these, being of the Monophysite persuasion and having their own church and patriarch, hated the Orthodox patriarch (who from the time of Justinian onwards was identical with the prefect) and all his following. Towards the middle of the 5th century, the Blemmyes, quiet since the reign of Diocletian, recommenced their incursions, and were even joined in them by the Nobatae. These tribes were twice brought to account severely for their misdoings, but not effectually checked. It was in these circumstances that Egypt fell without a conflict when attacked by Chosroës (A.D. 616). After ten years of Persian dominion the success of Heraclius restored Egypt to the empire, and for a time it again received a Greek governor. The Monophysites, who had taken advantage of the Persian occupation, were persecuted and their patriarch expelled. The Arab conquest was welcomed by the native Christians, but with it they ceased to be the Egyptian nation. Their language is still used in their churches, but it is no longer spoken, and its literature, which is wholly ecclesiastical, has been long unproductive.

The decline of Egypt was due to the purely military government of the Romans, and their subsequent alliance with the Greek party of Alexandria, which never represented the country. Under weak emperors, the rest of Egypt was exposed to the inroads of savages, and left to fall into a condition of barbarism. Ecclesiastical disputes tended to alienate both the native population and the Alexandrians. Thus at last the country was merely held by armed force, and the authority of the governor was little recognized beyond the capital, except where garrisons were stationed. There was no military spirit in a population unused to arms, nor any disinclination to be relieved from an arbitrary and persecuting rule. Thus the Moslem conquest was easy.

BIBLIOGRAPHY.—*Hellenistic Period.*—See the special articles ALEXANDRIA, &c., and especially PTOLEMIES; J. P. Mahaffy, *The Empire of the Ptolemies* (London, 1895), *A History of Egypt under the Ptolemaic Dynasty* (London, 1899); A. Bouché-Leclercq, *Histoire des Lagides* (4 vols., Paris, 1903-   ); E. A. W. Budge, *A History of Egypt*, vols. vii.-viii. (London, 1902); J. G. Milne, *A History of Egypt under Roman Rule* (London, 1898); E. Gibbon, *Decline and Fall of the Roman Empire* (edited by J. B. Bury) (London, 1900). The administration and condition of Egypt under the Ptolemaic and Roman rules are abundantly illustrated in recently discovered papyri, see especially the English publications of B. P. Grenfell and A. S. Hunt (*Memoirs of the Graeco-Roman Branch of the Egypt Exploration Fund*) and F. G. Kenyon (British Museum Catalogues); also Mr Kenyon's annual summaries in the *Archaeological Report of the Egypt Exploration Fund*. An ample selection of the Greek inscriptions from Egypt is to be found in W. Dittenberger, *Orientis Graeci inscriptiones selectae* (2 vols., Leipzig, 1903-1905).

(R. S. P.; F. LL. G.)

2. *Mahommedan Period.*

(1) *Moslem Conquest of Egypt.*—In accordance with the scheme of universal conquest conceived by the founder of Islam, an army of some 4000 men was towards the end of the year A.D. 639 sent against Egypt under the command of 'Amr (see 'AMR-IBN-EL-ASS), by the second caliph, Omar I., who had some doubt as to the expediency of the enterprise. The commander marched from Syria through El-'Arish, easily took Farama or Pelusium, and thence proceeded to Bilbeis, where he was delayed for a month; having captured this place, he proceeded to a point on the Nile called Umm Dunain, the siege of which also occasioned him some difficulty. After taking it, he crossed the Nile to the Fayum. On the 6th of June of the following year (640) a second army of 12,000 men, despatched by Omar, arrived at Heliopolis (On). 'Amr recrossed the river and joined it, but presently was confronted by a Roman army, which he defeated at the battle of Heliopolis (July 640); this victory was followed by the siege of Babylon, which after some futile attempts at negotiation was taken partly by storm and partly by capitulation on Good Friday, the 6th of April 641. 'Amr next proceeded in the direction of Alexandria, which was surrendered to him by a treaty signed on the 8th of November 641, under which it was to be occupied by the Moslems on the 29th of September of the following year. The interval was spent by him in founding the city Fostat (Fusṭāṭ), near the modern Cairo, and called after the camp (*Fossatum*) occupied by him while besieging Babylon; and in reducing those coast towns that still offered resistance. The Thebaid seems to have surrendered with scarcely any opposition.

The ease with which this valuable province was wrenched from the Roman empire appears to have been due to the treachery of the governor of Egypt, Cyrus, patriarch of Alexandria, and the incompetence of the generals of the Roman forces. The former, called by the Arabs Mukaukis (Muqauqis) from his Coptic name Pkauchios, had for ten years before the arrival of 'Amr maintained a fierce persecution of the Jacobite sect, to which the bulk of the Copts belonged. During the siege of Babylon he had been recalled and exiled, but after the death of Heraclius had been reinstated as patriarch by Heraclonas, and been welcomed back to Alexandria with general rejoicing in September 641. Since Alexandria could neither have been stormed nor starved out by the Arabs, his motives for surrendering it, and with it the whole of Egypt, have been variously interpreted, some supposing him to have been secretly a convert to Islam. The notion that the Arab invaders were welcomed and assisted by the Copts, driven to desperation by the persecution of Cyrus, appears to be refuted by the fact that the invaders treated both Copts and Romans with the same ruthlessness; but the dissensions which prevailed in the Christian communities, leading to riots and even civil war in Alexandria and elsewhere, probably weakened resistance to the common enemy. An attempt was made in the year 645 with a force under Manuel, commander of the Imperial forces, to regain Alexandria for the Byzantine empire; the city was surprised, and held till the summer of 646, when it was again stormed by 'Amr. In 654 a fleet was equipped by Constans with a view to an invasion, but it was repulsed, and partly destroyed by storm. From that time no serious effort was made by the Eastern Empire to regain possession of the country. And it would appear that at the time of the attempt by Manuel the Arabs were actually assisted by the

Copts, who at the first had found the Moslem lighter than the Roman yoke.

Terms of capitulation.

A question often debated by Arabic authors is whether Egypt was taken by storm or capitulation, but, so far as the transference of the country was accomplished by the first taking of Alexandria, there seems no doubt that the latter view is correct. The terms were those on which conquered communities were ordinarily taken under Moslem protection. In return for a tribute of money (*jizyah*) and food for the troops of occupation (*ḍarībat-al-ṭa'ām*), the Christian inhabitants of Egypt were to be excused military service, and to be left free in the observance of their religion and the administration of their affairs.

From 639 to 968 Egypt was a province of the Eastern Caliphate, and was ruled by governors sent from the cities which at different times ranked as capitals. Like other provinces of the later Abbasid Caliphate its rulers were, during this period, able to establish quasi-independent dynasties, such being those of the Tulunids who ruled from 868 to 905, and the Ikshidis from 935–969. In 969 the country was conquered by Jauhar for the Fatimite caliph Mo'izz, who transferred his capital from Mahdia (*q.v.*) in the Maghrib to Cairo. This dynasty lasted till 1171, when Egypt was again embodied in the Abbasid empire by Saladin, who, however, was himself the founder of a quasi-independent dynasty called the Ayyubites or Ayyubids, which lasted till 1252. The Ayyubites were followed by the Mameluke dynasties, usually classified as Bahri from 1252–1382, and Burji from 1382–1517; these sovereigns were nominally under the suzerainty of Abbasid caliphs, who were in reality instruments of the Mameluke sultans, and resided at Cairo. In 1517 Egypt became part of the Ottoman empire and was governed by pashas sent from Constantinople, whose influence about 1707 gave way to that of officials chosen from the Mamelukes who bore the title Sheik al-balad. After the episode of the French occupation, government by pashas was restored; Mehemet Ali (appointed pasha in 1805) obtained from the Porte in 1841 the right to bequeath the sovereignty to his descendants, one of whom, Ismail Pasha, received the title Khedive, which is still held by Mehemet Ali's descendants.

(2) The following is a list of the governors of Egypt in these successive periods:—

(a) *During the undivided Caliphate.*

'Amr-ibn-el-Ass, A.H. 18–24 (A.D. 639–645).
'Abdallah b. Sa'd b. Abī Sarh, 24–36 (645–656).
Qais b. Sa'd b. 'Ubādah, 36 (657–658).
Mahommed b. Abu Bekr, 37–38 (658).
Ashtar Mālik b. al-Hārith appointed, but never governed).
'Amr-ibn-el-Ass, 38–43 (658–663).
'Utbah b. Abu Sofiān, 43–44 (664–665).
'Utbah b. 'Āmir, 44–45 (665).
Maslama b. Mukhallad, 45–62 (665–682).
Sa'īd b. Yazīd b. 'Alqamah, 62–64 (682–684).
Abdarrahman b. 'Utbah b. Jahdam, 64–65 (684).
Abdalazīz ('Abd al-'Azīz) b. Merwān, 65–86 (685–705).
'Abdallah b. 'Abd al-Malik, 86–90 (705–708).
Qurrah b. Sharik al-'Absī, 90–96 (709–714).
'Abd al-Malik b. Rifā'ah al-Fahmī, 96–99 (715–717).
Ayyūb b. Shurahbīl al-Aṣbaḥī, 99–101 (717–720).
Bishr b. Safwān al-Kalbi, 101–102 (720–721).
Hanzalah b. Ṣafwān, 102–105 (721–724).
Mahommed b. 'Abd al-Malik, 105 (724).
Ḥurr b. Yūsuf, 105–108 (724–727).
Ḥafṣ b. al-Walīd, 108 (727).
'Abd al-Malik b. Rifā'ah, 109 (727).
Walīd b. Rifā'ah, 109–117 (727–735).
'Abd al-Raḥmān b. Khālid, 117–118 (735).
Hanẓalah b. Ṣafwān, 118–124 (735–742).
Hafṣ b. al-Walīd, 124–127 (742–745).
Hassān b. 'Atāhiyah al-Tu'jibi, 127 (745).
Hafṣ b. al-Walīd, 127 (745).
Hautharah b. Suhail al-Bāhilī, 128–131 (745–749).
Mughīrah b. 'Ubaidallah al-Fazārī, 131–132 (749).
'Abd al-Malik b. Marwān al-Lakhmī, 132 (750).
Ṣāliḥ b. 'Alī, 133 (750–751).
Abū 'Aun 'Abdalmalik b. Yazīd, 133–136 (751–753)
Ṣāliḥ b. 'Alī, 136–137 (753–755)—second time.
Abū 'Aun, 137–141 (755–758)—second time.
Mūsā b. Ka'b b. 'Uyainah al-Tamīmī, 141 (758–759).
Mahommed b. al-Ash'ath b. 'Uqbah al-Khuzā'ī, 141–143 (759–760).
Ḥumaid b. Qaḥṭabah b. Shabīb al-Ṭā'ī, 143–144 (760–762).
Yazid b. Ḥātim b. Kabīsah al-Muhallabī, 144–152 (762–769).
'Abdallah b. 'Abdarraḥmān b. Moawiya b. Ḥudaij, 152–155 (769–772).
Mahommed b. Abdarraḥman b. Moawiya b. Ḥudaij, 155 (772).
Mūsā b. 'Ulayy b. Rabāh al-Lakhmī, 155–161 (772–778).
'Īsā b. Luqmān b. Mahommed al-Jumahī, 161–162 (778).
Wāḍiḥ, 162 (779).
Manṣūr b. Yazīd b. Manṣūr al-Ru'ainī, 162 (779).
Abū Ṣāliḥ Yaḥyā b. Dāwūd b. Mamdūd, 162–164 (779–780).
Sālim b. Sawādah al-Tamīmī, 164 (780–781).
Ibrāhīm b. Ṣāliḥ b. 'Alī, 165–167 (781–784).
Mūsā b. Mus'ab b. al-Rabī al-Khath'amī, 167–168 (784–785).
Usāmah b. 'Amr b. 'Alqamah al-Ma'āfirī, 168 (785).
al Faḍl b. Ṣāliḥ b. 'Alī al-'Abbāsi, 168–169 (785–786).
'Alī b. Sulaimān b. 'Alī al-'Abbāsī, 169–171 (786–787).
Mūsā b. 'Īsā b. Mūsā al-'Abbāsī, 171–172 (787–789).
Maslamah b. Yaḥyā b. Qurrah al-Bājilī, 172–173 (789–790).
Mahommed b. Zuhair al-Azdī, 173 (790).
Dāwūd b. Yazīd b. Ḥātim al-Muhallabī, 174–175 (790).
Mūsā b. 'Īsā al-'Abbāsī, 175–176 (790–792).
Ibrāhīm b. Ṣāliḥ, 176 (792).
Ṣāliḥ b. Ibrāhīm, 176 (792).
Abdallah b. al-Musayyib b. Zuhair al Ḍabbī, 176–177 (792–793).
Isḥāq b. Sulaimān b. 'Alī al-'Abbāsī, 177–178 (793–794).
Harthamah b. A'yan, 178 (794–795).
'Obaidallah b. al-Mahdī, 179 (795).
Mūsā b. 'Īsā al-'Abbāsī, 179–180 (795–796).
'Obaidallah b. al-Mahdī, 180–181 (796–797)—second time.
Ismā'īl b. Ṣāliḥ b. 'Alī al-'Abbāsī, 181–182 (797–798).
Ismā'īl b. 'Īsā b. Mūsā al-'Abbāsī, 182–183 (798).
Laith b. al-Faḍl al-Abīwardī, 183–187 (798–803).
Aḥmad b. Ismā'īl b. 'Alī al-'Abbāsī, 187–189 (803–805).
'Obaidallah b. Mahommed b. Ibrāhīm al-'Abbāsī, 189–190 (805–806).
Ḥusain b. Jamīl, 190–192 (806–808).
Mālik b. Dalham b. 'Īsā al-Kalbī, 192–193 (808).
Ḥasan b. al-Taḥtāḥ, 193–194 (808–809).
Ḥātim b. Harthamah b. A'yan, 194–195 (809–811).
Jābir b. al-Ash'ath b. Yaḥyā al-Ṭā'ī, 195–196 (811–812).
'Abbād b. Mahommed b. Ḥayyān al-Balkhī, 196–198 (812–813).
Moṭṭalib b. 'Abdallah b. Mālik al-Khuzā'ī, 198 (813–814).
'Abbās b. Mūsā b. 'Īsā al-'Abbāsī, 198–199 (814).
Moṭṭalib b. 'Abdallah, 199–200 (814–816)—second time.
Sarī b. al-Ḥakam b. Yūsuf, 200–201 (816).
Sulaimān b. Ghālib b. Jibrīl al-Bājilī, 201 (816–817).
Sari b. al Ḥakam, 201–205 (817–820).
Abū Naṣr Mahommed b. al-Sari, 205 (820–821).
'Obaidallah b. al-Sari, 205–211 (821–826).
'Abdallah b. Ṭāhir, 211–213 (826–829).
Mahommed b. Hārūn (al-Mo'tasim), 213–214 (829).
'Umair b. Al-Walid al-Tamimī al-Bādhaghīsī, 214 (829).
'Īsā b. Yazid, 214 (829).
'Abduyah b. Jabalah, 215–216 (830–831).
'Īsā b. Manṣūr b. Mūsā al-Rāfi'ī, 216–217 (831–832).
Naṣr b. Abdallah Kaidar al-Ṣafadī, 217–219 (832–834).
Muzaffar b. Kaidar, 219 (834).
Mūsā b. Abi'l-'Abbās Thābit al Hanafī, 219–224 (834–839).
Mālik b. Kaidar al Ṣafadī, 224–226 (839–841).
'Alī b. Yaḥyā abu l-Hasan al-Armanī, 226–228 (841–842).
'Īsā b. Manṣūr al-Rāfi'ī, 229–233 (843–847).
Harthamah b. al-Naḍir al Jabalī, 233–234 (848–849).
Ḥātim b. Harthamah, 234 (849).
'Alī b. Yaḥyā, 234–235 (849–850).
Isḥāq b. Yaḥyā al-Khatlānī, 235–236 (850–851).
'Abd al-Wāhid b. Yaḥyā b. Manṣūr, 236–238 (851–852).
'Anbasa b. Isḥāq b. Shamir, 238–242 (852–856).
Yazīd b. 'Abdallah b. Dīnār, 242–253 (856–867).
Muzāḥim b. Khāqān al-Turkī, 253–254 (867–868).
Aḥmad b. Muzāḥim b. Khāqān, 254 (868).
Urjūz b. Ulugh Ṭarkhān al-Turkī, 254 (868).

Tulunid house.

Aḥmad b. Ṭūlūn, 254–270 (868–884).
Khomārūya b. Aḥmad, 270–282 (884–896).
Jaish b. Khomārūya, 282 (896).
Hārūn b. Khomārūya, 283–292 (896–904).

Shaibān b. Aḥmad, 292 (905).
'Īsā b. Mahommed al-Naūsharī, 292 (905).
Mahommed b. 'Ali al-Khalanjī, 292–293 (905–906).
'Īsā al-Naūsharī, 293–297 (906–910)—second time.
Takīn b. Abdallah al-Khazari, 297–302 (910–915).
Dhukā al-Rūmī, 303–307 (915–919).
Takīn b. 'Abdallah, 307–309 (919–921)—second time.
Abū Qābūs Maḥmūd b. Ḥamal, 309 (921).
Hilāl b. Badr, 309–311 (921–923).

Aḥmad b. Kaighlagh, 311 (923).
Takīn b. Abdallah, 311–321 (923–933)—third time.
Mahommed b. Takīn, 321 (933).

Ikshīdī house.

Mahommed b. Ṭughj al-Ikshīd, 321 (933).
[Aḥmad b. Kaighlagh, 321–322 (933–934)].
Mahommed b. Ṭughj, 323–334 (934–946)—second time.
Ūnjūr b. al-Ikshīd, 334–349 (946–961).
'Alī b. al-Ikshīd, 349–355 (961–966).
Kāfūr b. Abdallah al-Ikshīdī, 355–357 (966–968).
Abu'l-Fawāris Aḥmad b. 'Alī b. al-Ikshīd, 357 (968).

(*b*) *Fāṭimite Caliphs*, 357–567 (969–1171).

Mo'izz Abū Tamīm Ma'add (or li-dīn allāh), 357–365 (969–975).
'Azīz Abū Manṣūr Nizār (al-'Azīz billāh), 365–386 (975–996).
Ḥākim [Abū 'Alī Manṣūr], 386–411 (996–1020).
Ẓāhir [Abu'l-Ḥasan 'Alī], 411–427 (1020–1035).
Mostanṣir [Abū Tamīm Ma'add], 427–487 (1035–1094).
Mosta'lī [Abu'l-Qāsim Aḥmad], 487–495 (1094–1101).
Amir [Abū 'Alī Manṣūr], 495–524 (1101–1130).
Ḥāfiz [Abu'l-Maimūn 'Abd al-Majīd], 524–544 (1130–1149).
Ẓāfir [Abu'l-Manṣūr Ismā'īl], 544–549 (1149–1154).
Fā'iz [Abu'l-Qāsim 'Īsā], 549–555 (1154–1160).
'Āḍid [Abū Mahommed 'Abdallah], 555–567 (1160–1171).

(*c*) *Ayyūbite Sultans*, 564–648 (1169–1250).

Malik al-Nāṣir Ṣalāḥ al-dīn Yūsuf b. Ayyūb (SALADIN), 564–589 (1169–1193).
Malik al-'Azīz 'Imād al-dīn Othman, 589–595 (1193–1198).
Malik al-Manṣūr Mahommed, 595–596 (1198–1199).
Malik al-'Ādil Saif al-dīn Abū Bakr, 596–615 (1199–1218).
Malik AL-KĀMIL Mahommed, 615–635 (1218–1238).
Malik al-'Ādil II. Saif al-dīn Abū Bakr, 635–637 (1238–1240).
Malik al-Ṣāliḥ Najm al-dīn Ayyūb, 637–647 (1240–1249).
Malik al-Mo'azzam Tūrānshāh, 647–648 (1249–1250).
Malik al-Ashraf Mūsā, 648–650 (1250–1252).

(*d*) *Baḥri Mamelukes*, 648–792 (1250–1390).

Shajar al-durr, 648 (1250).
Malik al-Mo'izz 'Izz al-dīn Aibek, 648–655 (1250–1257).
Malik al-Manṣūr Nureddin 'Alī, 655–657 (1257–1259).
Malik al-Moẓaffar Saif al-dīn KOTUZ, 657–658 (1259–1260).
Malik al-Ẓāhir [Rukn al-dīn (Rukneddin) BIBARS Bundukdārī], 658–676 (1260–1277).
Malik al-Sa'id Nāṣir al-dīn Barakah Khān, 676–678 (1277–1279).
Malik al-'Ādil Badr al-dīn Salāmish, 678 (1279).
Malik al-Manṣūr Saif al-dīn QALĀ'ŪN, 678–689 (1279–1290).
Malik al-Ashraf [Ṣalāḥ al-dīn KHALĪL], 689–693 (1290–1293).
Malik al-Nāṣir [Nāṣir al-dīn Mahommed], 693–694 (1293–1294).
Malik al-'Ādil [Zain al-dīn KITBOGA], 694–696 (1294–1296).
Manṣūr [Ḥusām al-dīn LĀJĪN], 696–698 (1296–1298).
NĀṢIR MAHOMMED (again), 698–708 (1298–1308).
Moẓaffar [Rukn al-dīn Bibars Jāshengīr], 708–709 (1308–1310).
Nāṣir Mahommed (third time), 709–741 (1310–1341).
Manṣūr [Saif al-dīn ABŪ BAKR], 741–742 (1341).
Ashraf [Alā'u 'l-dīn KUCHUK], 742 (1341–1342).
Nāṣir [Shihāb al-dīn Aḥmad], 742–743 (1342).
Ṣāliḥ 'Imād al-dīn Ismā'īl], 743–746 (1342–1345).
Kāmil [Saif al-dīn SHA'BAN], 746–747 (1345–1346).
Moẓaffar [Saif al-dīn ḤAJJI], 747–748 (1346–1347).
Nāṣir [Nāṣir al-dīn Ḥasan], 748–752 (1347–1351).
Ṣāliḥ [Ṣalāḥ al-dīn Ṣāliḥ], 752–755 (1351–1354).
Nāṣir [Ḥasan] (again), 755–762 (1354–1361).
Manṣūr [Ṣalāḥ al-dīn Mahommed], 762–764 (1361–1363).
Ashraf [Nāṣir al-dīn Sha'bān], 764–778 (1363–1377).
Manṣūr ['Alā'u 'l-dīn 'Alī], 778–783 (1377–1381).
Ṣāliḥ [Ṣalāḥ al-dīn Ḥājjī], 783–784 (1381–1382).
Barḳūḳ or Barqūq (see below), 784–791 (1382–1389).
Ḥājjī again, with title of Moẓaffar, 791–792 (1389–1390).

(*e*) *Burji Mamelukes*, 784–922 (1382–1517).

Ẓāhir [Saif al-dīn Barqūq], 784–801 (1382–1398) [interrupted by Ḥājji, 791–792].
Nāṣir [Nāṣir al-dīn FARAJ], 801–808 (1398–1405).
Manṣūr ['Izz al-dīn Abdalaziz ('Abd al-'Azīz)], 808–809 (1405–1406).
Nāṣir Faraj (again), 809–815 (1406–1412).
'Ādil Mosta'in (Abbasid caliph), 815 (1412).
Mu'ayyad [Sheikh], 815–824 (1412–1421).
Moẓaffar [Aḥmad], 824 (1421).
Ẓāhir [Saif al-dīn Tatār], 824 (1421).
Ṣāliḥ [Nāṣir al-dīn Mahommed], 824–825 (1421–1422).
Ashraf [Saif al-dīn Barsbai], 825–842 (1422–1438).
'Azīz [Jamāl al-dīn Yūsuf], 842 (1438).
Ẓāhir [Saif al-dīn Jakmak], 842–857 (1438–1453).
Manṣūr [Fakhr al-dīn Othman], 857 (1453).
Ashraf [Saif al-dīn Īnāl], 857–865 (1453–1461).
Mu'ayyad [Shihāb al-dīn Aḥmad], 865 (1461).
Ẓāhir [Saif al-dīn Khoshkadam], 865–872 (1461–1467).
Ẓāhir [Saif al-dīn Yelbai or Bilbai], 872 (1467).
Ẓāhir [Timūrboghā], 872–873 (1467–1468).
Ashraf [Saif al-dīn (KAIT BEY)], 873–901 (1468–1495).
Nāṣir [Mahommed], 901–904 (1495–1498).
Ẓāhir [Kānsūh], 904–905 (1498–1499).
Ashraf [Jānbalāt or Jan Belāt], 905–906 (1499–1501).
'Ādil Tumanbey (1501).
Ashraf [Kānsūh Ghūri], 906–922 (1501–1516).
Ashraf [Tūmānbey], 922 (1516–1517).

(*f*) *Turkish Governors after the Ottoman Conquest.*

Khair Bey, 923 (1517).
Muṣṭafā Pasha, 926 (1520).
Aḥmad, 929 (1523).
Qāsim, 930 (1524).
Ibrāhīm, 931 (1525).
Suleimān, 933 (1527).
Dāwūd, 945 (1538).
'Alī, 956 (1549).
Mahommed, 961 (1554).
Iskandar, 963 (1556).
'Alī al-Khādim, 968 (1561).
Muṣṭafā, 969 (1561).
'Alī al-Sūfī, 971 (1563).
Maḥmūd, 973 (1566).
Sinān, 975 (1567).
Ḥosain, 980 (1573).
Masīḥ, 982 (1575).
Ḥasan al-Khādim, 988 (1580).
Ibrāhīm, 991 (1583).
Sinān, 992 (1584).
Uwais, 994 (1585).
Ḥāfiz Aḥmad, 999 (1591).
Kurṭ, 1003 (1595).
Sayyid Mahommed, 1004 (1596).
Khiḍr, 1006 (1598).
'Alī al-Silaḥdār, 1009 (1601).
Ibrāhīm, 1012 (1604).
Mahommed al-Kūrjī, 1013 (1605).
Ḥasan, 1014 (1605).
Mahommed al-Sūfī, 1016 (1607).
Aḥmad al-Daftardār, 1022 (1613).
Muṣṭafā Lafakli, 1026 (1617).
Ja'far, 1027 (1618).
Muṣṭafā, 1028 (1619).
Ḥosain, 1028 (1619).
Mahommed, 1031 (1622).
Ibrāhīm, 1031 (1622).
Muṣṭafā, 1032 (1623).
'Alī, 1032 (1623).
Muṣṭafā, 1032 (1624).
Bairām, 1036 (1626).
Mahommed, 1037 (1627).
Mūsā, 1040 (1631).
Khalīl al-Bustānjī, 1041 (1631).
Aḥmad al-Kūrjī, 1042 (1633).
Ḥosain, 1045 (1636).
Mahommed b. Aḥmad, 1047 (1638).
Muṣṭafā al-Bustānjī, 1049 (1639).
Maqsūd, 1050 (1641).
Suyān Bey, 1054 (1644).
Ayyūb, 1055 (1645).
Mahommed b. Ḥaidar, 1057 (1647).
Aḥmad, 1058 (1648).
'Abd al-Raḥmān, 1061 (1651).
Mahommed al-Silaḥdār, 1062 (1652).
Ghāzī, 1066 (1655).
Omar, 1067 (1652).
Aḥmad, 1077 (1666).
Ibrāhīm, 1078 (1667).
Ḥosain, 1085 (1674).
Ḥasan al-Jānbalāṭ, 1087 (1676).
Othmān, 1091 (1680).
Ḥasan al-Silaḥdār, 1099 (1688).
Aḥmad, 1101 (1690).
'Alī Qilij, 1102 (1691).
Ismā'īl, 1107 (1696).
Ḥosain, 1109 (1697).
Qarā Mahommed or Aḥmad, 1111 (1699).
Mahommed Rāmī, 1116 (1704).
'Alī Muslim, 1118 (1706).
Ḥosain Ketkhudā, 1119 (1707).
Ibrāhīm Qabūdān, 1121 (1709).
Khalīl, 1122 (1710).
Walī, 1123 (1711).
'Ābidīn, 1127 (1715).
'Alī Izmīrli, 1129 (1717).
Rajab, 1130 (1718).
Mahommed al-Bāshimī, 1132 (1720).
'Alī, 1138 (1728).
Bākir, 1141 (1729).
'Abdallah Kubūrlu, 1142 (1729).
Mahommed Silaḥdār, 1144 (1732).
Othman Ḥalabī, 1146 (1733).
Bākir, 1148 (1735).
Muṣṭafā, 1149 (1736).
Sulaimān b. al-'Aẓim, 1152 (1739).
'Alī Ḥakīm Oghlu, 1153 (1740).
Yaḥyā, 1154 (1741).
Mahommed Yedkeshi, 1156 (1743).
Mahommed Rāghib, 1158 (1745).
Aḥmad Kuruzir, 1161 (1748).
Sharīf 'Abdallāh, 1163 (1750).
Mahommed Amīn, 1166 (1753).
Muṣṭafā, 1166 (1753).
'Alī Ḥakim Oghlu, 1169 (1756).
Mahommed Sa'id, 1171 (1758).
Muṣṭafā, 1173 (1759).
Aḥmad Kāmil, 1174 (1761).
Bākir, 1175 (1761).
Ḥasan, 1176 (1761).
Ḥamzah, 1179 (1765).
Mahommed Rāqim, 1181 (1767).
Mahommed Urflu, 1182 (1768).
Aḥmad, 1183 (1770).
Qara Khalīl, 1184 (1770).
Muṣṭafā Nābulsī, 1188 (1774).
Ibrāhīm 'Arabgirli, 1189 (1775).
Mahommed 'Izzet, 1190 (1776).
Ismā'īl, 1193 (1779).
Mahommed Mālik, 1195 (1781).
Sharīf 'Alī Qaṣṣāb, 1196 (1782).
Mahommed Silaḥdār, 1198 (1783).
Mahommed Yeyen, 1200 (1785).
'Ābidīn Sharīf, 1201 (1787).
Ismā'īl Tūnisī, 1203 (1788).
Ṣāliḥ Qaisarli, 1209 (1794).
Abū Bakr Ṭarābulsī, 1211 (1796).

French Occupation.

Khosrev, 1216 (1802).
Ṭāhir, 1218 (1803).
Ali Jazā'irlī or Ṭarābulsī, 1218 (1803).
Khorshīd, 1219 (1804).

(*g*) *Hereditary Pashas (later Khedives), from* 1220 (*from* 1805).

Mehemet 'Alī, 1220–1264 (1805–1848).
Ibrāhīm, 1264 (1848).
'Abbās I., 1264–1270 (1848–1854).
Sa'id, 1270–1280 (1854–1863).
Ismā'īl, 1280–1300 (1863–1882).
Tewfīk, 1300–1309 (1882–1892).
Abbās II., 1309 (1892).

(3) *Period under Governors sent from the Metropolis of the eastern Caliphate.*—The first governor of the newly acquired province was the conqueror 'Amr, whose jurisdiction was

presently restricted to Lower Egypt; Upper Egypt, which was divided into three provinces, being assigned to Abdallāh b. Sa'd, on whom the third caliph conferred the government of Lower Egypt also, 'Amr being recalled, owing to his unwillingness to extort from his subjects as much money as would satisfy the caliph. In the troubles which overtook the Islamic empire with the accession of Othman, Egypt was greatly involved, and it had to be reconquered from the adherents of Ali for Moawiya (Mo'awiyah) by 'Amr, who in A.H. 38 was rewarded for his services by being reinstated as governor, with the right to appropriate the surplus revenue instead of sending it as tribute to the metropolis. In the confusion which followed on the death of the Omayyad caliph Yazīd the Egyptian Moslems declared themselves for Abdallāh b. Zobair, but their leader was defeated in a battle near Ain Shams (December 684) by Merwān b. Ḥakam (Merwān I.), who had assumed the Caliphate, and the conqueror's son Abd al-'Azīz was appointed governor. They also declared themselves against the usurper Merwān II. in 745, whose lieutenant al-Ḥautharah had to enter Fostat at the head of an army. In 750 Merwān II. himself came to Egypt as a fugitive from the Abbasids, but found that the bulk of the Moslem population had already joined with his enemies, and was defeated and slain in the neighbourhood of Giza in July of the same year. The Abbasid general, Ṣāliḥ b. Ali, who had won the victory, was then appointed governor.

During the period that elapsed between the Moslem conquest and the end of the Omayyad dynasty the nature of the Arab occupation had changed from what had originally been intended, the establishment of garrisons, to systematic colonization. Conversions of Copts to Islam were at first rare, and the old system of taxation was maintained for the greater part of the first Islamic century. This was at the rate of a dinar per *feddan*, of which the proceeds were used in the first place for the pay of the troops and their families, with about half the amount in kind for the rations of the army. The process by which the first of these contributions was turned into coin is still obscure; it is clear that the corn when threshed was taken over by certain public officials who deducted the amount due to the state. In general the system is well illustrated by the papyri forming the Schott-Reinhardt collection at Heidelberg (edited by C.H. Becker, 1906), which contain a number of letters on the subject from Qurrah b. Sharīk, governor from A.H. 90 to 96. The old division of the country into districts (*nomoi*) is maintained, and to the inhabitants of these districts demands are directly addressed by the governor of Egypt, while the head of the community, ordinarily a Copt, but in some cases a Moslem, is responsible for compliance with the demand. An official called "receiver" (*qabbāl*) is chosen by the inhabitants of each district to take charge of the produce till it is delivered into the public magazines, and receives 5% for his trouble. Some further details are to be found in documents preserved by the archaeologist Maqrīzī, from which it appears that the sum for which each district was responsible was distributed over the unit in such a way that artisans and tradesmen paid at a rate similar to that which was enforced on those employed in agriculture. It is not known at what time the practice of having the amount due settled by the community was altered into that according to which it was settled by the governor, or at what time the practice of deducting from the total certain expenses necessary for the maintenance of the community was abandoned. The researches of Wellhausen and Becker have made it clear that the difference which is marked in later Islam between a poll-tax (*jizyah*) and a land-tax (*kharāj*) did not at first exist: the papyri of the 1st century know only of the jizyah, which, however, is not a poll-tax but a land-tax (in the main). The development of the poll-tax imposed on members of tolerated cults seems to be due to various causes, chief of them the acquisition of land by Moslems, who were not at first allowed to possess any, the conversion of Coptic landowners to Islam, and the enforcement (towards the end of the 1st century of Islam) of the poll-tax on monks. The treasury could not afford to lose the land-tax, which it would naturally forfeit by the first two of the above occurrences, and we read of various expedients being tried to prevent this loss. Such were making the Christian community to which the proselyte had belonged pay as much as it had paid when his lands belonged to it, making proselytes pay as before their conversion, or compelling them to abandon their lands on conversion. Eventually the theory spread that all land paid land-tax, whereas members of tolerated sects paid a personal tax also; but during the evolution of this doctrine the relations between conquerors and conquered became more and more strained, and from the time when the control of the finance was separated from the administration of the country (A.D. 715) complaints of extortion became serious; under the predecessor of Qurrah, 'Abdallāh b. 'Abd al-Malik, the country suffered from famine, and under this ruler it was unable to recover. Under the finance minister Obaidallah b. Ḥabḥāb (720–734) the first government survey by Moslems was made, followed by a census; but before this time the higher administrative posts had been largely taken out of the hands of Copts and filled with Arabs. The resentment of the Copts finally expressed itself in a revolt, which broke out in the year 725, and was suppressed with difficulty. Two years after, in order that the Arab element in Egypt might be strengthened, a colony of North Arabians (Qaisites) was sent for and planted near Bilbeis, reaching the number of 3000 persons; this immigration also restored the balance between the two branches of the Arab race, as the first immigrants had belonged almost exclusively to the South Arabian stock. Meanwhile the employment of the Arabic language had been steadily gaining ground, and in 706 it was made the official language of the bureaux, though the occasional use of Greek for this purpose is attested by documents as late as the year 780. Other revolts of the Copts are recorded for the year 739 and 750, the last year of Omayyad domination. The outbreaks in all cases are attributed to increased taxation.

Coptic revolt.

The Abbasid period was marked at its commencement by the erection of a new capital to the north of Fostat, bearing the name *'Askar* or "camp." Apparently at this time the practice of farming the taxes began, which naturally led to even greater extortion than before; and a fresh rising of the Copts is recorded for the fourth year of Abbasid rule. Governors, as will be seen from the list, were frequently changed. The three officials of importance whose nomination is mentioned by the historians in addition to that of the governor were the commander of the bodyguard, the minister of finance and the judge. Towards the beginning of the 3rd Islamic century the practice of giving Egypt in fief to a governor was resumed by the caliph Mamūn, who bestowed this privilege on 'Abdallāh b. Ṭāhir, who in 827 was sent to recover Alexandria, which for some ten years had been held by exiles from Spain. 'Abdallāh b. Ṭāhir decided to reside at Bagdad, sending a deputy to Egypt to govern for him; and this example was afterwards followed. In 828, when Mamūn's brother Motaṣim was feudal lord, a violent insurrection broke out in the Ḥauf, occasioned, as usual, by excessive taxation; it was partly quelled in the next year by Motaṣim, who marched against the rebels with an army of 4000 Turks. The rebellion broke out repeatedly in the following years, and in 831 the Copts joined with the Arabs against the government; the state of affairs became so serious that the caliph Mamūn himself visited Egypt, arriving at Fostat in February 832; his general Afshīn fought a decisive battle with the rebels at Bāsharūd in the Ḥauf region, at which the Copts were compelled to surrender; the males were massacred and the women and children sold as slaves.

This event finally crushed the Coptic nation, which never again made head against the Moslems. In the following year the caliph Motaṣim, who surrounded himself with a foreign bodyguard, withdrew the stipends of the Arab soldiers in Egypt; this measure caused some of the Arab tribes who had been long settled in Egypt to revolt, but their resistance was crushed, and the domination of the Arab element in the country from this time gave way to that of foreign mercenaries, who, belonging to one nation or another, held it for most of its subsequent history. Egypt was given in fief to a Turkish general Ashnās

Turkish governors appointed.

(Ashinas), who never visited the country, and the rule of individuals of Turkish origin prevailed till the rise of the Fâṭimites, who for a time interrupted it. The presence of Turks in Egypt is attested by documents as early as 808. While the governor was appointed by the feudal lord, the finance minister continued to be appointed by the caliph. On the death of Ashnâs in 844 Egypt was given in fief to another Turkish general Itâkh, but in 850 this person fell out of favour, and the fief was transferred to Montaṣir, son of the caliph Motawakkil. In 856 it was transferred from him to the vizier Fatḥ b. Khâqân, who for the first time appointed a Turkish governor. The chief places in the state were also filled with Turks. The period between the rise of the Abbasids and the quasi-independent dynasties of Egypt was marked by much religious persecution, occasioned by the fanaticism of some of the caliphs, the victims being generally Moslem sectarians. (For Egypt under Motawakkil see CALIPHATE, § c. par. 10.)

The policy of these caliphs also led to severe measures being taken against any members of the Alid family or adherents of their cause who were to be found in Egypt.

Tûlûnid Dynasty.

In the year 868 Egypt was given in fief to a Turkish general Bayikbeg, who sent thither as his representative his stepson Aḥmad b. Ṭûlûn, the first founder of a quasi-independent dynasty. This personage was himself the son of a Turk who, originally sent as a slave to Bagdad, had risen to high rank in the service of the caliphs. Aḥmad b. Ṭûlûn spent some of his early life in Tarsus, and on his return distinguished himself by rescuing his caravan, which conveyed treasure belonging to the caliph, from brigands who attacked it; he afterwards accompanied the caliph Mosta'în into exile, and displayed some honourable qualities in his treatment of the fallen sovereign. He found a rival in Egypt in the person of Ibn al-Modabbir, the finance minister, who occupied an independent position, and who started the practice of surrounding himself with an army of his own slaves or freedmen; of these Ibn Ṭûlûn succeeded in depriving the finance minister, and they formed the nucleus of an army by which he eventually secured his own independence. Insurrections by adherents of the Alids gave him the opportunity to display his military skill; and when in 870 his stepfather died, by a stroke of luck the fief was given to his father-in-law, who retained Aḥmad in the lieutenancy, and indeed extended his authority to Alexandria, which had till that time been outside it. The enterprise of a usurper in Syria in the year 872 caused the caliph to require the presence of Aḥmad in that country at the head of an army to quell it; and although this army was not actually employed for the purpose, it was not disbanded by Aḥmad, who on his return founded a fresh city called Kaṭâ'i', "the fiefs," S.E. of modern Cairo, to house it. On the death of Aḥmad's father-in-law in the same year, when Egypt was given in fief to the caliph's brother Mowaffaq (famous for his defeat of the Zanj), Aḥmad secured himself in his post by extensive bribery at headquarters; and in the following year the administration of the Syrian frontier was conferred on him as well. By 875 he found himself strong enough to refuse to send tribute to Bagdad, preferring to spend the revenues of Egypt on the maintenance of his army and the erection of great buildings, such as his famous mosque; and though Mowaffaq advanced against him with an army, the project of reducing Aḥmad to submission had to be abandoned for want of means. In 877 and 878 Aḥmad advanced into Syria and obtained the submission of the chief cities, and at Tarsus entered into friendly relations with the representatives of the Byzantine emperor. During his absence his son 'Abbâs revolted in Egypt; on the news of his father's return he fled to Barca, whence he endeavoured to conquer the Aghlabite dominions in the Maghrib; he was, however, defeated by the Aghlabite ruler, and returned to Barca, where he was again defeated by his father's forces and taken prisoner.

In 882 relations between Aḥmad and Mowaffaq again became strained, and the former conceived the bold plan of getting the caliph Mo'tamid into his power, which, however, was frustrated by Mowaffaq's vigilance; but an open rupture was the result, as Mowaffaq formally deprived Aḥmad of his lieutenancy, while Aḥmad equally formally declared that Mowaffaq had forfeited the succession. A revolt that broke out at Tarsus caused Aḥmad to traverse Syria once more in 883, but illness compelled him to return, and on the 10th of May 884 he died at his residence in Kaṭâ'i'. He was the first to establish the claim of Egypt to govern Syria, and from his time Egypt grew more and more independent of the Eastern caliphate. He appears to have invented the fiction which afterwards was repeatedly employed, by which the money spent on mosque-building was supposed to have been furnished by discoveries of buried treasure.

He was succeeded by his son Khomârûya, then twenty years of age, who immediately after his accession had to deal with an attempt on the part of the caliph to recover Syria; this attempt failed chiefly through dissensions between the caliph's officers, but partly through the ability of Khomârûya's general, who succeeded in winning a battle after his master had run away from the field. By 886 Mowaffaq found it expedient to grant Khomârûya the possession of Egypt, Syria, and the frontier towns for a period of thirty years, and ere long, owing to the disputes of the provincial governors, Khomârûya found it possible to extend his domain to the Euphrates and even the Tigris. On the death of Mowaffaq in 891 the Egyptian governor was able to renew peaceful relations with the caliphs, and receive fresh confirmation in his possessions for thirty years. The security which he thereby gained gave him the opportunity to indulge his taste for costly buildings, parks and other luxuries, of which the chroniclers give accounts bordering on the fabulous. After the marriage of his daughter to the caliph, which was celebrated at enormous expense, an arrangement was made giving the Ṭûlûnid sovereign the viceroyalty of a region extending from Barca on the west to Hît on the east; but tribute, ordinarily to the amount of 300,000 dinars, was to be sent to the metropolis. His realm enjoyed peace till his death in 896, when he fell a victim to some palace intrigue at Damascus.

His son and successor Abu'l-'Asâkir Jaish was fourteen years old at his accession, and being without adequate guidance soon revealed his incompetence, which led to his being murdered after a reign of six months by his troops, who gave his place to his brother Hârûn, who was of about the same age. In the eight years of his government the Ṭûlûnid empire contracted, owing to the revolts of the deputies which Hârûn was unable to quell, though in 898 he endeavoured to secure a new lease of the sovereignty in Egypt and Syria by a fresh arrangement with the caliph, involving an increase of tribute. The following years witnessed serious troubles in Syria caused by the Carmathians, which called for the intervention of the caliph, who at last succeeded in defeating these fanatics; the officer Mahommed b. Solaimân, to whom the victory was due, was then commissioned by the caliph to reconquer Egypt from the Ṭûlûnids, and after securing the allegiance of the Syrian prefects he invaded Egypt by sea and land at once. Before the arrival of these troops Hârûn had met his death at the hands of an assassin, or else in an affray, and his uncle Shaibân, who was placed on the throne, found himself without the means to collect an army fit to grapple with the invaders. Fostat was taken by Mahommed b. Solaimân after very slight resistance, at the beginning of 905, and after the infliction of severe punishment on the inhabitants Egypt was once more put under a deputy, 'Îsâ al-Nausharî, appointed directly by the caliph.

The old régime was not restored without an attempt made by an adherent of the Ṭûlûnids to reconquer Egypt ostensibly for their benefit, and for a time the caliph's viceroy had to quit the capital. The vigorous measures of the authorities at Bagdad speedily quelled this rebellion, and the Ṭûlûnid palace at Kaṭâ'i' was then destroyed in order that there might be nothing to remind the Egyptians of the dynasty. In the middle of the year 914 Egypt was invaded for the first time by a Fâṭimite force sent by the caliph al-Mahdî 'Obaidallah, now established at Kairawân. The Mahdi's son succeeded in taking Alexandria, and advancing as far as the Fayûm; but once more the Abbasid caliph sent a powerful army to assist his viceroy, and the invaders were driven out of the country and pursued as far as Barca; the Fāṭimite caliph, however, continued to maintain active propaganda in Egypt. In 919 Alexandria was again seized by the Mahdi's son, afterwards the caliph al-Qā'im, and while his forces advanced northward as far as Ushmunain (Eshmunain) he was reinforced by a fleet which arrived at Alexandria. This fleet was destroyed by a far smaller one sent by the Bagdad caliph to Rosetta; but Egypt was not freed from the invaders till the year 921, when reinforcements had been repeatedly sent from Bagdad to deal with them. The extortions necessitated by these wars for the maintenance of armies and the incompetence of the viceroys brought Egypt at this time into a miserable condition; and the numerous political crises at Bagdad prevented for a time any serious measures being taken to improve it. After a struggle between various pretenders to the viceroyalty, in which some pitched battles were fought, Mahommed b. Ṭughj, son of a Ṭūlūnid prefect of Damascus, was sent by the caliph to restore order; he had to force his entrance into the country by an engagement with one of the pretenders, Ibn Kaighlagh, in which he was victorious, and entered Fostat in August 935.

Ikshidite Dynasty.

Mahommed b. Ṭughj was the founder of the Ikshīdī dynasty, so called from the title Ikshīd, conferred on him at his request by the caliph shortly after his appointment to the governorship of Egypt; it is said to have had the sense of "king" in Ferghana, whence this person's ancestors had come to enter the service of the caliph Metaṣim. He had himself served under the governor of Egypt, Takīn, whose son he displaced, in various capacities, and had afterwards held various governorships in Syria. One of the historians represents his appointment to Egypt as effected by bribery and even forgery. He united in his person the offices of governor and minister of finance, which had been separate since the time of the Ṭūlūnids. He endeavoured to replenish the treasury not only by extreme economy, but by inflicting fines on a vast scale on persons who had held offices under his predecessor and others who had rendered themselves suspect. The disaffected in Egypt kept up communications with the Fāṭimites, against whom the Ikshīd collected a vast army, which, however, had first to be employed in resisting an invasion of Egypt threatened by Ibn Rāiq, an adventurer who had seized Syria; after an indecisive engagement at Lajūn the Ikshīd decided to make peace with Ibn Rāiq, undertaking to pay him tribute. The favour afterwards shown to Ibn Rāiq at Bagdad nearly threw the Ikshīd into the arms of the Fāṭimite caliph, with whom he carried on a friendly correspondence, one letter of which is preserved. He is even said to have given orders to substitute the name of the Fāṭimite caliph for that of the Abbasid in public prayer, but to have been warned of the unwisdom of this course. In 941, after the death of Ibn Rāiq, the Ikshīd took the opportunity of invading Syria, which the caliph permitted him to hold with the addition of the sacred cities of Mecca and Medina, which the Ṭūlūnids had aspired to possess. He is said at this time to have started (in imitation of Aḥmad Ibn Ṭūlūn) a variety of vexatious enactments similar to those afterwards associated with the name of Ḥākim, *e.g.* compelling his soldiers to dye their hair, and adding to their pay for the purpose.

In the year 944 he was summoned to Mesopotamia to assist the caliph, who had been driven from Bagdad by Tūzūn and was in the power of the Ḥamdānids; and he proposed, though unsuccessfully, to take the caliph with him to Egypt. At this time he obtained hereditary rights for his family in the government of that country and Syria. The Ḥamdānid Saif addaula shortly after this assumed the governorship of Aleppo, and became involved in a struggle with the Ikshīd, whose general, Kāfūr, he defeated in an engagement between Homs and Hamah (Hamath). In a later battle he was himself defeated by the Ikshīd, when an arrangement was made permitting Saif addaula to retain most of Syria, while a prefect appointed by the Ikshīd was to remain in Damascus. The Buyid ruler, who was now supreme at Bagdad, permitted the Ikshīd to remain in possession of his viceroyalty, but shortly after receiving this confirmation he died at Damascus in 946.

The second of this dynasty was the Ikshīd's son Ūnjūr, who had been proclaimed in his father's time, and began his government under the tutelage of the negro Kāfūr. Syria was immediately overrun by Saif addaula, but he was defeated by Kāfūr in two engagements, and was compelled to recognize the overlordship of the Egyptian viceroy. At the death of Unjūr in 961 his brother Abu'l-Ḥasan 'Alī was made viceroy with the caliph's consent by Kāfūr, who continued to govern for his chief as before. The land was during this period threatened at once by the Fāṭimites from the west; the Nubians from the south, and the Carmathians from the east; when the second Ikshīdī died in 965, Kāfūr at first made a pretence of appointing his young son Aḥmad as his successor, but deemed it safer to assume the viceroyalty himself, setting an example which in Mameluke times was often followed. He occupied the post little more than three years, and on his death in 968 the aforementioned Aḥmad, called Abu'l-Fawāris, was appointed successor, under the tutelage of a vizier named Ibn Furāt, who had long served under the Ikshīds. The accession of this prince was followed by an incursion of the Carmathians into Syria, before whom the Ikshīdī governor fled into Egypt, where he had for a time to undertake the management of affairs, and arrested Ibn Furāt, who had proved himself incompetent.

The administration of Ibn Furāt was fatal to the Ikshīdīs and momentous for Egypt, since a Jewish convert, Jacob, son of Killis, who had been in the Ikshīd's service, and was ill-treated by Ibn Furāt, fled to the Fāṭimite sovereign, and persuaded him that the time for invading Egypt with a prospect of success had arrived, since there was no one in Fostat capable of organizing a plan of defence, and the dissensions between the Buyids at Bagdad rendered it improbable that any succour would arrive from that quarter. The Fāṭimite caliph Mo'izz li-dīn allāh was also in correspondence with other residents in Egypt, where the Alid party from the beginning of Abbasid times had always had many supporters; and the danger from the Carmathians rendered the presence of a strong government necessary. The Fāṭimite general Jauhar (variously represented as of Greek, Slav and Sicilian origin), who enjoyed the complete confidence of the Fāṭimite sovereign, was placed at the head of an army of 100,000 men—if Oriental numbers are to be trusted—and started from Rakkāda at the beginning of March 969 with the view of seizing Egypt.

Before his arrival the administration of affairs had again been committed to Ibn Furāt, who, on hearing of the threatened invasion, at first proposed to treat with Jauhar for the peaceful surrender of the country; but though at first there was a prospect of this being carried out, the majority of the troops at Fostat preferred to make some resistance, and an advance was made to meet Jauhar in the neighbourhood of Giza. He had little difficulty in defeating the Egyptian army, and on the 6th of July 969 entered Fostat at the head of his forces. The name of Mo'izz was immediately introduced into public prayer, and coins were struck in his name. The Ikshīdī governor of Damascus, a cousin of Abu'l-Fawāris Aḥmad, endeavoured to save Syria, but was defeated at Ramleh by a general sent by Jauhar and taken prisoner. Thus the Ikshīdī Dynasty came to an end, and Egypt was transferred from the Eastern to the Western caliphate, of which it furnished the metropolis.

(4) *The Fāṭimite period* begins with the taking of Fostat by Jauhar, who immediately began the building of a new city, al-Kāhira or Cairo, to furnish quarters for the army which he had brought. A palace for the caliph and a mosque for the army were immediately constructed, the latter still famous as al-Azhar, and for many centuries the centre of Moslem learning. Almost immediately after the conquest of Egypt, Jauhar found himself engaged in a struggle with the Carmathians (*q.v.*), whom the Ikshīdī prefect of Damascus had pacified by a promise of tribute; this promise was of course not held binding by the Fāṭimite general (Ja'far b. Falāḥ) by whom Damascus was taken, and the Carmathian leader al-Ḥasan b. Aḥmad al-A'ṣam received

aid from Bagdad for the purpose of recovering Syria to the Abbasids. The general Ja'far, hoping to deal with this enemy independently of Jauhar, met the Carmathians without waiting for reinforcements from Egypt, and fell in battle, his army being defeated. Damascus was taken by the Carmathians, and the name of the Abbasid caliph substituted for that of Mo'izz in public worship. Ḥasan al-A'ṣam advanced from Damascus through Palestine to Egypt, encountering little resistance on the way; and in the autumn of 971 Jauhar found himself besieged in his new city. By a timely sortie, preceded by the administration of bribes to various officers in the Carmathian host, Jauhar succeeded in inflicting a severe defeat on the besiegers, who were compelled to evacuate Egypt and part of Syria.

Meanwhile Mo'izz had been summoned to enter the palace that had been prepared for him, and after leaving a viceroy to take charge of his western possessions he arrived in Alexandria on the 31st of May 973, and proceeded to instruct his new subjects in the particular form of religion (Shī'ism) which his family represented. As this was in origin identical with that professed by the Carmathians, he hoped to gain the submission of their leader by argument; but this plan was unsuccessful, and there was a fresh invasion from that quarter in the year after his arrival, and the caliph found himself besieged in his capital. The Carmathians were gradually forced to retreat from Egypt and then from Syria by some successful engagements, and by the judicious use of bribes, whereby dissension was sown among their leaders. Mo'izz also found time to take some active measures against the Byzantines, with whom his generals fought in Syria with varying fortune. Before his death he was acknowledged as caliph in Mecca and Medina, as well as Syria, Egypt and North Africa as far as Tangier.

In the reign of the second Egyptian Fāṭimite 'Azīz billah, Jauhar, who appears to have been cashiered by Mo'izz, was again employed at the instance of Jacob b. Killis, who had been raised to the rank of vizier, to deal with the situation in Syria, where a Turkish general Aftakīn had gained possession of Damascus, and was raiding the whole country; on the arrival of Jauhar in Syria the Turks called the Carmathians to their aid, and after a campaign of many vicissitudes Jauhar had to return to Egypt to implore the caliph himself to take the field. In August 977 'Azīz met the united forces of Aftakīn and his Carmathian ally outside Ramleh in Palestine and inflicted a crushing defeat on them, which was followed by the capture of Aftakīn; this able officer was taken to Egypt, and honourably treated by the caliph, thereby incurring the jealousy of Jacob b. Killis, who caused him, it is said, to be poisoned. This vizier had the astuteness to see the necessity of codifying the doctrines of the Fāṭimites, and himself undertook this task; in the newly-established mosque of el-Azhar he got his master to make provision for a perpetual series of teachers and students of his manual. It would appear, however, that a large amount of toleration was conceded by the first two Egyptian Fāṭimites to the other sects of Islam, and to other communities. Indeed at one time in 'Azīz's reign the vizierate of Egypt was held by a Christian, Jesus, son of Nestorius, who appointed as his deputy in Syria a Jew, Manasseh b. Abraham. These persons were charged by the Moslems with unduly favouring their co-religionists, and the belief that the Christians of Egypt were in league with the Byzantine emperor, and even burned a fleet which was being built for the Byzantine war, led to some persecution. Azīz attempted without success to enter into friendly relations with the Buyid ruler of Bagdad, 'Aḍod addaula, who was disposed to favour the 'Alids, but caused the claim of the Fāṭimites to descend from 'Ali to be publicly refuted. He then tried to gain possession of Aleppo, as the key to 'Irāk, but this was prevented by the intervention of the Byzantines. His North African possessions were maintained and extended by 'Ali, son of Bulukkīn, whom Mo'izz had left as his deputy; but the recognition of the Fāṭimite caliph in this region was little more than nominal.

His successor *Abū 'Alī al-Manṣūr*, who reigned under the title *al-Ḥākim bi'amr allāh*, came to the throne at the age of eleven, being the son of 'Azīz by a Christian mother. He was at first under the tutelage of the Slav Burjuwān, whose policy it was to favour the Turkish element in the army as against the Maghribine, on which the strength of the Fāṭimites had till then rested; his conduct of affairs was vigorous and successful, and he concluded a peace with the Greek emperor. After a few years' regency he was assassinated at the instance of the young sovereign, who at an early age developed a dislike for control and jealousy of his rights as caliph. He is branded by historians as the Caligula of the East, who took a delight in imposing on his subjects a variety of senseless and capricious regulations, and persecuting different sections of them by cruel and arbitrary measures. It is observable that some of those with which Ḥākim is credited are also ascribed to Ibn Ṭūlūn and the Ikhshīd (Mahommed b. Tughj). He is perhaps best remembered by his destruction of the church of the Holy Sepulchre at Jerusalem (1010), a measure which helped to provoke the Crusades, but was only part of a general scheme for converting all Christians and Jews in his dominions to his own opinions by force. A more reputable expedient with the same end in view was the construction of a great library in Cairo, with ample provision for students, this was modelled on a similar institution at Bagdad. It formed part of the great palace of the Fāṭimites, and was intended to be the centre of their propaganda. At times, however, he ordered the destruction of all Christian churches in Egypt, and the banishment of all who did not adopt Islam. It is strange that in the midst of these persecutions he continued to employ Christians in high official positions. His system of persecution was not abandoned till in the last year of his reign (1020) he thought fit to claim divinity, a doctrine which is perpetuated by the Druses (*q.v.*), called after one Darazī, who preached the divinity of Ḥākim at the time, the violent opposition which this aroused among the Moslems probably led him to adopt milder measures towards his other subjects, and those who had been forcibly converted were permitted to return to their former religion and rebuild their places of worship. Whether his disappearance at the beginning of the year 1021 was due to the resentment of his outraged subjects, or, as the historians say, to his sister's fear that he would bequeath the caliphate to a distant relative to the exclusion of his own son, will never be known. In spite of his caprices he appears to have shown competence in the management of external affairs; enterprises of pretenders both in Egypt and Syria were crushed with promptitude; and his name was at times mentioned in public worship in Aleppo and Mosul.

His son *Abū'l-Ḥasan 'Alī*, who succeeded him with the title *al-Ẓāhir li'i'zāz dīn allāh*, was sixteen years of age at the time, and for four years his aunt Sitt al-Mulk acted as regent; she appears to have been an astute but utterly unscrupulous woman. After her death the caliph was in the power of various ministers, under whose management of affairs Syria was for a time lost to the Egyptian caliphate, and Egypt itself raided by the Syrian usurpers, of whom one, Ṣāliḥ b. Mirdās, succeeded in establishing a dynasty at Aleppo, which maintained itself after Syria and Palestine had been recovered for the Fāṭimites by Anushtakīn al-Dizbarī at the battle of Ukhuwānah in 1029. His career is said to have been marked by some horrible caprices similar to those of his father. After a reign of nearly sixteen years he died of the plague.

His successor, *Abū Tamīm Ma'add*, who reigned with the title *al-Mostanṣir*, was also an infant at the time of his accession, being little more than seven years of age. The power was largely in the hands of his mother, a negress, who promoted the interests of her kinsmen at court, where indeed even in Ḥākim's time they had been used as a counterpoise to the Maghribine and Turkish elements in the army. In the first years of this reign affairs were administered by the vizier al-Jarjarā'ī, by whose mismanagement Aleppo was lost to the Fāṭimites. At his death in 1044 the chief influence passed into the hands of Abu Sa'd, a Jew, and the former master of the queen-mother, and at the end of four years he was assassinated at the instance of another Jew (Ṣadaḳah, perhaps Zedekiah, b. Joseph al-Falāḥī), whom he had appointed vizier. In this reign Mo'izz b. Badis, the 4th ruler of the dependent Zeirid dynasty which had ruled in the Maghrib since the migration of the Fāṭimite Mo'izz to Egypt, definitely abjured his allegiance (1049) and returned to Sunnite principles and subjection to the Bagdad caliphate. The Zeirids maintained Mahdia (see ALGIERS), while other cities of the Maghrib were colonized by Arab tribes sent thither by the Cairene vizier. This loss was more than compensated by the enrolment of Yemen among the countries which recognized the Fāṭimite caliphate through the enterprise of one 'Ali b. Mahommed al-Ṣulaiḥī, while owing to the disputes between the Turkish generals who claimed supremacy at Bagdad, Mostanṣir's name was mentioned in public prayer at that metropolis on the 12th of January 1058, when a Turkish adventurer Basāsīrī was for a time in power. The Egyptian court, chiefly owing to the jealousy of the vizier, sent no efficient aid to Basāsīrī, and after a year Bagdad was retaken by the Seljūk Toghrul Beg, and the Abbasid caliph restored to his rights. In the following years the troubles in Egypt caused by the struggles between the Turkish and negro elements in Mostanṣir's army nearly brought the country into the dominion of the Abbasids. After several battles of various issue the Turkish commander Nāṣir addaula b. Hamdān got possession of Cairo, and at the end of 1068 plundered the caliph's palace; the valuable library which had been begun by Ḥākim was pillaged, and an accidental fire caused great destruction. The caliph and his family were reduced to destitution, and Nāṣir addaula began negotiations for restoring the name of the Abbasid caliph in public prayer; he was, however, assassinated before he could carry this out, and his assassin, also a Turk, appointed vizier. Mostanṣir then summoned to his aid Badr al-Jamālī, an Armenian who had displayed competence in various posts which he had held in Syria, and this person early in 1074 arrived in Cairo accompanied by a bodyguard of Armenians; he contrived to massacre the chiefs of the party at the time in possession of power, and with the title Amīr al-Juyūsh ("prince of the armies") was given by Mostanṣir complete control of affairs. The period of internal disturbances, which had been accompanied by famine and pestilence, had caused usurpers to spring up in all parts of Egypt, and Badr was compelled practically to reconquer the country. During this time, however, Syria was overrun by an invader in league with the Seljūk Malik Shah, and Damascus was permanently lost to the Fāṭimites; other cities were recovered by Badr himself or his officers. He rebuilt the walls of Cairo, of more durable material than that which had been employed by Jauhar—a measure rendered necessary partly by the growth of the metropolis, but also by the repeated sieges which it had undergone since the commencement of Fāṭimite rule. The time of Mostanṣir is otherwise memorable for the rise of the Assassins (*q.v.*), who at the first supported the claims of his eldest son Nizār to the succession against the youngest Aḥmed, who was favoured by the family of Badr. When Badr died in 1094 his influence was inherited by his son al-Afḍal Shāhinshāh, and this, at the death of Mostanṣir in the same year, was thrown in favour of *Aḥmed*, who succeeded to the caliphate with the title *al-Mosta'lī billāh.*

The Crusades.

Mosta'lī's succession was not carried through without an attempt on the part of Nizār to obtain his rights, the title which he chose being *al-Moṣṭafā lidīn allāh;* for a time he maintained himself in Alexandria, but the energetic measures of his brother soon brought the civil war to an end. The beginning of this reign coincided with the beginning of the Crusades, and al-Afḍal made the fatal mistake of helping the Franks by rescuing Jerusalem from the Ortokids, thereby facilitating its conquest by the Franks in 1099. He endeavoured to retrieve his error by himself advancing into Palestine, but he was defeated in the neighbourhood of Ascalon, and compelled to retire to Egypt. Many of the Palestinian possessions of the Fāṭimites then successively fell into the hands of the Franks. After a reign of seven years Mosta'lī died and the caliphate was given by al-Afḍal to an infant son, aged five years at the time, who was placed on the throne with the title *al-Āmir biahkām allāh*, and for twenty years was under the tutelage of al-Afḍal. He made repeated attempts to recover the Syrian and Palestinian cities from the Franks, but with poor success. In 1118 Egypt was invaded by Baldwin I., who burned the gates and the mosques of Farama, and advanced to Tinnis, whence illness compelled him to retreat. In August 1121 al-Afḍal was assassinated in a street of Cairo, it is said, with the connivance of the caliph, who immediately began the plunder of his house, where fabulous treasures were said to be amassed. The vizier's offices were given to one of the caliph's creatures, Mahommed b. Fātik al-Baṭā'iḥī, who took the title *al-Ma'mūn.* His external policy was not more fortunate than that of his predecessor, as he lost Tyre to the Franks, and a fleet equipped by him was defeated by the Venetians. On the 4th of October 1125 he with his followers was seized and imprisoned by order of the Caliph Āmir, who was now resolved to govern by himself, with the assistance of only subordinate officials, of whom two were drawn from the Samaritan and Christian communities. The vizier was afterwards crucified with his five brothers. The caliph's personal government appears to have been incompetent, and to have been marked by extortions and other arbitrary measures. He was assassinated in October 1129 by some members of the sect who believed in the claims of Nizār, son of Mostanṣir.

The succeeding caliph, *Abu'l-Maimūn 'Abd al-Majīd*, who took the title *al-Ḥāfiẓ lidīn allāh*, was not the son but the cousin of the deceased caliph, and of ripe age, being about fifty-eight years old at the time; for more than a year he was kept in prison by the new vizier, a son of al-Afḍal, whom the army had placed in the post; but towards the end of 1131 this vizier fell by the hand of assassins, and the caliph was set free. The reign of Ḥāfiẓ was disturbed by the factions of the soldiery, between which several battles took place, ending in the subjection of the caliph for a time to various usurpers, one of these being his own son Ḥasan, who had been provoked to rebel by the caliph nominating a younger brother as his successor. For some months the caliph was under this son's control; but the latter, who aimed at conciliating the people, speedily lost his popularity with the troops, and his father was able to get possession of his person and cause him to be poisoned (beginning of 1135).

His son *Abu'l-Manṣūr Ismā'īl*, who was seventeen years old at the time of Ḥāfiẓ's death, succeeded him with the title *al-Ẓāfir lia'dā allāh.* From this reign to the end of the Fāṭimite period we have the journals of two eminent men, Usāmah b. Muniqdh and Umārah of Yemen, which throw light on the leading characters. The civil dissensions of Egypt were notorious at the time. The new reign began by an armed struggle between two commanders for the post of vizier, which in January 1150 was decided in favour of the Amir Ibn Sallār. This vizier was presently assassinated by the direction of his stepson 'Abbās, who was raised to the vizierate in his place. This event was shortly followed by the loss to the Fāṭimites of Ascalon, the last place in Syria which they held; its loss was attributed to dissensions between the parties of which the garrison consisted. Four years later (April 1154) the caliph was murdered by his vizier 'Abbās, according to Usāmah, because the caliph had suggested to his favourite, the vizier's son, to murder his father; and this was followed by a massacre of the brothers of Ẓāfir, followed by the raising of his infant son *Abu'l-Qāsim 'Īsā* to the throne.

The new caliph, who was not five years old, received the title *al-Fā'iz binaṣr allāh*, and was at first in the power of 'Abbās. The women of the palace, however, summoned to their aid Ṭalā'i' b. Ruzzīk, prefect of Ushmunain, at whose arrival in Cairo the troops deserted 'Abbās, who was compelled to flee into Syria, taking his son and Usāmah with him. 'Abbās was killed by the Franks near Ascalon, his son sent in a cage to Cairo where he was executed, while Usāmah escaped to Damascus.

The infant Fā'iz, who had been permanently incapacitated by the scenes of violence which accompanied his accession, died in 1160. Ṭalā'i' chose to succeed him a grandson of Ẓāfir, who was nine years of age, and received the title *al-'Āḍid lidīn allāh.* Ṭalā'i', who had complete control of affairs, introduced the

Frankish Invasion.

Saladin.

practice of farming the taxes for periods of six months instead of a year, which led to great misery, as the taxes were demanded twice. His death was brought on by the rigour with which he treated the princesses, one of whom, with or without the connivance of the caliph, organized a plot for his assassination, and he died in September 1160. His son Ruzzīk inherited his post and maintained himself in it for more than a year, when another prefect of Upper Egypt, Shāwar b. Mujīr, brought a force to Cairo, before which Ruzzīk fled, to be shortly afterwards captured and beheaded. Shāwar's entry into Cairo was at the beginning of 1163; after nine months he was compelled to flee before another adventurer, an officer in the army named Ḍirghām. Shāwar's flight was directed to Damascus, where he was favourably received by the prince Nureddin, who sent with him to Cairo a force of Kurds under Asad al-dīn Shīrgūh. At the same time Egypt was invaded by the Franks, who raided and did much damage on the coast. Dirghām was defeated and killed, but a dispute then arose between Shāwar and his Syrian allies for the possession of Egypt. Shāwar, being unable to cope with the Syrians, demanded help of the Frankish king of Jerusalem Amalric (Amauri) I., who hastened to his aid with a large force, which united with Shāwar's and besieged Shīrgūh in Bilbeis for three months; at the end of this time, owing to the successes of Nureddin in Syria, the Franks granted Shīrgūh a free passage with his troops back to Syria, on condition of Egypt being evacuated (October 1164). Rather more than two years later Shīrgūh persuaded Nureddin to put him at the head of another expedition to Egypt, which left Syria in January 1167, and, entering Egypt by the land route, crossed the Nile at Itfīḥ (Atfih), and encamped at Giza; a Frankish army hastened to Shāwar's aid. At the battle of Bābain (April 11th, 1167) the allies were defeated by the forces commanded by Shīrgūh and his nephew Saladin, who was presently made prefect of Alexandria, which surrendered to Shīrgūh without a struggle. Saladin was soon besieged by the allies in Alexandria; but after seventy-five days the siege was raised, Shīrgūh having made a threatening movement on Cairo, where a Frankish garrison had been admitted by Shāwar. Terms were then made by which both Syrians and Franks were to quit Egypt, though the garrison of Cairo remained; the hostile attitude of the Moslem population to this garrison led to another invasion at the beginning of 1168 by King Amalric, who after taking Bilbeis advanced to Cairo. The caliph, who up to this time appears to have left the administration to the viziers, now sent for Shīrgūh, whose speedy arrival in Egypt caused the Franks to withdraw. Reaching Cairo on the 6th of January 1169, he was soon able to get possession of Shāwar's person, and after the prefect's execution, which happened some ten days later, he was appointed vizier by the caliph. After two months Shīrgūh died of indigestion (23rd of March 1169), and the caliph appointed Saladin as successor to Shīrgūh; the new vizier professed to hold office as a deputy of Nureddin, whose name was mentioned in public worship after that of the caliph. By appropriating the fiefs of the Egyptian officers and giving them to his Kurdish followers he stirred up much ill-feeling, which resulted in a conspiracy, of which the object was to recall the Franks with the view of overthrowing the new régime; but this conspiracy was revealed by a traitor and crushed. Nureddin loyally aided his deputy in dealing with Frankish invasions of Egypt, but the anomaly by which he, being a Sunnite, was made in Egypt to recognize a Fāṭimite caliph could not long continue, and he ordered Saladin to weaken the Fāṭimite by every available means, and then substitute the name of the Abbasid for his in public worship. Saladin and his ministers were at first afraid lest this step might give rise to disturbances among the people; but a stranger undertook to risk it on the 17th of September 1171, and the following Friday it was repeated by official order; the caliph himself died during the interval, and it is uncertain whether he ever heard of his deposition. The last of the Fāṭimite caliphs was not quite twenty-one years old at the time of his death.

(5) *Ayyubite Period.*—Saladin by the advice of his chief Nureddin cashiered the Fāṭimite judges and took steps to encourage the study of orthodox theology and jurisprudence in Egypt by the foundation of colleges and chairs. On the death of the ex-caliph he was confirmed in the prefecture of Egypt as deputy of Nureddin; and on the decease of the latter in 1174 (12th of April) he took the title sultan, so that with this year the Ayyubite period of Egyptian history properly begins. During the whole of it Damascus rather more than Cairo counted as the metropolis of the empire. The Egyptian army, which was motley in character, was disbanded by the new sultan, whose troops were Kurds. Though he did not build a new metropolis he fortified Cairo with the addition of a citadel, and had plans made for a new wall to enclose both it and the double city; this latter plan was never completed, but the former was executed after his death, and from this time till the French occupation of Egypt the citadel of Cairo was the political centre of the country. It was in 1183 that Saladin's rule over Egypt and North Syria was consolidated. Much of Saladin's time was spent in Syria, and his famous wars with the Franks belong to the history of the Crusades and to his personal biography. Egypt was largely governed by his favourite Karākūsh, who lives in popular legend as the "unjust judge," though he does not appear to have deserved that title.

Saladin at his death divided his dominions between his sons, of whom 'Othman succeeded to Egypt with the title *Malik al-Azīz 'Imād al-dīn*. The division was not satisfactory to the heirs, and after three years (beginning of 1196) the Egyptian sultan conspired with his uncle Malik al-'Ādil to deprive Saladin's son al-Afḍal of Damascus, which had fallen to his lot. The war between the brothers was continued with intervals of peace, during which al-'Ādil repeatedly changed sides: eventually he with al-'Azīz besieged and took Damascus, and sent al-Afḍal to Sarkhad, while al-'Ādil remained in possession of Damascus. On the death of al-'Azīz on the 29th of November 1198 in consequence of a hunting accident, his infant son Mahommed was raised to the throne with the title *Malik al-Manṣūr Nāṣir al-dīn*, and his uncle al-Afḍal sent for from Sarkhad to take the post of regent or Atābeg. So soon as al-Afdal had got possession of his nephew's person, he started on an expedition for the recovery of Damascus: al-'Ādil not only frustrated this, but drove him back to Egypt, where on the 25th of January 1200 a battle was fought between the armies of the two at Bilbeis, resulting in the defeat of al-Afḍal, who was sent back to Sarkhad, while al-'Ādil assumed the regency, for which after a few months he substituted the sovereignty, causing his nephew to be deposed. He reigned under the title *Malik al-'Ādil Saif al-dīn*. His name was Abū Bakr.

Though the early years of his reign were marked by numerous disasters, famine, pestilence and earthquake, of which the second seems to have been exceedingly serious, he reunited under his sway the whole of the empire which had belonged to his brother, and his generals conquered for him parts of Mesopotamia and Armenia, and in 1215 he got possession of Yemen. He followed the plan of dividing his empire between his sons, the eldest Mahommed, called *Malik al-Kāmil*, being his viceroy in Egypt, while al-Mu'azzam 'Īsā governed Syria, al-Ashraf Mūsā his eastern and al-Malik al-Auḥad Ayyūb his northern possessions. His attitude towards the Franks was at the first peaceful, but later in his reign he was compelled to adopt more strenuous measures. His death occurred at Alikin (1218), a village near Damascus, while the Franks were besieging Damietta—the first operation of the Fifth Crusade—which was defended by al-Kāmil, to whom his father kept sending reinforcements. The efforts of al-Kāmil after his accession to the independent sovereignty were seriously hindered by the endeavour of an amir named Aḥmed b. Mashṭūb to depose him and appoint in his place a brother called al-Fā'iz Sābiq al-dīn Ibrāhīm: this attempt was frustrated by the timely interposition of al-Mu'azzam 'Īsā, who came to Egypt to aid his brother in February 1219, and compelled al-Fā'iz to depart for Mosul. After a siege of sixteen and a half months Damietta was taken by the Franks on Tuesday the 6th of November 1219; al-Kāmil thereupon proclaimed the

Jihād, and was joined at his fortified camp, afterwards the site of Mansūra, by troops from various parts of Egypt, Syria and Mesopotamia, including the forces of his brothers ʽĪsā and Mūsā. With these allies, and availing himself of the advantages offered by the inundation of the Nile, al-Kāmil was able to cut off both the advance and the retreat of the invaders, and on the 31st of August 1221 a peace was concluded, by which the Franks evacuated Egypt.

For some years the dominions of al-ʽĀdil remained divided between his sons: when the affairs of Egypt were settled, al-Kāmil determined to reunite them as before, and to that end brought on the Sixth Crusade. Various cities in Palestine and Syria were yielded to Frederick II. as the price of his help against the son of Muʽazzam ʽĪsā, who reigned at Damascus with the title of Malik al-Nāṣir. About 1231–32 Kāmil led a confederacy of Ayyūbite princes against the Seljuk Kaikobad into Asia Minor, but his allies mistrusted him and victory rested with Kaikobad (see Seljuks). Before Kāmil's death he was mentioned in public prayer at Mecca as lord of Mecca (Hejāz), Yemen, Zabīd, Upper and Lower Egypt, Syria and Mesopotamia.

At his death (May 8th, 1238) at Damascus, his son Abū Bakr was appointed to succeed with the title *Malik al-ʽĀdil Saif al-dīn*; but his elder brother Malik al-Sāliḥ Najm al-dīn Ayyūb, having got possession of Damascus, immediately started for Egypt, with the view of adding that country to his dominions: meanwhile his uncle Ismāʽīl, prince of Hamath, with the prince of Homs, seized Damascus, upon hearing which the troops of Najm al-dīn deserted him at Nablus, when he fell into the hands of Malik al-Nāṣir, prince of Kerak, who carried him off to that city and kept him a prisoner there for a time; after which he was released and allowed to return to Nablus. On the 31st of May 1240 the new sultan was arrested at Bilbeis by his own amirs, who sent for Najm al-dīn to succeed him; and on the 19th of June of the same year Najm al-dīn entered Cairo as sultan, and imprisoned his brother in the citadel, where he died in 1248. Meanwhile in 1244 Jerusalem had been finally wrested from the Franks. The administration of Najm al-dīn is highly praised by Ibn Khallikan, who lived under it. He made large purchases of slaves (Mamelukes) for his army, and when the inhabitants of Cairo complained of their lawlessness, he built barracks for them on the island of Roda (Rauda), whence they were called Bahrī or Nile Mamelukes, which became the name of the first dynasty that originated from them. Much of his time was spent in campaigns in Syria, where the other Ayyūbites allied themselves against him with the Crusaders, whereas he accepted the services of the Khwarizmians: eventually he succeeded in recovering most of the Syrian cities. His name is commemorated by the town of Salihia, which he built in the year 1246 as a resting-place for his armies on their marches through the desert from Egypt to Palestine. In 1249 he was recalled from the siege of Homs by the news of the invasion of Egypt by Louis IX. (the Seventh Crusade), and in spite of illness he hastened to Ushmum Tannā, in the neighbourhood of Damietta, which he provisioned for a siege. Damietta was taken on the 6th of June 1249, owing to the desertion of his post by the commander Fakhr ud-dīn, and the Banū Kinānah, to whom the defence of the place had been entrusted: fifty-four of their chieftains were afterwards executed by the sultan for this proceeding. On the 22nd of November the sultan died of disease at Manṣūra, but his death was carefully concealed by the amirs Lājīn and Aktai, acting in concert with the Queen Shajar al-durr, till the arrival from Syria of the heir to the throne, *Tūrānshāh*, who was proclaimed some four months later. At the battle of Fāriskūr, 6th of April 1250, the invaders were utterly routed and the French king fell into the hands of the Egyptian sultan. The Egyptian authorities now resolved to raze Damietta, which, however, was rebuilt shortly after. The sultan, who himself had had no share in the victory, advanced after it from Manṣūra to Fāriskūr, where his conduct became menacing to the amirs who had raised him to the throne, and to Shajar al-durr; she in revenge organized an attack upon him which was successful, fire, water, and steel contributing to his end.

(6) *Period of Baḥrī Mamelukes.*—The dynasties that succeeded the Ayyūbites till the conquest of Egypt by the Ottomans bore the title Dynasties of the Turks, but are more often called Mameluke dynasties, because the sultans were drawn from the enfranchised slaves who constituted the court, and officered the army. The family of the fourth of these sovereigns, Kaʼāʼūn (Qalāʼūn), reigned for 110 years, but otherwise no sultan was able to found a durable dynasty: after the death of a sultan he was usually succeeded by an infant son, who after a short time was dethroned by a new usurper.

After the death of the Sultan Tūrānshāh, his step-mother at first was raised to the vacant throne, when she committed the administration of affairs to the captain of the retainers, Aibek; but the rule of a queen caused scandal to the Moslem world, and Shajar al-durr gave way to this sentiment by marrying Aibek and allowing the title sultan to be conferred on him instead of herself. For policy's sake, however, Aibek nominally associated with himself on the throne a scion of the Ayyūbite house, Malik al-Ashraf Musa, who died in prison (1252 or 1254). Aibek meanwhile immediately became involved in war with the Ayyūbite Malik al-Nāṣir, who was in possession of Syria, with whom the caliph induced him after some indecisive actions to make peace: he then successfully quelled a mutiny of Mamelukes, whom he compelled to take refuge with the last Abbasid caliph Mostasim in Bagdad and elsewhere. On the 10th of April 1257 Aibek was murdered by his wife Shajar al-durr, who was indignant at his asking for the hand of another queen: but Aibek's followers immediately avenged his death, placing on the throne his infant son *Malik al-Manṣūr*, who, however, was almost immediately displaced by his guardian *Koṭuz*, on the plea that the Mongol danger necessitated the presence of a grown man at the head of affairs. In 1260 the Syrian kingdom of al-Nāṣir was destroyed by Hulaku (Hulagu), the great Mongol chief, founder of the Ilkhan Dynasty (see Mongols), who, having finally overthrown the caliph of Bagdad (see Caliphate, sect. c. § 37), also despatched a threatening letter to Kotuz; but later in the same year Syria was invaded by Koṭuz, who defeated Hulagu's lieutenant at the battle of ʽAin Jālūt (3rd of September 1260), in consequence of which event the Syrian cities all rose against the Mongols, and the Egyptian sultan became master of the country with the exception of such places as were still held by the Crusaders.

Rule of Bibars.

Before Kotuz had reigned a year he was murdered at Sālihia by his lieutenant Bibars (October 23rd, 1260), who was piqued, it is said, at the governorship of Aleppo being withheld from him. The sovereignty was seized by this person with the title of *Malik al-Qāhir*, presently altered to *al-Zāhir*. He had originally been a slave of Malik al-Sāliḥ, had distinguished himself at the battle after which Louis IX. was captured, and had helped to murder Tūrānshāh. Sultan Bibars, who proved to be one of the most competent of the Bahrī Mamelukes, made Egypt the centre of the Moslem world by re-establishing in theory the Abbasid caliphate, which had lapsed through the taking of Bagdad by Hulagu, followed by the execution of the caliph. Bibars recognized the claim of a certain Abu'l-Qāsim Aḥmed to be the son of Zāhir, the 35th Abbasid caliph, and installed him as Commander of the Faithful at Cairo with the title *al-Mostanṣir billāh*. Mostanṣir then proceeded to confer on Bibars the title sultan, and to address to him a homily, explaining his duties. This document is preserved in the MS. life of Bibars, and translated by G. Weil. The sultan appears to have contemplated restoring the new caliph to the throne of Bagdad: the force, however, which he sent with him for the purpose of reconquering Irak was quite insufficient for the purpose, and Mostanṣir was defeated and slain. This did not prevent Bibars from maintaining his policy of appointing an Abbasid for the purpose of conferring legitimacy on himself; but he encouraged no further attempts at re-establishing the Abbasids at Bagdad, and his principle, adopted by successive sultans, was that the caliph should not leave Cairo except when accompanying the sultan on an expedition.

Abbasid caliphate revived.

The reign of Bibars was spent largely in successful wars against the Crusaders, from whom he took many cities, notably Safad, Caesarea and Antioch; the Armenians, whose territory he repeatedly invaded, burning their capital Sis; and the Seljukids of Asia Minor. He further reduced the Ismā'ilians or Assassins, whose existence as a community lasted on in Syria after it had nearly come to an end in Persia. He made Nubia tributary, therein extending Moslem arms farther south than they had been extended by any previous sultan. His authority was before his death recognized all over Syria (with the exception of the few cities still in the power of the Franks), over Arabia, with the exception of Yemen, on the Euphrates from Birah to Kerkesia (Circesium) on the Chaboras (Khabur), whilst the amirs of north-western Africa were tributary to him. His successes were won not only by military and political ability, but also by the most absolute unscrupulousness, neither flagrant perjury nor the basest treachery being disdained. He was the first sultan who acknowledged the equal authority of the four schools of law, and appointed judges belonging to each in Egypt and Syria; he was thus able to get his measures approved by one school when condemned by another.

Kalā'ūn.

On the 1st of July 1277 Bibars died, and the events that followed set an example repeatedly followed during the period of the Mamelukes. The sultan's son *Malik al-Sa'īd* ascended the throne; but within little more than two years he was compelled to abdicate in favour of his father-in-law *Kalā'ūn*, a Mameluke who had risen high in the former sovereign's service. The accession of Kalā'ūn was also marked by an attempt on the part of the governor of Damascus to form Syria into an independent kingdom, an attempt frequently imitated on similar occasions. The Syrian forces were defeated at the battle of Jazūrah (April 26th, 1280) and Kalā'ūn resumed possession of the country; but the disaffected Syrians entered into relations with the Mongols, who proceeded to invade Syria, but were finally defeated by Kalā'ūn on the 30th of October 1281 under the walls of Homs (Emesa).

The conversion to Islam of Nikudar Ahmad, the third of the Ilkhan rulers of Persia, and the consequent troubles in the western Mongol empire, let to a suspension of hostilities between Egypt and the Ilkhans (see PERSIA: *History*, § B), though the latter did not cease to agitate in Europe for a renewal of the Crusades, with little result. Kalā'ūn, without pursuing any career of active conquest, did much to consolidate his dominions, and especially to extend Egyptian commerce, for which purpose he started passports enabling merchants to travel with safety through Egypt and Syria as far as India. After the danger from the Mongols had ceased, however, Kalā'ūn directed his energies towards capturing the last places that remained in the hands of the Franks, and proceeded to take Markab, Latakia, and Tripoli (April 26th, 1289). In 1290 he planned an attack on Acre, but died (November 10th) in the middle of all his preparations. Under Kalā'ūn we first hear of the Burjite Mamelukes, who owe their name to the citadel (Burj) of Cairo, where 3700 of the whole number of 12,000 Mamelukes maintained by this sovereign were quartered. He also set an example, frequently followed, of the practice of dismissing all non-Moslems from government posts: this was often done by his successors with the view of conciliating the Moslems, but it was speedily found that the services of the Jewish and Christian clerks were again required. He further founded a hospital for clinical research on a scale formerly unknown.

Malik al-Nāṣir.

Mongol Wars.

Kalā'ūn was followed by his son *Khalīl* (*Malik al-Ashraf Salāḥ al-dīn*), who carried out his father's policy of driving the Franks out of Syria and Palestine, and proceeded with the siege of Acre, which he took (May 18th, 1291) after a siege of forty-three days. The capture and destruction of this important place were followed by the capture of Tyre, Sidon, Haifa, Athlit and Beirut, and thus Syria was cleared of the Crusaders. He also planned an expedition against the prince of Lesser Armenia, which was averted by the surrender of Behesna, Marash and Tell Ḥamdūn. The disputes between his favourite, the vizier Ibn al-Sa'lūs, and his viceroy Baidara led to his being murdered by the latter (December 12th, 1293), who was proclaimed sultan, but almost immediately fell a victim to the vengeance of the deceased sultan's party, who placed a younger son of Kalā'ūn, *Mahommed Malik al-Nāṣir*, on the throne. This prince had the singular fortune of reigning three times, being twice dethroned: he was first installed on the 14th of December 1293, when he was nine years old, and the affairs of the kingdom were undertaken by a cabinet, consisting of a vizier ('Alam al-dīn Sinjar), a viceroy (Kitboga), a war minister (Ḥusām al-dīn Lājīn al-Rūmī), a prefect of the palace (Rokneddin Bibars Jāshengir) and a secretary of state (Rokneddin Bibars Manṣūrī). This cabinet naturally split into rival camps, in consequence of which Kitboga, himself a Mongol, with the aid of other Mongols who had come into Egypt after the battle of Homs, succeeded in ousting his rivals, and presently, with the aid of the surviving assassins of the former sultan, compelling Malik al-Nāṣir to abdicate in his favour (December 1st, 1294). The usurper was, however, able to maintain himself for two years only, famine and pestilence which prevailed in Egypt and Syria during his reign rendering him unpopular, while his arbitrary treatment of the amirs also gave offence. He was dethroned in 1296, and one of the murderers of Khalīl, Ḥusām al-dīn *Lājīn*, son-in-law of the sultan Bibars and formerly governor of Damascus, installed in his palace (November 26th, 1296). It had become the practice of the Egyptian sultans to bestow all offices of importance on their own freedmen (Mamelukes) to the exclusion of the older amirs, whom they could not trust so well, but who in turn became still more disaffected. Ḥusām al-dīn fell a victim to the jealousy of the older amirs whom he had incensed by bestowing arbitrary power on his own Mameluke Mengutimur, and was murdered on the 16th of January 1299. His short reign was marked by some fairly successful incursions into Armenia, and the recovery of the fortresses Marash and Tell Ḥamdūn, which had been retaken by the Armenians. He also instituted a fresh survey and division of land in Egypt and Syria, which occasioned much discontent. After his murder the deposed sultan Malik al-Nāṣir, who had been living in retirement at Kerak, was recalled by the army and reinstated as sultan in Cairo (February 7th, 1299), though still only fourteen years of age, so that public affairs were administered not by him, but by Salār the viceroy, and Bibars Jāshengir, prefect of the palace. The 7th Ilkhan, Ghazan Mahmud, took advantage of the disorder in the Mameluke empire to invade Syria in the latter half of 1299, when his forces inflicted a severe defeat on those of the new sultan, and seized several cities, including the capital Damascus, of which, however, they were unable to storm the citadel; in 1300, when a fresh army was collected in Egypt, the Mongols evacuated Damascus and made no attempt to secure their other conquests. The fear of further Mongolian invasion led to the imposition of fresh taxes in both Egypt and Syria, including one of 33% on rents, which occasioned many complaints. The invasion did not take place till 1303, when at the battle of Marj al-Ṣaffar (April 20th) the Mongols were defeated. This was the last time that the Ilkhans gave the Egyptian sultans serious trouble; and in the letter written in the sultan's name to the Ilkhan announcing the victory, the former suggested that the caliphate of Bagdad should be restored to the titular Abbasid caliph who had accompanied the Egyptian expedition, a suggestion which does not appear to have led to any actual steps being taken. The fact that the Mongols were in ostensible alliance with Christian princes led to a renewal by the sultan of the ordinances against Jews and Christians which had often been abrogated, as often renewed and again fallen into abeyance; and their renewal led to missions from various Christian princes requesting milder terms for their co-religionists. The amirs Salār and Bibars having usurped the whole of the sultan's authority, he, after some futile attempts to free himself of them, under the pretext of pilgrimage to Mecca, retired in March 1309 to Kerak, whence he sent his abdication to Cairo; in consequence of which, on the 5th of April 1309, *Bibars Jāshengir* was proclaimed sultan, with the title *Malik al-Moẓaffar*. This prince was originally a freedman of Kalā'ūn, and was the first Circassian who ascended the throne of Egypt. Before the year was out the new sultan had been rendered unpopular by the occurrence of a famine, and Malik al-Nāṣir was easily able to induce the Syrian amirs to return to his allegiance, in consequence of which Bibars in his turn abdicated, and Malik al-Nāṣir re-entered Cairo as sovereign on the 5th of March 1310. He soon found the means to execute both Bibars and Salār, while other amirs who had been eminent under the former régime fled to the Mongols. The relations between their Ilkhan and the Egyptian sultan continued strained, and the 8th Ilkhan Oeljeitu (1304–1316) addressed letters to Philip the Fair and the English king Edward I. (answered by Edward II. in 1307), desiring aid against Malik al-Nāsir; and for many years the courts of the sultan and the Ilkhan continued to be the refuge of malcontents from the other kingdom. Finally in 1322 terms of peace and alliance were agreed on between the sultan and Abū Sa'id the 9th Ilkhan. The sultan also entered into relations with the Mongols of the Golden Horde and in 1319 married a daughter of the reigning prince Uzbeg Khan (see MONGOLS: *Golden Horde*). Much of Malik al-Nāṣir's third administration was spent in raids into Nubia, where he endeavoured to set up a creature of his own as sovereign, in attempts at bringing the Bedouins of south-eastern Egypt into subordination, and in persecuting the Nosairīs, whose heresy became formidable about this time. Like other Egyptian sultans he made considerable use of the Assassins, 124 of whom were sent by him into Persia to execute Kara Sonkor, at one time governor of Damascus, and one of the murderers of Malik al-Ashraf; but they were all outwitted by the exile, who was finally poisoned by the Ilkhan in recompense for a similar service rendered by the Egyptian sultan. For a time Malik al-Nāṣir was recognized as suzerain in north Africa, the Arabian Irak, and Asia Minor, but he was unable to make any permanent conquests in any of these countries. He brought Medīna, which had previously been governed by independent sherīfs, to acknowledge his authority. His diplomatic relations were more extensive than those of any previous sultan, and included Bulgarian, Indian, and Abyssinian potentates, as well as the pope, the king of Aragon and the king of France. He appears to have done his utmost to protect his Christian subjects, incurring thereby the reproaches of the more fanatical Moslems, especially in the year 1320 when owing to incendiarism in Cairo there was danger of a general massacre of the Christian population. His internal administration was marked by gross extravagance, which led to his viziers being forced to practise violent extortion for which they afterwards suffered. He paid considerable attention to sheep-breeding and agriculture, and by a canal which he had dug from Fuah to Alexandria not only assisted commerce but brought 100,000 feddans under cultivation. His taste for building and street improvement led to the beautifying of Cairo, and his example was followed by the governors of other great cities in the empire, notably Aleppo and Damascus. He paid exceptionally high prices for Mamelukes, many of whom were sold by their Mongol parents to his agents, and accustomed them to greater luxury than was usual under his predecessors. In 1315 he instituted a survey of Egypt, and of the twenty-four parts into which it was divided ten were assigned to the sultan and fourteen to the amirs and the army. He took occasion to abolish a variety of vexatious imposts, and the new budget fell less heavily on the Christians than the old. Among the literary ornaments of his reign was the historian and geographer Ismā'īl Abulfeda (*q.v.*), to whom Malik al-Nāṣir restored the government of Hamath, which had belonged to his ancestors, and even gave the title sultan. He died on the 7th of June 1341. The son, *Abu Bakr*, to whom he had left the throne, was able to maintain himself only a few months on it, being compelled to abdicate on the 4th of August 1341 in favour of his infant brother *Kuchuk*; the revolution was brought about by Kausūn, a powerful Mameluke of the preceding monarch. This person's authority was, however, soon overthrown by a party formed by the Syrian prefects, and on the 11th of January *Malik al-Nāṣir Aḥmad*, an elder son of the former sultan of the same title, was installed in his place, though he did not actually arrive in Cairo till the 6th of November, being unwilling to leave Kerak, where he had been living in retirement. After a brief sojourn in Cairo he speedily returned thither, thereby forfeiting his throne, which was conferred by the amirs on his brother *Ismā'īl al-Malik al-Ṣāliḥ* (June 27th, 1342). This sultan was mainly occupied during his short reign with besieging and taking Kerak, whither Aḥmad had taken refuge, and himself died on the 3rd of August 1345, when another son of Malik al-Nāṣir, named *Sha'bān*, was placed on the throne.

Decline of the Bahri power.

The constant changes of sultan led to great disorder in the provinces, and many of the subject principalities endeavoured to shake off the Egyptian yoke. Sha'bān proved no more competent than his predecessors, being given to open debauchery and profligacy, an example followed by his amirs, and fresh discontent led to his being deposed by the Syrian amirs, when his brother *Ḥājjī* was proclaimed sultan in his place (September 18th, 1346). Ḥājjī was deposed and killed on the 10th of December 1347, and another infant son of Malik al-Nāṣir, *Ḥasan*, who took his father's title, was proclaimed, the real power being shared by three amirs, Sheikhun, Menjek and Yelbogha Arus. During this reign (1348–1349) Egypt was visited by the "Black Death," which is said to have carried off 900,000 of the inhabitants of Cairo and to have raged as far south as Assuan. Towards the beginning of 1351 the sultan got rid of his guardians and attempted to rule by himself; but though successful in war, his arbitrary measures led to his being dethroned on the 21st of August 1351 by the amirs, who proclaimed his brother Ṣāliḥ with the title of *Malik al-Ṣāliḥ*. He too was only fourteen years of age. The power was contested for by various groups of amirs, whose struggles ended with the deposition of the sultan Ṣāliḥ on the 20th of October 1354, and the reinstatement of his brother *Ḥasan*, who was again dethroned on the 16th of March 1361 by an amir Yelbogha, whom he had offended, and who, having got possession of the sultan's person, murdered him. The next day a son of the dethroned sultan Ḥājjī was proclaimed sultan with the title *Malik al-Manṣūr*. On the 29th of May 1363 this sultan was also dethroned on the ground of incompetence, and his place was given to another grandson of Malik al-Nāṣir, *Sha'bān*, son of Ḥosain, then ten years old. The amir Yelbogha at first held all real power and is said to have acquired a degree of authority which no other subject ever held. During this reign, on the 8th of October 1365, a landing was effected at Alexandria by a Frankish fleet under Peter I. of Cyprus, which presently took possession of the city; the Franks were speedily compelled to embark again after plundering the city, for which compensation was afterwards demanded by Yelbogha from the Christian population of Egypt and Syria. Alexandria was further made the seat of a viceroy, having previously only had a prefect. On the 11th of December 1366 Yelbogha was himself attacked by the sultan, captured and slain. His successor in the office of first minister was a mere tool in the hands of his Mamelukes, who compelled him to institute and depose governors, &c., at their pleasure. In 1374 the Egyptians raided Cilicia and captured Leo VI., prince of Lesser Armenia, which now became an Egyptian province with a Moslem governor. On the 15th of March 1377 the sultan was murdered by the Mamelukes, owing to his refusing a largess of money which they demanded. The infant son of the late sultan *'Alī*, a lad of eight years, was proclaimed with the title *Malik al-Manṣūr*; the power was in the hands of the ministers Kartai and Ibek, the latter of whom overthrew the former with the aid of his own Mamelukes, Berekeh and Barkūk. An insurrection in Syria which spread to Egypt presently caused the fall of Ibek, and led to the occupation of the highest posts by the Circassian freedmen Berekeh and Barkūk, of whom the latter ere long succeeded in ousting the former and usurping the sultan's place; on the 19th of May 1381, when the sultan 'Alī died, his place was given to an infant brother Ḥājjī, but on the 26th of November 1382, *Barkūk* set this child aside and had himself proclaimed sultan (with the title *Malik al-Ẓāhir*), thereby ending the Bahrī dynasty and commencing that of the Circassians. For a short period, however, Ḥājjī was restored, when on the 1st of June 1389 Cairo was taken by Yelbogha, governor of Damascus, and Barkûk expelled; Ḥâjjî reigned at first under the guardianship of Yelbogha, who was then overthrown by Mintâsh; Barkûk, who had been relegated to Kerak, succeeded in again forming a party, and in a battle fought at Shakhab, January 1390, succeeded in gaining possession of the person of the sultan Ḥâjjî, and on the 21st of January he was again proclaimed sultan in Cairo.

(7) *Period of Burjî Mamelukes.*—Barkûk presently entered into relations with the Ottoman sultan Bâyezîd I., and by slaying an envoy of Timur incurred the displeasure of the world-conqueror; and in 1394 led an army into Syria with the view of restoring the Jelairid Ilkhan Aḥmad to Bagdad (as Barkûk's vassal), and meeting the Mongol invasion. Barkûk, however, died (June 20th, 1399) before Timur had time to invade Syria. According to the custom that had so often proved disastrous, a young son of Barkûk, *Faraj*, then aged thirteen, was appointed sultan under the guardianship of two amirs. Incursions were immediately made by the Ottoman sultan into the territory of Egyptian vassals at Derendeh and Albistan (Ablestin), and Malatia was besieged by his forces. Timur, who was at this time beginning his campaign against Bâyezîd, turned his attention first to Syria, and on the 30th of October 1400 defeated the Syrian amirs near Aleppo, and soon got possession of the city and the citadel. He proceeded to take Hamah, Homs (Emesa) and other towns, and on the 20th of December started for Damascus. An endeavour was made by the Egyptian sultan to relieve Damascus, but the news of an insurrection in Cairo caused him to retire and leave the place to its fate. In the first three months of 1401 the whole of Northern Syria suffered from Timur's marauders. In the following year (September 29th, 1402) Timur who had in the interval inflicted a crushing defeat on the Ottoman sultan, sent to demand homage from Faraj, and his demand was readily granted, together with the delivery of the princes who had sought refuge from Timur in Egyptian territory. The death of Timur in February 1405 restored Egyptian authority in Syria, which, however, became a rendezvous for all who were discontented with the rule of Faraj and his amirs, and two months after Timur's death was in open rebellion against Faraj. Although Faraj succeeded in defeating the rebels, he was compelled by insubordination on the part of his Circassian Mamelukes to abdicate (September 20th, 1405), when his brother *Abd al-'aziz* was proclaimed with the title *Malik al-Manṣûr*; after two months this prince was deposed, and Faraj, who had been in hiding, recalled. Most of his reign was, however, occupied with revolts on the part of the Syrian amirs, to quell whom he repeatedly visited Syria; the leaders of the rebels were the amirs Newruz and Sheik Maḥmûdî, afterwards sultan. Owing to disturbances and misgovernment the population of Egypt and Syria is said to have shrunk to a third in his time, and he offended public sentiment not only by debauchery, but by having his image stamped on his coins. On the 23rd of May 1412, after being defeated and shut up in Damascus, he was compelled by Sheik Maḥmûdî to abdicate, and an Abbasid caliph, Mosta'în, was proclaimed sultan, only to be forced to abdicate on the 6th of November of the same year in *Sheik's* favour, who took the title *Malik al-Mu'ayyad*, his colleague Newruz having been previously sent to Syria, where he was to be autocrat by the terms of their agreement. In the struggle which naturally followed between the two, Newruz was shut up in Damascus, defeated and slain. Sheik himself invaded Asia Minor and forced the Turkoman states to acknowledge his suzerainty. After the sultan's return they soon rebelled, but were again brought into subjection by Sheik's son Ibrâhîm; his victories excited the envy of his father, who is said to have poisoned him. Sheik himself died a few months after the decease of his son (January 13th, 1421), and another infant son, *Aḥmad*, was proclaimed with the title *Malik al-Moẓaffar*, the proclamation being followed by the usual dissensions between the amirs, ending with the assumption of supreme power by the amir *Tatar*, who, after defeating his rivals, on the 29th of August 1421 had himself proclaimed sultan with the title *Malik al-Ẓâhir*. This usurper, however, died on the 30th of November of the same year, leaving the throne to an infant son *Mohammed*, who was given the title *Malik al-Ṣâliḥ*; the regular intrigues between the amirs followed, leading to his being dethroned on the following 1st of April 1422, when the amir appointed to be his tutor, *Barsbai*, was proclaimed sultan with the title *Malik al-Ashraf*. This sultan avenged the attacks on Alexandria repeatedly made by Cyprian ships, for he sent a fleet which burned Limasol, and another which took Famagusta (August 4th, 1425), but failed in the endeavour to annex the island permanently. An expedition sent in the following year (1426) succeeded in taking captive the king of Cyprus, who was brought to Cairo and presently released for a ransom of 200,000 dinars, on condition of acknowledging the suzerainty of the Egyptian sultan and paying him an annual tribute. Barsbai appears to have excelled his predecessors in the invention of devices for exacting money from merchants and pilgrims, and in juggling with the exchange. This led to a naval demonstration on the part of the Venetians, who secured better terms for their trade, and to the seizure of Egyptian vessels by the king of Aragon and the prince of Catalonia. In a census made during Barsbai's reign, it was found that the total number of towns and villages in Egypt had sunk to 2170, whereas in the 4th century A.H. it had stood at 10,000. Much of Barsbai's attention was occupied with raids into Asia Minor, where the Dhu 'l-Kadiri Turkomans frequently rebelled, and with wars against Kara Yelek, prince of Amid, and Shah Rokh, son of Timur. Barsbai died on the 7th of June 1438. In accordance with the custom of his predecessors he left the throne to a son still in his minority, *Abu'l-Maḥâsin Yûsuf*, who took the title *Malik al-'Azîz*, but as usual after a few months he was displaced by the regent *Jakmak*, who on the 9th of September 1438 was proclaimed sultan with the title *Malik al-Ẓâhir*. In the years 1442–1444 this sultan sent three fleets against Rhodes, where the third effected a landing, but was unable to make any permanent conquest. In consequence of a lengthy illness Jakmak abdicated on the 1st of February 1453; when his son *'Othman* was proclaimed sultan with the title *Malik al-Manṣûr*. Though not a minor, he had no greater success than the sons of the usurpers who preceded him, being dethroned after six weeks (March 15th, 1453) in favour of the amir *Inal al-'Alâ'î*, who took the title *Malik al-Ashraf*. His reign was marked by friendly relations with the Ottoman sultan Mahommed II., whose capture of Constantinople (1453) was the cause of great rejoicings in Egypt, but also by violent excesses on the part of the Mamelukes, who dictated the sultan's policy. On his death on the 26th of February 1461 his son *Aḥmad* was proclaimed sultan with the title *Malik al-Mu'ayyad*; he had the usual fate of sultans' sons, earned in his case by an attempt to bring the Mamelukes under discipline; he was compelled to abdicate on the 28th of June 1461, when the amir *Khoshkadam*, who had served as a general, was proclaimed sultan. Unlike the other Mameluke sovereigns, who were Turks or Circassians, this man had originally been a Greek slave.

Timur in Syria.

Wars with European powers.

In his reign (1463) there began the struggle between the Egyptian and the Ottoman sultanates which finally led to the incorporation of Egypt in the Ottoman empire. The dispute began with a struggle over the succession in the principality of Karaman, where the two sultans favoured rival candidates, and the Ottoman sultan Mahommed II. supported the claim of his candidate with force of arms, obtaining as the price of his assistance several towns in which the suzerainty of the Egyptian sultan had been acknowledged. Open war did not, however, break out between the two states in Khoshkadam's time. This sultan is said to have taken money to permit innocent persons to be ill-treated or executed. He died on the 9th of October 1467, when the Atâbeg *Yelbai* was selected by the Mamelukes to succeed him, and was proclaimed sultan with the title of *Malik al-Ẓâhir*. This person, proving incompetent, was deposed by a revolution of the Mamelukes on the 4th of December 1467, when the Atâbeg *Timurbogha*

Early relations with Turkey.

was proclaimed with the title *Malik al-Ẓāhir*. In a month's time, however, there was another palace revolution, and the new Atābeg *Kait Bey* or *Kaietbai* (January 31st, 1468) was proclaimed sultan, the dethroned Timurbogha being, however, permitted to go free whither he pleased. Much of Kait Bey's reign was spent in struggles with Ūzūn Hasan, prince of Diārbekr, and Shah Siwār, chief of the Dhu'l-Kādiri Turkomans. He also offended the Ottoman sultan Bāyezid II. by entertaining his brother Jem, who was afterwards poisoned in Europe. Owing to this, and also to the fact that an Indian embassy to the Ottoman sultan was intercepted by the agents of Kait Bey, Bāyezid II. declared war against Egypt, and seized Adana, Tarsus and other places within Egyptian territory; extraordinary efforts were made by Kait Bey, whose generals inflicted a severe defeat on the Ottoman invaders. In 1491, however, after the Egyptians had repeatedly defeated the Ottoman troops, Kait Bey made proposals of peace which were accepted, the keys of the towns which the Ottomans had seized being restored to the Egyptian sultan. Kait Bey endeavoured to assist his co-religionists in Spain who were threatened by King Ferdinand, by threatening the pope with reprisals on Syrian Christians, but without effect. As the consequence of a palace intrigue, which Kait Bey was too old to quell, on the 7th of August 1496, a day before his death, his son *Mahommed* was proclaimed sultan with the title *Malik al-Nāsir*; this was in order to put the supreme power into the hands of the Atābeg Kānsūh, since the new sultan was only fourteen years old. An attempt of the Atābeg to oust the new sultan, however, failed. After a reign of little more than two years, filled mainly with struggles between rival amirs, Malik al-Nāṣir was murdered (October 31st, 1498), and his uncle and vizier *Kānsūh* proclaimed sultan with the title *Malik al-Zāhir*. His reign only lasted about twenty months; on the 30th of June 1500 he was dethroned by Tūmānbey, who caused *Jān Belāt*, the Atābeg, to be proclaimed sultan. A few months later *Tūmānbey*, at the suggestion of Kasrawah, governor of Damascus, whom he had been sent to reduce to subjection, ousted Jān Belāt, and was himself proclaimed sultan with the title *Malik al-'Ādil* (January 25th, 1501). His reign lasted only one hundred days, when he was displaced by *Kānsūh al-Ghūrī* (April 20th, 1501). His reign was remarkable for a naval conflict between the Egyptians and the Portuguese, whose fleet interfered with the pilgrim route from India to Mecca, and also with the trade between India and Egypt; Kānsūh caused a fleet to be built which fought naval battles with the Portuguese with varying results.

The Turkish conquest.

In 1515 there began the war with the Ottoman sultan Selim I. which led to the close of the Mameluke period, and the incorporation of Egypt and its dependencies in the Ottoman empire (see TURKEY: *History*). Kānsūh was charged by Selim with giving the envoys of the Ṣafawid Isma'il passage through Syria on their way to Venice to form a confederacy against the Turks, and with harbouring various refugees. The actual declaration of war was not made by Selim till May 1515, when the Ottoman sultan had made all his preparations; and at the battle of Merj Dabik, on the 24th of August 1515, Kānsūh was defeated by the Ottoman forces and fell fighting. Syria passed quickly into the possession of the Turks, whose advent was in many places welcome as meaning deliverance from the Mamelukes. In Cairo, when the news of the defeat and death of the Egyptian sultan arrived, the governor who had been left by Kānsūh, *Tūmānbey*, was proclaimed sultan (October 17th, 1516). On the 20th of January 1517 Cairo was taken by the Ottomans, and Selim shortly after declared sultan of Egypt. Tūmānbey continued the struggle for some months, but was finally defeated, and after being captured and kept in prison seventeen days was executed on the 15th of April 1517.

(8) *The Turkish Period.*—The sultan Selim left with his viceroy Khair Bey a guard of 5000 janissaries, but otherwise made few changes in the administration of the country. The register by which a great portion of the land was a fief of the Mamelukes was left unchanged, and it is said that a proposal made by the sultan's vizier to appropriate these estates was punished with death. The Mameluke amirs were to be retained in office as heads of twelve sanjaks into which Egypt was divided; and under the next sultan, Suleiman I., two chambers were created, called respectively the Greater and the Lesser Divan, in which both the army and the ecclesiastical authorities were represented, to aid the pasha by their deliberations. Six regiments altogether were constituted by the conqueror Selim for the protection of Egypt; to these Suleiman added a seventh, of Circassians. As will be seen from the tables, it was the practice of the Porte to change the governor of Egypt at very short intervals—after a year or even some months. The third governor, Aḥmad Pasha, hearing that orders for this execution had come from Constantinople, endeavoured to make himself an independent ruler and had coins struck in his own name. His schemes were frustrated by two of the amirs whom he had imprisoned and who, escaping from their confinement, attacked him in his bath and killed him. In 1527 the first survey of Egypt under the Ottomans was made, in consequence of the official copy of the former registers having perished by fire; yet this new survey did not come into use until 1605. Egyptian lands were divided in it into four classes—the sultan's domain, fiefs, land for the maintenance of the army, and lands settled on religious foundations.

Troubles with the army.

It would seem that the constant changes in the government caused the army to get out of control at an early period of the Ottoman occupation, and at the beginning of the 11th Islamic century mutinies became common; in 1013 (1604) the governor Ibrahim Pasha was murdered by the soldiers, and his head set on the Bab Zuwēla. The reason for these mutinies was the attempt made by successive pashas to put a stop to the extortion called *Tulbah*, a forced payment exacted by the troops from the inhabitants of the country by the fiction of debts requiring to be discharged, which led to grievous ill-usage. In 1609 something like civil war broke out between the army and the pasha, who had on his side some loyal regiments and the Bedouins. The soldiers went so far as to choose a sultan, and to divide provisionally the regions of Cairo between them. They were defeated by the governor Mahommed Pasha, who on the 5th of February 1610 entered Cairo in triumph, executed the ringleaders, and banished many others to Yemen. The contemporary historian speaks of this event as a second conquest of Egypt for the Ottomans. A great financial reform was now effected by Mahommed Pasha, who readjusted the burdens imposed on the different communities of Egypt in accordance with their means. With the troubles that beset the metropolis of the Ottoman empire, the governors appointed thence came to be treated by the Egyptians with continually decreasing respect. In July 1623 there came an order from the Porte dismissing Muṣṭafā Pasha and appointing 'Alī Pasha governor in his place. The officers met and demanded from the newly-appointed governor's deputy the customary gratuity, when this was refused they sent letters to the Porte declaring that they wished to have Mustafā Pasha and not 'Alī Pasha as governor. Meanwhile 'Alī Pasha had arrived at Alexandria, and was met by a deputation from Cairo telling him that he was not wanted. He returned a mild answer; and, when a rejoinder came in the same style as the first message, he had the leader of the deputation arrested and imprisoned. Hereupon the garrison of Alexandria attacked the castle and rescued the prisoner, whereupon 'Alī Pasha was compelled to embark. Shortly after a rescript arrived from Constantinople confirming Muṣṭafā Pasha in the governorship. Similarly in 1631 the army took upon themselves to depose the governor Mūsā Pasha, in indignation at his execution of Kītās Bey, an officer who was to have commanded an Egyptian force required for service in Persia. The pasha was ordered either to hand over the executioners to vengeance or to resign his place; as he refused to do the former he was compelled to do the latter, and presently a rescript came from Constantinople, approving the conduct of the army and appointing one Khalīl Pasha as Mūsā's successor. Not only was the governor unsupported by the sultan against the troops, but each new governor regularly inflicted a fine upon his outgoing predecessor, under the name of money due to the treasury; and the outgoing governor would not be allowed to leave Egypt till he had paid it. Besides the extortions to which this practice gave occasion the country suffered greatly in these centuries from famine and pestilence. The latter in the spring of 1619 is said to have carried off 635,000 persons, and in 1643 completely desolated 230 villages.

Rise of the Beys.

By the 18th century the importance of the pasha was quite superseded by that of the beys, and two offices, those of Sheik al-Balad and Amīr al-Ḥājj, which were held by these persons, represented the real headship of the community. The process by which this state of affairs came about is somewhat obscure, owing to the want of good chronicles for the Turkish period of Egyptian history. In 1707 the Sheik al-Balad, Qāsim Iywāz, is found at the head of one of two Mameluke factions, the Qāsimites and the Fiqārites, between whom the seeds of enmity were sown by the pasha of the time, with the result that a fight took place between the factions outside Cairo, lasting eighty days. At the end of that time Qāsim Iywāz was killed and the office which he had held was given to his son Ismā'īl. Ismā'īl held this office for sixteen years, while the pashas were constantly being changed, and succeeded in reconciling the two factions of Mamelukes. In 1724 this person was assassinated through the machinations of the pasha, and Shirkas Bey, of the opposing faction, elevated to the office of Sheik al-Balad in his place. He was soon driven from his post by one of his own faction called Dhu'l-Fiqār, and fled to Upper Egypt. After a short time he returned at the head of an army, and some engagements ensued, in the last of which Shirkas Bey met his end by drowning; Dhu'l-Fiqār was himself assassinated in 1730 shortly after this event. His place was filled by Othman Bey, who had served as his general in this war. In 1743 Othman Bey, who had governed with wisdom and moderation, was forced to fly from Egypt by the intrigues of two adventurers, Ibrāhīm and Riḍwān Bey, who, when their scheme had succeeded, began a massacre of beys and others thought to be opposed to them; they then proceeded to govern Egypt jointly, holding the two offices mentioned above in alternate years. An attempt made by one of the pashas to rid himself of these two persons by a *coup d'état* signally failed owing to the loyalty of their armed supporters, who released Ibrāhīm and Riḍwān from prison and compelled the pasha to fly to Constantinople. An attempt made by a subsequent pasha in accordance with secret orders from Constantinople was so far successful that some of the beys were killed. Ibrāhīm and Riḍwān escaped, and compelled the pasha to resign his governorship and return to Constantinople. Ibrāhīm shortly afterwards fell by the hand of an assassin who had aspired to occupy one of the vacant beyships himself, which was conferred instead on 'Alī, who as 'Alī Bey was destined to play an important part in the history of Egypt. The murder of Ibrāhīm Bey took place in 1755, and his colleague Riḍwān perished in the disputes that followed upon it.

'Alī Bey.

'Alī Bey, who had first distinguished himself by defending a caravan in Arabia against bandits, set himself the task of avenging the death of his former master Ibrāhīm, and spent eight years in purchasing Mamelukes and winning other adherents. He thereby excited the suspicions of the Sheik al-Balad Khalīl Bey, who organized an attack upon him in the streets of Cairo, in consequence of which he fled to Upper Egypt. Here he met one Ṣāliḥ Bey, who had injuries to avenge on Khalīl Bey, and the two organized a force with which they returned to Cairo and defeated Khalīl, who was forced to fly to Ṭanṭa, where for a time he concealed himself, eventually, however, he was discovered, sent to Alexandria and finally strangled. The date of 'Alī Bey's victory was 1164 A.H. (A.D. 1750), and after it he was made Sheik al-Balad In that capacity he executed the murderer of his former master Ibrāhīm; but the resentment which this act aroused among the beys caused him to leave his post and fly to Syria, where he won the friendship of the governor of Acre, Ẓāhir b. Omar, who obtained for him the goodwill of the Porte and reinstatement in his post as Sheik al-Balad. In 1766, after the death of his supporter the grand vizier Rāghib Pasha, he was again compelled to fly from Egypt to Yemen, but in the following year he was told that his party at Cairo was strong enough to permit of his return. Resuming his office he raised eighteen of his friends to the rank of bey, among them Ibrāhīm and Murād, who were afterwards at the head of affairs, as well as Mahommed Abu'l-Dhahab, who was closely connected with the rest of 'Alī Bey's career. He appears to have done his utmost to bring Egyptian affairs into order, and by very severe measures repressed the brigandage of the Bedouins of Lower Egypt. He appears to have aspired to found an independent monarchy, and to that end endeavoured to disband all forces except those which were exclusively under his own control. In 1769 a demand came to 'Alī Bey for a force of 12,000 men to be employed by the Porte in the Russian war. It was suggested, however, at Constantinople that 'Alī would employ this force when he collected it for securing his own independence, and a messenger was sent by the Porte to the pasha with orders for his execution. 'Alī, being apprised by his agents at the metropolis of the despatch of this messenger, ordered him to be waylaid and killed; the despatches were seized and read by 'Alī before an assembly of the beys, who were assured that the order for execution applied to all alike, and he urged them to fight for their lives. His proposals were received with enthusiasm by the beys whom he had created. Egypt was declared independent and the pasha given forty-eight hours to quit the country. Ẓāhir Pasha of Acre, to whom was sent official information of the step taken by 'Alī Bey, promised his aid and kept his word by compelling an army sent by the pasha of Damascus against Egypt to retreat.

The Porte was not able at the time to take active measures for the suppression of 'Alī Bey, and the latter endeavoured to consolidate his dominions by sending expeditions against marauding tribes, both in north and south Egypt, reforming the finance, and improving the administration of justice. His son-in-law, Abu'l-Dhahab, was sent to subject the Hawwārah, who had occupied the land between Assuan and Assiut, and a force of 20,000 was sent to conquer Yemen. An officer named Ismā'īl Bey was sent with 8000 to acquire the eastern shore of the Red Sea, and one named Ḥasan Bey to occupy Jidda. In six months the greater part of the Arabian peninsula was subject to 'Alī Bey, and he appointed as sherif of Mecca a cousin of his own, who bestowed on 'Alī by an official proclamation the titles Sultan of Egypt and Khākān of the Two Seas. He then, in virtue of this authorization, struck coins in his own name (1185 A.H.) and ordered his name to be mentioned in public worship.

His next move turned out fatally. Abu'l-Dhahab was sent with a force of 30,000 men in the same year (A.D. 1771) to conquer Syria; and agents were sent to negotiate alliances with Venice and Russia. Abu'l-Dhahab's progress through Palestine and Syria was triumphant. Reinforced by 'Alī Bey's ally Ẓāhir, he easily took the chief cities, ending with Damascus; but at this point he appears to have entered into secret negotiations with the Porte, by which he undertook to restore Egypt to Ottoman suzerainty. He then proceeded to evacuate Syria, and marched with all the forces he could collect to Upper Egypt, occupying Assiut in April 1772. Having collected some additional troops from the Bedouins, he marched on Cairo. Ismā'īl Bey was sent by 'Alī Bey with a force of 3000 to check his advance; but at Basātīn Ismā'īl with his troops joined Abu'l-Dhahab. 'Alī Bey intended at first to defend himself so long as possible in the citadel at Cairo; but receiving information to the effect that his friend Ẓāhir of Acre was still willing to give him refuge, he left Cairo for Syria (8th of April 1772), one day before the entrance of Abu'l-Dhahab.

At Acre 'Alī's fortune seemed to be restored. A Russian vessel anchored outside the port, and, in accordance with the agreement which he had made with the Russian empire, he was supplied with stores and ammunition, and a force of 3000 Albanians. He sent one of his officers, 'Alī Bey al-Ṭanṭāwī, to recover the Syrian towns evacuated by Abu'l-Dhahab, and now in the possession of the Porte. He himself took Jaffa and Gaza, the former of which he gave to his friend Ẓāhir of Acre. On the 1st of February 1773 he received information from Cairo that Abu'l-Dhahab had made himself Sheik al-Balad, and in that capacity was practising unheard-of extortions, which were making Egypt with one voice call for the return of 'Alī Bey. He accordingly started for Egypt at the head of an army of 8000 men, and on the 19th of April met the army of Abu'l-Dhahab at Sālihia. 'Alī's forces were successful at the first engagement; but when the battle was renewed two days later he was deserted by some of his officers, and prevented by illness and wounds from himself taking the conduct of affairs. The result was a complete defeat for his army, after which he declined to leave his tent; he was captured after a brave resistance, and taken to Cairo, where he died seven days later.

After 'Alī Bey's death Egypt became once more a dependency of the Porte, governed by Abu'l-Dhahab as Sheik al-Balad with the title pasha. He shortly afterwards received permission from the Porte to invade Syria, with the view of punishing 'Alī Bey's supporter Ẓāhir, and left as his deputies in Cairo Ismā'īl Bey and Ibrāhīm Bey, who, by deserting 'Alī at the battle of Sālihia, had brought about his downfall. After taking many cities in Palestine Abu'l-Dhahab died, the cause being unknown; and Murād Bey (another of the deserters at Sālihia) brought his forces back to Egypt (26th of May 1775).

Ismā'īl Bey now became Sheik al-Balad, but was soon involved in a dispute with Ibrāhīm and Murād, who after a time succeeded in driving Ismā'īl out of Egypt and establishing a joint rule (as Sheik al-Balad and Amīr al-Ḥājj respectively) similar to that which had been tried previously. The two were soon involved in quarrels, which at one time threatened to break out into open war; but this catastrophe was averted, and the joint rule was maintained till 1786, when an expedition was sent by the Porte to restore Ottoman supremacy in Egypt. Murād Bey attempted to resist, but was easily defeated; and he with Ibrāhīm decided to fly to Upper Egypt and await the trend of events. On the 1st of August 1782 the Turkish commander entered Cairo, and, after some violent measures had been taken for the restoration of order, Ismā'īl Bey was again made Sheik al-Balad and a new pasha installed as governor. In January 1791 a terrible plague began to rage in Cairo and elsewhere in Egypt, to which Ismā'īl Bey and most of his family fell victims. Owing to the need for competent rulers Ibrāhīm and Murād Bey were sent for from Upper Egypt and resumed their dual government. These two persons were still in office when Bonaparte entered Egypt.

Moslem Authorities.—Arabic literature being cosmopolitan, and Arabic authors accustomed to travel from place to place to collect traditions and obtain oral instruction from contemporary authorities, or else to enjoy the patronage of Maecenates, the literary history of Egypt cannot be dissociated from that of the other Moslem countries in which Arabic was the chief literary vehicle. Hence the list of authors connected with Egypt, which occupies pages 161-275 of Suyūṭī's work, *Ḥusn al-muḥādarah fi akhbāri Misr wal-Qāhirah* (Cairo, 1321 A.H.), contains the names of persons like Mutanabbī, who stayed there for a short time in the service of some patron; Abū Tammām, who lived there before he acquired fame as a poet; 'Umāra of Yemen, who came there at a mature age to spend some years in the service of Fāṭimite viziers; each of whom figures in lists of authors belonging to some other country also. So long as the centre of the Islamic world was not in Egypt, the best talent was attracted elsewhere; but after the fall of Bagdad, Cairo became the chief seat of Islamic learning, and this rank, chiefly owing to the university of Azhar, it has ever since continued to maintain. The following composed special histories of Egypt: Ibn 'Abd al-Ḥakam, d. 257 A.H.; 'Abd al-Raḥīm b. Yūnus, d. 347; Mahommed b. Yūsuf al-Kindī, d. somewhat later; Ibn Zūlāq, d. 387; 'Izz al-Mulk Mahommed al-Musabbihī, d. 420; Mahommed b. Salāmah al-Qodā'ī, d. 454; Jamāl al-dīn 'Alī al-Qifṭī, d. 568; Jamāl al-dīn al-Ḥalabī, d. 623; 'Abd al-Laṭīf al-Baghdādī, d. 629; Mahommed b. 'Abd al-Azīz al-Idrīsī (history of Upper Egypt), d. 649; his son Ja'far (history of Cairo), d. 676; Ibn Sa'īd, d. 685; Ibrāhīm b. Wasīf Shāh; Ibn al-Mutawwaj, d. 703; Mahommed b. Danī'āl, d. 710; Ja'far b. Tha'lab Kamāl al-dīn al-Adfu'ī (history of Upper Egypt), d. 730; 'Abd al-Qarūn al-Ḥalabī, d. 735; Ibn Ḥabīb, d. 779; Ibn Duqmāq, d. 790; Ibn Tughān, Shihāb al-dīn al-Auḥadī, d. 790; Ibn al-Mulaqqin, d. 806; Maqrīzī, Taqiyy al-dīn Aḥmad, d. 840; Ibn Ḥajar al-'Asqalānī, d. 852; al-Sakhāwī, d. 902; Abu'l-Mahāsin b. Taghribirdī, d. 874; Jalāl al-dīn al-Suyūṭī, d. 911; Ibn Zunbul al-Rammāl; Ibn Iyās, d. after 928; Mahommed b. Abī Surūr, d. after 1017; Zain al-dīn al Karamī, d. 1033; Abd al-Raḥmān Jabartī, d. after 1236. Of many of the Mameluke sultans there are special chronicles preserved in various European and Oriental libraries. The works of many of the authors enumerated are topographical and biographical as well as purely historical. To these there should be added the Survey of Egypt, called *al-tuḥfah al-saniyyah* of Ibn Jī'ān, belonging to the time of Kait Bey; the treatise on the Egyptian constitution called *Zubdat Kashf al-Mamālik*, by Khalīl al-Ẓāhirī, of the same period; and the encyclopaedic work on the same subject called *Ṣubḥ al-Inshā*, by al-Qalqashandī, d. 821.

Arabic poetry is in the main encomiastic and personal, and from the beginning of the Omayyad period sovereigns and governors paid poets to celebrate their achievements; of those of importance who are connected with Egypt we may mention Nusaib, encomiast of 'Abd al-Azīz b. Merwān, d. 180; the greater Nāshi (Abu l-Abbās 'Abdallah), d. 293; Ibn Ṭabāṭabā, d. 345; Abu'l-Raqa'maq, encomiast of al-Mo'izz, d. 399; Ṣarī' al-Dilā ('Alī b. 'Abd al-Wāhid), encomiast of the Fāṭimite al-Ẓāhir, d. 412; Sanajāt al-ḍauḥ (Mahommed b. al-Qāsim), encomiast of Ḥākim; 'Alī b. 'Abbād al-Iskandarī, encomiast of the vizier al-Afḍal, executed by Ḥāfiẓ; Ibn Qalāqis al-Iskandarī, encomiast of the Ayyūbites, d. 607; Muhaddhab b. Mamātī, encomiast of the Ayyūbites, d. 616; Ibn Sana' al-Mulk, encomiast of the Ayyūbites, d. 658; Ibn al-Munajjim, d. 626; Ibn Maṭrūḥ, encomiast of the Ayyūbites, d. 654; Bahā' al-dīn Zuhair, encomiast of al-Ṣāliḥ, d. 656; Ibn 'Ammār, d. 675; al-Mi'mār, d. 749; Ibn Nubātah, d. 768; Ibn Abī Ḥajalah, d. 776; Burhān al-din al-Qīrāṭī, d. 801; Ibn Mukānis, d. 864; Ibn Ḥijjah al-Ḥamawī, d. 837. Poets distinguished for special lines are al-Ḥakīm b. Dāni' āl, d. 608, author of the Shadow-play; and al-Būsīrī (Mahommed b. Sa'īd), d. 694, author of the ode in praise of the prophet called Burdah. The poets of Egypt are reckoned with those of Syria in the *Yatīmah* of Tha' ālibī; a special work upon them was written by Ibn Faḍl allāh (d. 740); and a list of poets of the 11th century is given by Khafājī in his *Raiḥānat al-alibbā*.

The needs of the Egyptian court produced a number of elegant letter-writers, of whom the most famous were 'Abd al-Raḥīm b. 'Alī al-Baisānī, ordinarily known as al-Qāḍī al-Fāḍil, d. 596, secretary of state to Saladin and other Ayyūbite sultans; 'Imād al-dīn al-Ispahānī, d. 597, also secretary of state and official chronicler; and Ibn 'Abd al-Ẓāhir, d. 692, secretary of state to Bibars I. and succeeding sultans; he was followed by his son Faṭḥ al-dīn, to whom the title "Secret writer" was first given.

In the subject of law Egypt boasts that the Imām Shāfi'ī, founder of one of the schools, resided at Fosṭāṭ from 195 till his death in 204; his system, though displaced for a time by that invented by the Fāṭimites, and since the Turkish conquest by the Ḥanifite system, has always been popular in Egypt: in Ayyūbite times it was dominant, whereas in Mameluke times all four systems were officially recognized. The eminent jurists who flourished in Moslem Egypt form a very lengthy list. Among the Egyptian traditionalists the most eminent is Dāraquṭnī, d. 385.

Among Egyptian mystics the most famous as authors are the poet Ibn al-Fāriḍ, d. 632, and Abd al-Wahhāb Sha rānī, d. 973. Abu'l-Ḥasan al-Shādhilī (d. 656) is celebrated as the founder of the Shādhilī order; but there were many others of note. The dictionary of physicians, compiled in the 7th century, enumerates nearly sixty men of science who resided in Egypt; the best-known among them are Sa'īd b. Biṭrīq, Moses Maimonides and Ibn Baiṭār. Of Egyptian miscellaneous writers two of the most celebrated are Ibn Daqīq al'-īd, d. 702, and Jalāl al-din Suyūṭī.

European Authorities.—For the Moslem conquest, A. J. Butler, *The Arab Conquest of Egypt* (Oxford, 1902); for the period before the Fāṭimites, Wüstenfeld, "Die Statthalter von Ägypten," in *Abhandlungen der königlichen Gesellschaft der Wissenschaften zu Göttingen*, vols. xx. and xxi.; for the Fāṭimite period, Wüstenfeld, "Geschichte der Fatimiden-Chalifen," *ibid.* vols. xxvi. and xxvii.; for the Ayyūbite period, Ibn Khallikan's *Biographical Dictionary*, translated by M'G. de Slane (London, 1842–1871); for the Mameluke period, Weil, *Geschichte der Chalifen*, vols. iv. and v. (also called *Geschichte des Abbasidenchalifats in Ägypten*), (Stuttgart, 1860–1862); Sir W. Muir, *The Mameluke or Slave Dynasty of Egypt* (London, 1896); for the Turkish period, G. Zaidan, *History of Modern Egypt* (Arabic), vol. ii. (Cairo, 1889). See also Maqrizi, *Description topographique et historique de l'Égypte*, translated by Bouriant (Paris, 1895, &c.); C. H. Becker, *Beiträge zur Geschichte Ägyptens* (Strassburg, 1902). (D. S. M.*)

(9) ***From the French Occupation to the Rise of Mehemet Ali.***—The ostensible object of the French expedition to Egypt was to reinstate the authority of the Sublime Porte, and suppress the Mamelukes; and in the proclamation printed with the Arabic types brought from the Propaganda press, and issued shortly after the taking of Alexandria, Bonaparte declared that he reverenced the prophet Mahomet and the Koran far more than the Mamelukes reverenced either, and argued that all men were equal except so far as they were distinguished by their intellectual and moral excellences, of neither of which the Mamelukes had

any great share. In future all posts in Egypt were to be open to all classes of the inhabitants; the conduct of affairs was to be committed to the men of talent, virtue, and learning; and in proof of the statement that the French were sincere Moslems the overthrow of the papal authority in Rome was alleged. That there might be no doubt of the friendly feeling of the French to the Porte, villages and towns which capitulated to the invaders were required to hoist the flags of both the Porte and the French republic, and in the thanksgiving prescribed to the Egyptians for their deliverance from the Mamelukes, prayer was to be offered for both the sultan and the French army. It does not appear that the proclamation convinced many of the Egyptians of the truth of these professions. After the battle of Ambabah, at which the forces of both Murâd Bey and Ibrâhîm Bey were dispersed, the populace readily plundered the houses of the beys, and a deputation was sent from al-Azhar to Bonaparte to ascertain his intentions; these proved to be a repetition of the terms of his proclamation, and, though the combination of loyalty to the French with loyalty to the sultan was unintelligible, a good understanding was at first established between the invaders and the Egyptians. A municipal council was established in Cairo, consisting of persons taken from the ranks of the sheiks, the Mamelukes and the French; and presently delegates from Alexandria and other important towns were added. This council did little more than register the decrees of the French commander, who continued to exercise dictatorial power. The destruction of the French fleet at the battle of the Nile, and the failure of the French forces sent to Upper Egypt (where they reached the first cataract) to obtain possession of the person of Murâd Bey, shook the faith of the Egyptians in their invincibility; and in consequence of a series of unwelcome innovations the relations between conquerors and conquered grew daily more strained, till at last, on the occasion of the introduction of a house tax, an insurrection broke out in Cairo on the 22nd of October 1798, of which the headquarters were in the Moslem university of Azhar. On this occasion the French general Dupuy, lieutenant-governor of Cairo, was killed. The prompt measures of Bonaparte, aided by the arrival from Alexandria of General J. B. Kléber, quickly suppressed this rising; but the stabling of the French cavalry in the mosque of Azhar gave great and permanent offence. In consequence of this affair, the deliberative council was suppressed, but on the 25th of December a fresh proclamation was issued, reconstituting the two divans which had been created by the Turks; the special divan was to consist of 14 persons chosen by lot out of 60 government nominees, and was to meet daily. The general divan was to consist of functionaries, and to meet on emergencies.

Battle of the Nile.

In consequence of despatches which reached Bonaparte on the 3rd of January 1799, announcing the intention of the Porte to invade the country with the object of recovering it by force, Bonaparte resolved on his Syrian expedition, and appointed governors for Cairo, Alexandria, and Upper Egypt, to govern during his absence. From that ill-fated expedition he returned at the beginning of June. Advantage had been taken of this opportunity by Murâd Bey and Ibrâhîm Bey to collect their forces and attempt a joint attack on Cairo, but this Bonaparte arrived in time to defeat, and in the last week of July he inflicted a crushing defeat on the Turkish army that had landed at Aboukir, aided by the British fleet commanded by Sir Sidney Smith. Shortly after his victory Bonaparte left Egypt, having appointed Kléber to govern in his absence, which he informed the sheiks of Cairo was not to last more than three months. Kléber himself regarded the condition of the French invaders as extremely perilous, and wrote to inform the French republic of the facts. A double expedition shortly after Bonaparte's departure was sent by the Porte for the recovery of Egypt, one force being despatched by sea to Damietta, while another under Yûsuf Pasha took the land route from Damascus by al-Arish. Over the first some success was won, in consequence of which the Turks agreed to a convention (signed January 24, 1800), by virtue of which the French were to quit Egypt. The Turkish troops advanced to Bilbeis, where they were received by the sheiks from Cairo, and the Mamelukes also returned to that city from their hiding-places. Before the preparations for the departure of the French were completed, orders came to Sir Sidney Smith from the British government, forbidding the carrying out of the convention unless the French army were treated as prisoners of war, and when these were communicated to Kléber he cancelled the orders previously given to the troops, and proceeded to put the country in a state of defence. His departure with most of the army to attack the Turks at Mataria led to riots in Cairo, in the course of which many Christians were slaughtered; but the national party were unable to get possession of the citadel, and Kléber, having defeated the Turks, was soon able to return to the capital. On the 14th of April he bombarded Bulak, and proceeded to bombard Cairo itself, which was taken the following night. Order was soon restored, and a fine of twelve million francs imposed on the rioters. Murâd Bey sought an interview with Kléber and succeeded in obtaining from him the government of Upper Egypt. He died shortly afterwards and was succeeded by Osman Bey al-Bardisi.

On the 14th of June Kléber was assassinated by a fanatic named Suleiman of Aleppo, said to have been incited to the deed by a Janissary refugee at Jerusalem, who had brought letters to the sheiks of the Azhar, who, however, refused to give him any encouragement. Three of these, nevertheless, were executed by the French as accessories before the fact, and the assassin himself was impaled, after torture, in spite of a promise of pardon having been made to him on condition of his naming his associates. The command of the army then devolved on General J. F. (Baron de) Menou (1750–1810), a man who had professed Islam, and who endeavoured to conciliate the Moslem population by various measures, such as excluding all Christians (with the exception of one Frenchman) from the divan, replacing the Copts who were in government service by Moslems, and subjecting French residents to taxes. Whatever popularity might have been gained by these measures was counteracted by his declaration of a French protectorate over Egypt, which was to count as a French colony.

In the first weeks of March 1801 the English, under Sir R. Abercromby, effected a landing at Aboukir, and proceeded to invest Alexandria, where on the 21st they were attacked by Menou; the French were repulsed, but the English commander was mortally wounded in the action. On the 25th fresh reinforcements arrived under Husain, the Kapudan Pasha, or high admiral; and a combined English and Turkish force was sent to take Rosetta. On the 30th of May, General A. D. Belliard, who had been left in charge at Cairo, was assailed on two sides by the British forces under General John Hely Hutchinson (afterwards 2nd earl of Donoughmore), and the Turkish under Yûsuf Pasha; after negotiations Belliard agreed to evacuate Cairo and to sail with his 13,734 troops to France. On the 30th of August, Menou at Alexandria was compelled to accept similar conditions, and his force of 10,000 left for Europe in September. This was the termination of the French occupation of Egypt, of which the chief permanent monument was the *Description de l'Égypte*, compiled by the French savants who accompanied the expedition. Further than this, "it brought to the attention of a few men in Egypt a keen sense of the great advantage of an orderly government, and a warm appreciation of the advance that science and learning had made in Europe" (Hajji Browne, ***Bonaparte in Egypt and the Egyptians of to-day***, 1907, p. 268).

French evacuation.

Soon after the evacuation of Egypt by the French, the country became the scene of more severe troubles, in consequence of the attempts of the Turks to destroy the power of the Mamelukes. In defiance of promises to the British government, orders were transmitted from Constantinople to Husain Pasha, the Turkish high admiral, to ensnare and put to death the principal beys. Invited to an entertainment, they were, according to the Egyptian contemporary historian al-Jabarti, attacked on board the flag-ship; Sir Robert Wilson and M. F. Mengin, however, state that they were fired on, in open boats, in the Bay of Aboukir. They offered an heroic resistance, but were overpowered, and some killed, some made prisoners; among the last was Osman Bey al-Bardīsī, who was severely wounded. General Hutchinson, informed of this treachery, immediately assumed threatening measures against the Turks, and in consequence the killed, wounded and prisoners were given up to him. At the same time Yūsuf Pasha arrested all the beys in Cairo, but was shortly compelled by the British to release them. Such was the beginning of the disastrous struggle between the Mamelukes and the Turks.

British, Turks and Mamelukes.

Mahommed Khosrev was the first Turkish governor of Egypt after the expulsion of the French. The form of government, however, was not the same as that before the French invasion, for the Mamelukes were not reinstated. The pasha, and through him the sultan, endeavoured on several occasions either to ensnare them or to beguile them into submission; but these efforts failing, Mahommed Khosrev took the field, and a Turkish detachment 7000 strong was despatched against them to Damanhur, whither they had descended from Upper Egypt, and was defeated by a small force under al-Alfī; or, as Mengin says, by 800 men commanded by al-Bardīsī, when al-Alfī had left the field. Their ammunition and guns fell into the hands of the Mamelukes.

In March 1803 the British evacuated Alexandria, and Mahommed Bey al-Alfī accompanied them to England to consult respecting the means to be adopted for restoring the former power of the Mamelukes, who meanwhile took Minia and interrupted communication between Upper and Lower Egypt. About six weeks after, the Arnaut (or Albanian) soldiers in the service of Khosrev tumultuously demanded their pay, and surrounded the house of the defterdār (or finance minister), who in vain appealed to the pasha to satisfy their claims. The latter opened fire from the artillery of his palace on the insurgent soldiery in the house of the defterdār, across the Ezbekia. The citizens of Cairo, accustomed to such occurrences, immediately closed their shops, and every man who possessed any weapon armed himself. The tumult continued all the day, and the next morning a body of troops sent out by the pasha failed to quell it. Tāhir, the commander of the Albanians, then repaired to the citadel, gained admittance through an embrasure, and, having obtained possession of it, began to cannonade the pasha over the roofs of the intervening houses, and then descended with guns to the Ezbekia and laid close siege to the palace. On the following day Mahommed Khosrev made good his escape, with his women and servants and his regular troops, and fled to Damietta by the river. This revolt marks the beginning in Egypt of the breach between the Albanians and Turks, which ultimately led to the expulsion of the latter, and of the rise to power of the Albanian Mehemet Ali (*q.v.*), who was destined to rule the country for nearly forty years and be the cause of serious European complications.

First appearance of Mehemet Ali.

Tāhir Pasha assumed the government, but in twenty-three days he met with his death from exactly the same cause as that of the overthrow of his predecessor. He refused the pay of certain of the Turkish troops, and was immediately assassinated. A desperate conflict ensued between the Albanians and Turks; and the palace was set on fire and plundered. The masters of Egypt were now split into these two factions, animated with the fiercest animosity against each other. Mehemet Ali, then in command of an Albanian regiment, became the head of the former, but his party was the weaker, and he therefore entered into an alliance with the Mameluke leaders Ibrahim Bey and 'Osmān Bey al-Bardīsī. A certain Ahmed Pasha, who was about to proceed to a province in Arabia, of which he had been appointed governor, was raised to the important post of pasha of Egypt, through the influence of the Turks and the favour of the sheiks; but Mehemet Ali, who with his Albanians held the citadel, refused to assent to their choice; the Mamelukes moved over from El-Giza, whither they had been invited by Tāhir Pasha, and Ahmed Pasha betook himself to the mosque of al-Ẓāhir, which the French had converted into a fortress. He was compelled to surrender by the Albanians; the two chiefs of the Turks who killed Tāhir Pasha were taken with him and put to death, and he himself was detained a prisoner. In consequence of the alliance between Mehemet Ali and al-Bardīsī, the Albanians gave the citadel over to the Mamelukes; and soon after, these allies marched against Khosrev Pasha, who having been joined by a considerable body of Turks, and being in possession of Damietta, was enabled to offer an obstinate resistance. After much loss on both sides, he was taken prisoner and brought to Cairo; but he was treated with respect. The victorious soldiery sacked the town of Damietta, and were guilty of the barbarities usual with them on such occasions.

A few days later, Ali Pasha Jazāirlī landed at Alexandria with an imperial firmān constituting him pasha of Egypt, and threatened the beys, who now were virtual masters of Upper Egypt, as well as of the capital and nearly the whole of Lower Egypt. Mehemet Ali and al-Bardīsī therefore descended to Rosetta, which had fallen into the hands of a brother of Ali Pasha, and having captured the town and its commander, al-Bardīsī purposed to proceed against Alexandria; but the troops demanded arrears of pay which it was not in his power to give, and the pasha had cut the dyke between the lakes of Aboukir and Mareotis, thus rendering the approach to Alexandria more difficult. Al-Bardīsī and Mehemet Ali therefore returned to Cairo. The troubles of Egypt were now increased by an insufficient inundation, and great scarcity prevailed, aggravated by the taxation to which the beys were compelled to resort in order to pay the troops; while murder and rapine prevailed in the capital, the riotous soldiery being under little or no control. Meanwhile, Ali Pasha, who had been behaving with violence towards the Franks in Alexandria, received a *hatt-i-sherif* from the sultan, which he sent by his secretary to Cairo. It announced that the beys should live peaceably in Egypt, with an annual pension each of fifteen purses (a "purse" = 500 piastres) and other privileges, but that the government should be in the hands of the pasha. To this the beys assented, but with considerable misgivings; for they had intercepted letters from Ali to the Albanians, endeavouring to alienate them from their side to his own. Deceptive answers were returned to these, and Ali was induced by them to advance towards Cairo at the head of 3000 men. The forces of the beys, with the Albanians, encamped near him at Shalakān, and he fell back on a place called Zufeyta. They next seized his boats conveying soldiers, servants, and his ammunition and baggage; and, following him, they demanded wherefore he brought with him so numerous a body of men, in opposition to usage and to their previous warning. Finding they would not allow his troops to advance, forbidden himself to retreat with them to Alexandria, and being surrounded by the enemy, he would have hazarded a battle, but his men refused to fight. He therefore went to the camp of the beys, and his army was compelled to retire to Syria. In the hands of the beys Ali Pasha again attempted treachery. A horseman was seen to leave his tent one night at full gallop; he was the bearer of a letter to Osmān Bey Hasan, the governor of Kine. This offered a fair pretext to the Mamelukes to rid themselves of a man proved to be a perfidious tyrant. He was sent under a guard of forty-five men towards the Syrian frontier; and about a week after, news was received that in a skirmish with some of his own soldiers he had fallen mortally wounded.

The Mamelukes and Ali Pasha.

The death of Ali Pasha produced only temporary tranquillity, in a few days (February 12, 1804) the return of Mahommed Bey al-Alfī (called the Great) from England was the signal for fresh disturbances, which, by splitting the Mamelukes into two parties, accelerated their final overthrow. An ancient jealousy existed between al-Alfī and the other most powerful bey, al-Bardīsī. The latter was now supreme among the Mamelukes, and this fact considerably heightened their old enmity. While the guns of the citadel, those at Old Cairo, and even those of the palace of al-Bardīsī, were thrice fired in honour of al-Alfī, preparations were immediately begun to oppose him. His partisans were collected opposite Cairo, and al-Alfī the Less held Giza; but treachery was among them; Husain Bey (a relative of al-Alfī) was assassinated by emissaries of al-Bardīsī, and Mehemet Ali, with his Albanians, gained possession of Giza, which was, as usual, given over to the troops to pillage. In the meanwhile al-Alfī the Great embarked at Rosetta, and not apprehending opposition, was on his way to Cairo, when a little south of the town of Manūf he encountered a party of Albanians, and with difficulty made his escape. He gained the eastern branch of the Nile, but the river had become dangerous, and he fled to the desert. There he had several hairbreadth escapes, and at last secreted himself among a tribe of Arabs at Rās al-Wādī. A change in the fortune of al-Bardīsī, however, favoured his plans for the future. That chief, in order to satisfy the demands of the Albanians for their pay, gave orders to levy heavy contributions from the citizens of Cairo; and this new oppression roused them to rebellion. The Albanians, alarmed for their safety, assured the populace that they would not allow the order to be executed; and Mehemet Ali himself caused a proclamation to be made to that effect. Thus the Albanians became the favourites of the people, and took advantage of their opportunity. Three days later (March 12th, 1804) they beset the house of the aged Ibrahim Bey, and that of al-Bardīsī, both of whom effected their escape with difficulty. The Mamelukes in the citadel directed a fire of shot and shell on the houses of the Albanians which were situated in the Ezbekīa; but, on hearing of the flight of their chiefs, they evacuated the place; and Mehemet Ali, on gaining possession of it, once more proclaimed Mahommed Khosrev pasha of Egypt. For one day and a half he enjoyed the title; the friends of the late Tāhir Pasha then accomplished his second degradation,[1] and Cairo was again the scene of terrible enormities, the Albanians revelling in the houses of the Mameluke chiefs, whose hareems met with no mercy at their hands. These events were the signal for the reappearance of al-Alfī.

The Albanians now invited Ahmed Pasha Khorshīd to assume the reins of government, and he without delay proceeded from Alexandria to Cairo. The forces of the partisans of al-Bardīsī were ravaging the country a few miles south of the capital and intercepting the supplies of corn by the river; a little later they passed to the north of Cairo and successively took Bilbeis and Kalyub, plundering the villages, destroying the crops, and slaughtering the herds of the inhabitants. Cairo was itself in a state of tumult, suffering severely from a scarcity of grain, and the heavy exactions of the pasha to meet the demands of his turbulent troops, at that time augmented by a Turkish detachment. The shops were closed, and the unfortunate people assembled in great crowds, crying "Yā Latīf! Yā Latīf!" ("O Gracious [God]!") Al-Alfī and Osmān Bey Hasan had professed allegiance to the pasha; but they soon after declared against him, and they were now approaching from the south; and having repulsed Mehemet Ali, they took the two fortresses of Turā. These Mehemet Ali speedily retook by night with 4000 infantry and cavalry; but the enterprise was only partially successful. On the following day the other Mamelukes north of the metropolis actually penetrated into the suburbs; but a few days later were defeated in a battle fought at Shubra, with heavy loss on both sides. This reverse in a measure united the two great Mameluke parties, though their chiefs remained at enmity. Al-Bardīsī passed to the south of Cairo, and the Mamelukes gradually retreated towards Upper Egypt. Thither the pasha despatched three successive expeditions (one of which was commanded by Mehemet Ali), and many battles were fought, but without decisive result.

At this period another calamity befell Egypt; about 3000 Delis (Kurdish troops) arrived in Cairo from Syria. These troops had been sent for by Khorshīd in order to strengthen himself against the Albanians; and the events of this portion of the history afford sad proof of their ferocity and brutal enormities, in which they far exceeded the ordinary Turkish soldiers and even the Albanians. Their arrival immediately recalled Mehemet Ali and his party from the war, and instead of aiding Khorshīd was the proximate cause of his overthrow.

Cairo was ripe for revolt; the pasha was hated for his tyranny and extortion, and execrated for the deeds of his troops, especially those of the Delis: the sheiks enjoined the people to close their shops, and the soldiers clamoured for pay. At this juncture a firman arrived from Constantinople conferring on Mehemet Ali the pashalic of Jedda; but the occurrences of a few days raised him to that of Egypt.

Struggle between Khorshīd and Mehemet Ali.

On the 12th of Safar 1220 (May 12th, 1805) the sheiks, with an immense concourse of the inhabitants, assembled in the house of the ḳāḍī; and the ulemā, amid the prayers and cries of the people, wrote a full statement of the heavy wrongs which they had endured under the administration of the pasha. The ulemā, in answer, were desired to go to the citadel; but they were apprised of treachery; and on the following day, having held another council at the house of the ḳāḍī, they proceeded to Mehemet Ali and informed him that the people would no longer submit to Khorshīd. "Then whom will ye have?" said he. "We will have *thee*," they replied, "to govern us according to the laws; for we see in thy countenance that thou art possessed of justice and goodness." Mehemet Ali seemed to hesitate, and then complied, and was at once invested. On this, a bloody struggle began between the two pashas. Khorshīd, being informed of the insurrection, immediately prepared to stand a siege in the citadel. Two chiefs of the Albanians joined his party, but many of his soldiers deserted. Mehemet Ali's great strength lay in the devotion of the citizens of Cairo, who looked on him as a deliverer from their afflictions; and great numbers armed themselves, advising constantly with Mehemet Ali, having the sayyid Omar and the sheiks at their head, and guarding the town at night. On the 19th of the same month Mehemet Ali began to besiege Khorshīd. After the siege had continued many days, Khorshīd gave orders to cannonade and bombard the town; and for six days his commands were executed with little interruption, the citadel itself also lying between two fires. Mehemet Ali's position at this time was very critical: his troops became mutinous for their pay; the silāhdār, who had commanded one of the expeditions against the Mamelukes, advanced to the relief of Khorshīd; and the latter ordered the Delis to march to his assistance. The firing ceased on the Friday, but began again on the eve of Saturday and lasted until the next Friday. On the day following (May 28th) news came of the arrival at Alexandria of a messenger from Constantinople. The ensuing night in Cairo presented a curious spectacle; many of the inhabitants, believing that this envoy would put an end to their miseries, fired off their weapons as they paraded the streets with bands of music. The silāhdār, imagining the noise to be a fray, marched in haste towards the citadel, while its garrison sallied forth and began throwing up entrenchments in the quarter of Arab al-Yesār, but were repulsed by the armed inhabitants and the soldiers stationed there; and during all this time the cannonade and bombardment from the citadel, and on it from the batteries on the hill, continued unabated.

Mehemet Ali granted the pashalic.

The envoy brought a firmān confirming Mehemet Ali and ordering Khorshīd to go to Alexandria, there to await further orders; but this he refused to do, on the ground that he had been appointed by a *katt-i-sherif*. The firing ceased on the following day, but the troubles of the people were rather increased than assuaged; murders and robberies were daily committed by the soldiery, the shops were all shut and some of the streets barricaded. While these scenes were being enacted, al-Alfī was besieging Damanhur, and the other beys were returning towards Cairo, Khorshīd having called them to his assistance; but Mehemet Ali forced them to retreat.

Soon after this, a squadron under the command of the Turkish high admiral arrived at Aboukir Bay, with despatches confirming the firmān brought by the former envoy, and authorizing

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[1] Khosrev Pasha afterwards filled several of the highest offices at Constantinople. He died on the 1st of February 1855. He was a bigot of the old school, strongly opposed to the influences of Western civilization, and consequently to the assistance of France and Great Britain in the Crimean War.

Mehemet Ali to continue to discharge the functions of governor. Khorshīd at first refused to yield; but at length, on condition that his troops should be paid, he evacuated the citadel and embarked for Rosetta.

Mehemet Ali now possessed the title of Governor of Egypt, but beyond the walls of Cairo his authority was everywhere disputed by the beys, who were joined by the army of the silāhdār of Khorshīd; and many Albanians deserted from his ranks. To replenish his empty coffers he was also compelled to levy exactions, principally from the Copts. An attempt was made to ensnare certain of the beys, who were encamped north of Cairo. On the 17th of August 1805 the dam of the canal of Cairo was to be cut, and some chiefs of Mehemet Ali's party wrote, informing them that he would go forth early on that morning with most of his troops to witness the ceremony, inviting them to enter and seize the city, and, to deceive them, stipulating for a certain sum of money as a reward. The dam, however, was cut early in the preceding night, without any ceremony. On the following morning, these beys, with their Mamelukes, a very numerous body, broke open the gate of the suburb al-Husainia, and gained admittance into the city from the north, through the gate called Bāb el-Futūḥ. They marched along the principal street for some distance, with kettle-drums behind each company, and were received with apparent joy by the citizens. At the mosque called the Ashrafia they separated, one party proceeding to the Azhar and the houses of certain sheiks, and the other continuing along the main street, and through the gate called Bāb Zuwēla, where they turned up towards the citadel. Here they were fired on by some soldiers from the houses; and with this signal a terrible massacre began. Falling back towards their companions, they found the bye-streets closed; and in that part of the main thoroughfare called Bain al-Kasrain they were suddenly placed between two fires. Thus shut up in a narrow street, some sought refuge in the collegiate mosque Barkukia, while the remainder fought their way through their enemies and escaped over the city-wall with the loss of their horses. Two Mamelukes had in the meantime succeeded, by great exertions, in giving the alarm to their comrades in the quarter of the Azhar, who escaped by the eastern gate called Bāb al-Ghoraib. A horrible fate awaited those who had shut themselves up in the Barkukia. Having begged for quarter and surrendered, they were immediately stripped nearly naked, and about fifty were slaughtered on the spot; and about the same number were dragged away, with every brutal aggravation of their pitiful condition, to Mehemet Ali. Among them were four beys, one of whom, driven to madness by Mehemet Ali's mockery, asked for a drink of water; his hands were untied that he might take the bottle, but he snatched a dagger from one of the soldiers, rushed at the pasha, and fell covered with wounds. The wretched captives were then chained and left in the court of the pasha's house; and on the following morning the heads of their comrades who had perished the day before were skinned and stuffed with straw before their eyes. One bey and two others paid their ransom and were released; the rest, without exception, were tortured and put to death in the course of the ensuing night. Eighty-three heads (many of them those of Frenchmen and Albanians) were stuffed and sent to Constantinople, with a boast that the Mameluke chiefs were utterly destroyed. Thus ended Mehemet Ali's first massacre of his too confiding enemies.

First massacre of the Mamelukes.

The beys, after this, appear to have despaired of regaining their ascendancy; most of them retreated to Upper Egypt, and an attempt at compromise failed. Al-Alfī offered his submission on the condition of the cession of the Fayum and other provinces; but this was refused, and that chief gained two successive victories over the pasha's troops, many of whom deserted to him.

At length, in consequence of the remonstrances of the English, and a promise made by al-Alfī of 1500 purses, the Porte consented to reinstate the twenty-four beys and to place al-Alfī at their head; but this measure met with the opposition of Mehemet Ali and the determined resistance of the majority of the Mamelukes, who, rather than have al-Alfī at their head, preferred their present condition; for the enmity of al-Bardīsī had not subsided, and he commanded the voice of most of the other beys. In pursuance of the above plan, a squadron under Sālih Pasha, shortly before appointed high admiral, arrived at Alexandria on the 1st of July 1806 with 3000 regular troops and a successor to Mehemet Ali, who was to receive the pashalik of Salonica. This wily chief professed his willingness to obey the commands of the Porte, but stated that his troops, to whom he owed a vast sum of money, opposed his departure. He induced the ulemā to sign a letter, praying the sultan to revoke the command for reinstating the beys, persuaded the chiefs of the Albanian troops to swear allegiance to him, and sent 2000 purses contributed by them to Constantinople. Al-Alfī was at that time besieging Damanhur, and he gained a signal victory over the pasha's troops, but the dissensions of the beys destroyed their last chance of a return to power. Al-Alfī and his partisans were unable to pay the sum promised to the Porte; Sālih Pasha received plenipotentiary powers from Constantinople, in consequence of the letter from the ulemā; and, on the condition of Mehemet Ali's paying 4000 purses to the Porte, it was decided that he should continue in his post, and the reinstatement of the beys was abandoned. Fortune continued to favour the pasha. In the following month al-Bardīsī died, aged forty-eight years; and soon after, a scarcity of provisions excited the troops of al-Alfī to revolt. That bey very reluctantly raised the siege of Damanhur, being in daily expectation of the arrival of an English army; and at the village of Shubra-ment he was attacked by a sudden illness, and died on the 30th of January 1807, at the age of fifty-five. Thus was the pasha relieved of his two most formidable enemies; and shortly after he defeated Shāhīn Bey, with the loss to the latter of his artillery and baggage and 300 men killed or taken prisoners.

On the 17th of March 1807 a British fleet appeared off Alexandria, having on board nearly 5000 troops, under the command of General A. Mackenzie Fraser; and the place, being disaffected towards Mehemet Ali, opened its gates to them. Here they first heard of the death of al-Alfī, upon whose co-operation they had founded their chief hopes of success; and they immediately despatched messengers to his successor and to the other beys, inviting them to Alexandria. The British resident, Major Missett, having represented the importance of taking Rosetta and Rahmanieh, to secure supplies for Alexandria, General Fraser, with the concurrence of the admiral, Sir John Duckworth, detached the 31st regiment and the Chasseurs Britanniques, accompanied by some field artillery under Major-General Wauchope and Brigadier-General Meade, on this service; and these troops entered Rosetta without encountering any opposition; but as soon as they had dispersed among the narrow streets, the garrison opened a deadly fire on them from the latticed windows and the roofs of the houses. They effected a retreat on Aboukir and Alexandria, after a very heavy loss of 185 killed and 281 wounded, General Wauchope and three officers being among the former, and General Meade and nineteen officers among the latter. The heads of the slain were fixed on stakes on each side of the road crossing the Ezbekīa in Cairo.

The British expedition of 1807.

Mehemet Ali, meanwhile, was conducting an expedition against the beys in Upper Egypt, and he had defeated them near Assiut, when he heard of the arrival of the British. In great alarm lest the beys should join them, especially as they were far north of his position, he immediately sent messengers to his rivals, promising to comply with all their demands if they should join in expelling the invaders; and this proposal being agreed to, both armies marched towards Cairo on opposite sides of the river.

To return to the unfortunate British expedition. The possession of Rosetta being deemed indispensable, Brigadier-Generals Sir William Stewart and Oswald were despatched thither with 2500 men. For thirteen days a cannonade of the town was continued without effect; and on the 20th of April, news having come in from the advanced guard at Hamād of large reinforcements to the besieged, General Stewart was compelled to retreat; and a dragoon was despatched to Lieutenant-colonel Macleod, commanding at Hamād, with orders to fall back. The messenger, however, was unable to penetrate to the spot; and the advanced guard, consisting of a detachment of the 31st, two companies of the 78th, one of the 35th, and De Roll's regiment, with a picquet of dragoons, the whole mustering 733 men, was surrounded, and, after a gallant resistance, the survivors, who had expended all their ammunition, became prisoners of war. General Stewart regained Alexandria with the remainder of his force, having lost, in killed, wounded and missing, nearly 900 men. Some hundreds of British heads were now exposed on stakes in Cairo, and the prisoners were marched between these mutilated remains of their countrymen.

Final massacre of the Mamelukes.

The beys became divided in their wishes, one party being desirous of co-operating with the British, the other with the pasha. These delays proved ruinous to their cause; and General Fraser, despairing of their assistance, evacuated Alexandria on the 14th of September. From that date to the spring of 1811 the beys from time to time relinquished certain of their demands; the pasha on his part granted them what before had been withheld; the province of the Fayum, and part of those of Giza and Benī-Suef, were ceded to Shāhīn; and a great portion of the Sa'īd, on the condition of paying the land-tax, to the others. Many of them took up their abode in Cairo, but tranquillity was not secured; several times they met the pasha's forces in battle and once gained a signal victory. Early in the year 1811, the preparations for an expedition against the Wahhābīs in Arabia being complete, all the Mameluke beys then in Cairo were invited to the ceremony of investing Mehemet Ali's favourite son, Tusun, with a pelisse and the command of the army. As on the former occasion, the unfortunate Mamelukes fell into the snare. On the 1st of March, Shāhīn Bey and the other chiefs (one only excepted) repaired with their retinues to the citadel, and were courteously received by the pasha. Having taken coffee, they formed in procession, and, preceded and followed by the pasha's troops, slowly descended the steep and narrow road leading to the great gate of the citadel; but as soon as the Mamelukes arrived at the gate it was suddenly closed before them. The last of those to leave before the gate was shut were Albanians under Salih Kush. To these troops their chief now made known the pasha's orders to massacre all the Mamelukes within the citadel; therefore, having returned by another way, they gained the summits of the walls and houses that hem in the road in which the Mamelukes were confined, and some stationed themselves upon the eminences of the rock through which that road is partly cut. Thus securely placed, they began a heavy fire on their victims; and immediately the troops who closed the procession, and who had the advantage of higher ground, followed their example. Of the betrayed chiefs, many were laid low in a few moments; some, dismounting, and throwing off their outer robes, vainly sought, sword in hand, to return, and escape by some other gate. The few who regained the summit of the citadel experienced the same fate as the rest, for no quarter was given. Four hundred and seventy Mamelukes entered the citadel; and of these very few, if any, escaped. One of these is said to have been a bey. According to some, he leapt his horse from the ramparts, and alighted uninjured, though the horse was killed by the fall; others say that he was prevented from joining his comrades, and discovered the treachery while waiting without the gate. He fled and made his way to Syria. This massacre was the signal for an indiscriminate slaughter of the Mamelukes throughout Egypt, orders to this effect being transmitted to every governor; and in Cairo itself the houses of the beys were given over to the soldiery. During the two following days the pasha and his son Tūsūn rode about the streets and tried to stop the atrocities; but order was not restored until 500 houses had been completely pillaged. The heads of the beys were sent to Constantinople.

A remnant of the Mamelukes fled to Nubia, and a tranquillity was restored to Egypt to which it had long been unaccustomed. In the year following the massacre the unfortunate exiles were attacked by Ibrahim Pasha, the eldest son of Mehemet Ali, in the fortified town of Ibrim, in Nubia. Here the want of provisions forced them to evacuate the place; a few who surrendered were beheaded, and the rest went farther south and built the town of New Dongola (correctly Dunkulah), where the venerable Ibrahim Bey died in 1816, at the age of eighty. As their numbers thinned, they endeavoured to maintain their little power by training some hundreds of blacks; but again, on the approach of Ismail, another son of the pasha of Egypt, sent with an army in 1820 to subdue Nubia and Sennār, some returned to Egypt and settled in Cairo, while the rest, amounting to about 100 persons, fled in dispersed parties to the countries adjacent to Sennār

See A. A Paton, *History of the Egyptian Revolution* (2 vols., 2nd ed., enlarged 1870); and French Revolutionary Wars.
(E. S. P.; S. L.-P.; D. S. M.*)

3. *Modern History.*

Wars in Arabia.

(1) *Rule of Mehemet Ali.*—Mehemet Ali was now undisputed master of Egypt, and his efforts henceforth were directed primarily to the maintenance of his practical independence. The suzerainty of the sultan he acknowledged, and at the reiterated commands of the Porte he despatched in 1811 an army of 8000 men, including 2000 horse, under the command of his son Tusun, a youth of sixteen, against the Wahhābīs (*q.v.*). After a successful advance, this force met with a serious repulse at the pass of Jedeida, near Safra, and retreated to Yembo' (Yambu). In the following year Tusun, having received reinforcements, again assumed the offensive, and captured Medina after a prolonged siege. He next took Jidda and Mecca, defeating the Wahhābīs beyond the latter place and capturing their general. But some mishaps followed, and Mehemet Ali, who had determined to conduct the war in person, left Egypt for that purpose in the summer of 1813. In Arabia he encountered serious obstacles from the nature of the country and the harassing mode of warfare adopted by his adversaries. His arms met with various fortunes; but on the whole his forces proved superior to those of the enemy. He deposed and exiled the sharif of Mecca, and after the death of the Wahhābī leader Saud II. he concluded in 1815 a treaty with Saud's son and successor, Abdullah. Hearing of the escape of Napoleon from Elba—and fearing danger to Egypt from the plans of France or Great Britain—Mehemet Ali returned to Cairo by way of Kosseir and Kena. He reached the capital on the day of the battle of Waterloo. His return was hastened by reports that the Turks, whose cause he was upholding in Arabia, were treacherously planning an invasion of Egypt.

During Mehemet Ali's absence in Arabia his representative at Cairo had completed the confiscation, begun in 1808, of almost all the lands belonging to private individuals, who were forced to accept instead inadequate pensions. By this revolutionary method of land "nationalization" Mehemet Ali became proprietor of nearly all the soil of Egypt, an iniquitous measure against which the Egyptians had no remedy. The attempt which in this year (1815) the pasha made to reorganize his troops on European lines led, however, to a formidable mutiny in Cairo. Mehemet Ali's life was endangered, and he sought refuge by night in the citadel, while the soldiery committed many acts of plunder. The revolt was reduced by presents to the chiefs of the insurgents, and Mehemet Ali ordered that the sufferers by the disturbances should receive compensation from the treasury. The project of the *Nizām Gedīd* (New System), as the European system was called, was, in consequence of this mutiny, abandoned for a time.

Tūsūn returned to Egypt on hearing of the military revolt at Cairo, but died in 1816 at the early age of twenty. Mehemet Ali, dissatisfied with the treaty concluded with the Wahhābīs, and with the non-fulfilment of certain of its clauses, determined to send another army to Arabia, and to include in it the soldiers who had recently proved unruly. This expedition, under his eldest son Ibrahim Pasha, left in the autumn of 1816. The war was long and arduous, but in 1818 Ibrahim captured the Wahhābī capital of Deraiya. Abdullah, their chief, was made prisoner, and with his treasurer and secretary was sent to Constantinople, where, in spite of Ibrahim's promise of safety, and of Mehemet Ali's intercession in their favour, they were put to death. At the close of the year 1819, Ibrahim returned to Cairo, having subdued all present opposition in Arabia.

Meanwhile the pasha had turned his attention to the improvement of the manufactures of Egypt, and engaged very largely in commerce. He created for himself a monopoly in the chief products of the country, to the further impoverishment of the people, and set up and kept going for years factories which never paid. But some of his projects were sound. The work of digging (1819–1820) the new canal of Alexandria, called the Mahmudiya (after the reigning sultan of Turkey), was specially important. The old canal had long fallen into decay, and the necessity of a safe channel between Alexandria and the Nile was much felt. Such was the object of the canal then excavated, and it answered its purpose; but the sacrifice of life was enormous (fully 20,000 workmen perished), and the labour of the unhappy fellahin was forced. Another notable fact in the economic progress of the country was the development of the cultivation of cotton in the Delta in 1822 and onwards. The cotton grown had been brought from the Sudan by Maho Bey, and the organization of the new industry—from which in a few years Mehemet Ali was enabled to extract considerable revenues—was entrusted to a Frenchman named Jumel.

Conquest of the Sudan begun.

In 1820 Mehemet Ali ordered the conquest of the eastern Sudan to be undertaken. He first sent an expedition westward (Feb. 1820) which conquered and annexed the oasis of Siwa. Among the pasha's reasons for wishing to extend his rule southward were the desire to capture the valuable caravan trade then going towards the Red Sea, and to secure the rich gold mines which he believed to exist in Sennâr. He also saw in the campaign a means of getting rid of the disaffected troops, and of obtaining a sufficient number of captives to form the nucleus of the new army. The forces destined for this service were led by Ismail, then the youngest son of Mehemet Ali; they consisted of between 4000 and 5000 men, Turks and Arabs, and left Cairo in July 1820. Nubia at once submitted, the Shagia Arabs immediately beyond the province of Dongola were worsted, the remnant of the Mamelukes dispersed, and Sennâr reduced without a battle. Mahommed Bey, the defterdâr, with another force of about the same strength, was then sent by Mehemet Ali against Kordofan with a like result, but not without a hard-fought engagement. In October 1822 Ismail was, with his retinue, burnt to death by Nimr, the *mek* (king) of Shendi; and the defterdâr, a man infamous for his cruelty, assumed the command of those provinces, and exacted terrible retribution from the innocent inhabitants. Khartum was founded at this time, and in the following years the rule of the Egyptians was largely extended and control obtained of the Red Sea ports of Suakin and Massawa (see SUDAN: *History*).

In 1824 a native rebellion of a religious character broke out in Upper Egypt headed by one Ahmad, an inhabitant of Es-Sâlimiya, a village situated a few miles above Thebes. He proclaimed himself a prophet, and was soon followed by between 20,000 and 30,000 insurgents, mostly peasants, but some of them deserters from the "Nizâm Gedid," for that force was yet in a half-organized state, and in part declared for the impostor. The insurrection was crushed by Mehemet Ali, and about one-fourth of Ahmad's followers perished, but he himself escaped and was never after heard of. Few of these unfortunates possessed any other weapon than the long staff (*nebbut*) of the Egyptian peasant; still they offered an obstinate resistance, and the combat in which they were defeated resembled a massacre. This movement was the last internal attempt to destroy the pasha's authority.

Sufferings of the fellahin.

The fellahin, a patient, long-suffering race save when stirred by religious fanaticism, submitted to the kurbash, freely used by the Turkish and Bashi Bazuk tax-gatherers employed by Mehemet Ali to enforce his system of taxation, monopolies, corvée and conscription. Under this régime the resources of the country were impoverished, while the finances fell into complete and incomprehensible chaos.

A vivid picture of the condition to which Egypt was reduced is painted in the report drawn up in 1838 by the British consul-general, Colonel Campbell:—

> "The government (he wrote), possessing itself of the necessaries of life at prices fixed by itself, disposes of them at arbitrary prices. The fellah is thus deprived of his harvest and falls into arrears with his taxes, and is harassed and bastinadoed to force him to pay his debts. This leads to deterioration of agriculture and lessens the production. The pasha having imposed high taxes has caused the high prices of the necessaries of life. It would be difficult for a foreigner now coming to Egypt to form a just idea of the actual state of the country as compared with its former state. In regard to the general rise in prices, all the ground cultivated under the Mamelukes was employed for producing food—wheat, barley, beans, &c.—in immense quantities. The people reared fowls, sheep, goats, &c., and the prices were one-sixth, or even one-tenth, of those at present. This continued until Mehemet Ali became viceroy in 1805. From that period until the establishment of monopolies prices have gradually increased; but the great increase has chiefly taken place since 1824, when the pasha established his regular army, navy and factories."

The conclusion in 1838 of a commercial treaty with Turkey, negotiated by Sir Henry Bulwer (Lord Dalling), struck a death-blow to the system of monopolies, though the application of the treaty to Egypt was delayed for some years. The picture of Egypt under Mehemet Ali is nevertheless not complete without regard being had to the beneficent side of his rule. Public order was rendered perfect; the Nile and the highways were secure to all travellers, Christian or Moslem; the Bedouin tribes were won over to peaceful pursuits, and genuine efforts were made to promote education and the study of medicine. To European merchants, on whom he was dependent for the sale of his exports, Mehemet Ali showed much favour, and under his influence the port of Alexandria again rose into importance. It was also under Mehemet Ali's encouragement that the overland transit of goods from Europe to India via Egypt was resumed.

Mehemet Ali was fully conscious that the empire which he had so laboriously built up might at any time have to be defended by force of arms against his master Sultan Mahmud II., whose whole policy had been directed to curbing the power of his too ambitious valis, and who was under the influence of the personal enemies of the pasha of Egypt, notably of Khosrev, the grand vizier, who had never forgiven his humiliation in Egypt in 1803. Mahmud also was already planning reforms borrowed from the West, and Mehemet Ali, who had had plenty of opportunity of observing the superiority of European methods of warfare, was determined to anticipate the sultan in the creation of a fleet and an army on modern lines, partly as a measure of precaution, partly as an instrument for the realization of yet wider schemes of ambition. Before the outbreak of the War of Greek Independence in 1821 he had already expended much time and energy in organizing a fleet and in training, under the supervision of French instructors, native officers and artificers; though it was not till 1829 that the opening of a dockyard and arsenal at Alexandria enabled him to build and equip his own vessels. By 1823, moreover, he had succeeded in carrying out the reorganization of his army on European lines, the turbulent Turkish and Albanian elements being replaced by negroes and fellahin.[1] His foresight was rewarded by the invitation of the sultan to help him in the task of subduing the Greek insurgents, offering as reward the pashaliks of the Morea and of Syria.

Ibrahim in the Morea.

Mehemet Ali had already, in 1821, been appointed governor of Crete, which he had occupied with a small Egyptian force. In the autumn of 1824 a fleet of sixty Egyptian war-ships carrying a large force of disciplined troops concentrated in Suda Bay, and, in the following March, Ibrahim as commander-in-chief landed in the Morea. But for the action of European powers the intervention of Mehemet Ali would have been decisive. His naval superiority wrested from the Greeks the command of the sea, on which the fate of the insurrection ultimately depended, while on land the Greek irregular bands were everywhere routed by Ibrahim's disciplined troops. The history of the events that led up to the battle of Navarino and the liberation of Greece is told elsewhere (see Navarino and Greek Independence, War of); the withdrawal of the Egyptians from the Morea was ultimately due to the action of Admiral Sir Edward Codrington, who early in August 1828 appeared before Alexandria and induced the pasha, by no means sorry to have a reasonable excuse, by a threat of bombardment, to sign a convention undertaking to recall Ibrahim and his army.

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[1] The work was carried out under the supervision of the Frenchman, Colonel Sève, who had turned Mahommedan and was known in Islam as Suleiman Pasha. The effectiveness of the new force was first tried in the suppression of a revolt of the Albanians in Cairo (1823) by six disciplined Sudanese regiments; after which Mehemet Ali was no more troubled with military *émeutes*.

The Syrian campaigns.

Before the final establishment of the new kingdom of Greece, the Eastern question had late in 1831 entered into a new and more perilous phase, owing to the revolt of Mehemet Ali against the sultan on pretext of chastising the ex-slave Abdullah, pasha of Acre, for refusing to send back Egyptian fugitives from the effects of Mehemet Ali's "reforms." The true reason was the refusal of Sultan Mahmud to hand over Syria according to agreement, and Mehemet Ali's determination to obtain at all hazards what had been from time immemorial an object of ambition to the rulers of Egypt. For ten years from this date the relations of sultan and pasha remained in the forefront of the questions which agitated the diplomatic world. It was not only the very existence of the Ottoman empire that seemed to be at stake, but Egypt itself had become more than ever an object of attention, to British statesmen especially, and in the issue of the struggle were involved the interests of Great Britain in the two routes to India by the Isthmus of Suez and the valley of the Euphrates. The diplomatic and military history of this period will be found sketched in the article on Mehemet Ali. Here it will suffice to say that the victorious career of Ibrahim, who once more commanded in his father's name, beginning with the storming of Acre on the 27th of May 1832, and culminating in the rout and capture of Reshid Pasha at Konia on the 21st of December, was arrested by the intervention of Russia. As the result of endless discussions between the representatives of the powers, the Porte and the pasha, the convention of Kutaya was signed on the 14th of May 1833, by which the sultan agreed to bestow on Mehemet Ali the pashaliks of Syria, Damascus, Aleppo and Itcheli, together with the district of Adana. The announcement of the pasha's appointment had already been made in the usual way in the annual firman issued on the 3rd of May. Adana, reserved for the moment, was bestowed on Ibrahim under the style of *muhassil*, or collector of the crown revenues, a few days later.

Mehemet Ali now ruled over a virtually independent empire, subject only to a moderate tribute, stretching from the Sudan to the Taurus Mountains. But though he was hailed, especially in France, as the pioneer of European civilization in the East, the unsound foundations of his authority were not long in revealing themselves. Scarcely a year from the signing of the convention of Kutaya the application by Ibrahim of Egyptian methods of government, notably of the monopolies and conscription, had driven Syrians, Druses and Arabs, who had welcomed him as a deliverer, into revolt. The unrest was suppressed by Mehemet Ali in person, and the Syrians were terrorized and disarmed. But their discontent encouraged Sultan Mahmud to hope for revenge, and a renewal of the conflict was only staved off by the anxious efforts of the powers. At last, in the spring of 1839, the sultan ordered his army, concentrated under Reshid in the border district of Bir on the Euphrates, to advance over the Syrian frontier. Ibrahim, seeing his flank menaced, attacked it at Nezib on the 24th of June. Once more the Ottomans were utterly routed. Six days later, before the news reached Constantinople, Mahmud died. Once more the Ottoman empire lay at the feet of Mehemet Ali; but the powers were now more prepared to meet a contingency which had been long foreseen. Their intervention was prompt; and the dubious attitude of France, which led to her exclusion from the concert and encouraged Mehemet Ali to resist, only led to his obtaining less favourable terms. (See Mehemet Ali.)

Mehemet Ali's authority confined to Egypt.

The end was reached early in 1841. New firmans were issued which confined the pasha's authority to Egypt, the Sinai peninsula and certain places on the Arabian side of the Red Sea, and to the Sudan. The most important of these documents are dated the 13th of February 1841. The government of the pashalik of Egypt was made hereditary in the family of Mehemet Ali.[1] A map showing the boundaries of Egypt accompanied the firman granting Mehemet Ali the pashalik, a duplicate copy being retained by the Porte. The Egyptian copy is supposed to have been lost in a fire which destroyed a great part of the Egyptian archives. The Turkish copy has never been produced and its existence now appears doubtful. The point is of importance, as in 1892 and again in 1906 boundary disputes arose between Turkey and Egypt (see below). Various restrictions were laid upon Mehemet Ali, emphasizing his position of vassalage. He was forbidden to maintain a fleet, and his army was not to exceed 18,000 men. The pasha was no longer a figure in European politics, but he continued to occupy himself with his improvements, real or imaginary, in Egypt. The condition of the country was deplorable; in 1842 a murrain of cattle was followed by a destructive Nile flood; in 1843 there was a plague of locusts, whole villages were depopulated. Meantime the uttermost farthing was wrung from the wretched fellahin, while they were forced to the building of magnificent public works by unpaid labour. In 1844–1845 there was some improvement in the condition of the country as a result of financial reforms the pasha was compelled to execute. Mehemet Ali, who had been granted the honorary rank of grand vizier in 1842, paid a visit to Stamboul in 1846, where he became reconciled to his old enemy Khosrev Pasha, whom he had not seen since he spared his life at Cairo in 1803. In 1847 Mehemet Ali laid the foundation stone of the great barrage across the Nile at the beginning of the Delta. He was barely persuaded from ordering the barrage to be built with stone from the pyramids! Towards the end of 1847 the aged pasha's mind began to give way, and by the following June he was no longer capable of administering the government. In September 1848 Ibrahim was acknowledged by the Porte as ruler of the pashalik, but he died in the November

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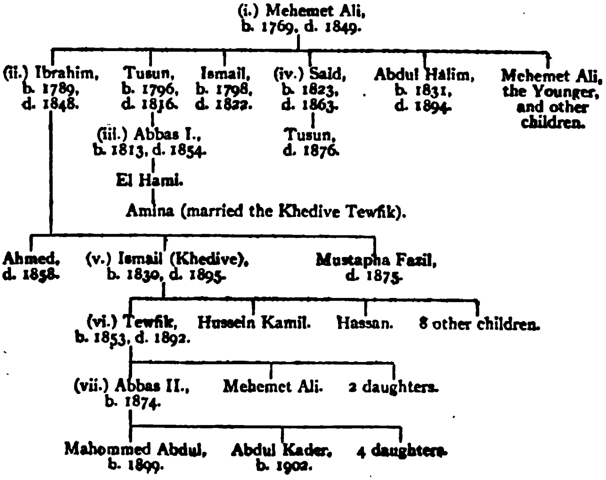
[1] The Dynasty of Mehfmet Ali.


(i.) Mehemet Ali, b. 1769, d. 1849.
(ii.) Ibrahim, b. 1789, d. 1848.
Tusun, b. 1796, d. 1816.
Ismail, b. 1798, d. 1822.
(iv.) Said, b. 1823, d. 1863.
Abdul Halim, b. 1831, d. 1894.
Mehemet Ali, the Younger, and other children.
(iii.) Abbas I., b. 1813, d. 1854.
Tusun, d. 1876.
El Hami.
Amina (married the Khedive Tewfik).
Ahmed, d. 1858.
(v.) Ismail (Khedive), b. 1830, d. 1895.
Mustapha Fazil, d. 1875.
(vi.) Tewfik, b. 1853, d. 1892.
Hussein Kamil.
Hassan.
8 other children.
(vii.) Abbas II., b. 1874.
Mehemet Ali.
2 daughters.
Mahommed Abdul, b. 1899.
Abdul Kader, b. 1902.
4 daughters.

following. Mehemet Ali survived another eight months, dying on the 2nd of August 1849, aged eighty. He had done a great work in Egypt; the most permanent being the weakening of the tie binding the country to Turkey, the starting of the great cotton industry, the recognition of the advantages of European science, and the conquest of the Sudan. (F. R. C.)

Abbas I. and Said Pasha.

(2) *From the Death of Mehemet Ali to the British Occupation.*—On Ibrahim's death in November 1848 the government of Egypt fell to his nephew Abbas I. (*q.v.*), the son of Tusun. Abbas put an end to the system of commercial monopolies, and during his reign the railway from Alexandria to Cairo was begun at the instigation of the British government. Opposed to European ways, Abbas lived in great seclusion, and after a reign of less than six years he was murdered (July 1854) by two of his slaves. He was succeeded by his uncle Said Pasha, the favourite son of Mehemet Ali, who lacked the strength of mind or physical health needed to execute the beneficent projects which he conceived. His endeavour, for instance, to put a stop to the slave raiding which devastated the Sudan provinces was wholly ineffectual. He had a genuine regard for the welfare of the fellahin, and a land law of 1858 secured to them an acknowledgment of freehold as against the crown. The pasha was much under French influence, and in 1856 was induced to grant to Ferdinand de Lesseps a concession for the construction of the Suez Canal. Lord Palmerston was opposed to this project, and the British opposition delayed the ratification of the concession by the Porte for two years. To the British Said also made concessions—one to the Eastern Telegraph Company, and another (1854) allowing the establishment of the Bank of Egypt. He also began the national debt by borrowing £3,293,000 from Messrs Frühling & Göschen, the actual amount received by the pasha being £2,640,000. In January 1863 Said Pasha died and was succeeded by his nephew Ismail, a son of Ibrahim Pasha.

Ismail's megalomania.

The reign of Ismail (*q.v.*), from 1863 to 1879, was for a while hailed as introducing a new era into modern Egypt. In spite of his vast schemes of reform and the *éclat* of his Europeanizing innovations, his oriental extravagance led to bankruptcy, and his reign is historically important simply for its compelling European intervention in the internal affairs of Egypt. Yet in its earlier years much was done which seemed likely to give Ismail a more important place in history. In 1866 he was granted by the sultan a firman—obtained on condition of the increase of the tribute from £376,000 to £720,000—by which the succession to the throne of Egypt was made to descend "to the eldest of thy male children and in the same manner to the eldest sons of thy successors," instead of, after Turkish law, to the eldest male of the family. In the following year another firman bestowed upon him the title of *khedive* in lieu of that of *vali*, borne by Mehemet Ali and his immediate successors. In 1873 a further firman placed the khedive in many respects in the position of an independent sovereign. Ismail re-established and improved the administrative system organized by Mehemet Ali, and which had fallen into decay under Abbas's indolent rule; he caused a thorough remodelling of the customs system, which was in an anarchic state, to be made by English officials; in 1865 he established the Egyptian post office; he reorganized the military schools of his grandfather, and gave some support to the cause of education. Railways, telegraphs, lighthouses, the harbour works at Suez, the breakwater at Alexandria, were carried out by some of the best contractors of Europe. Most important of all, the Suez Canal was opened in 1869. But the funds required for these public works, as well as the actual labour, were remorselessly extorted from a poverty-stricken population.

A striking picture of the condition of the people at this period is given by Lady Duff Gordon in *Last Letters from Egypt*. Writing in 1867 she said: "I cannot describe the misery here now—every day some new tax. Every beast, camel, cow, sheep, donkey and horse is made to pay. The fellaheen can no longer eat bread; they are living on barley-meal mixed with water, and raw green stuff, vetches, &c. The taxation makes life almost impossible: a tax on every crop, on every animal first, and again when it is sold in the market; on every man, on charcoal, on butter, on salt. . . . The people in Upper Egypt are running away by wholesale, utterly unable to pay the new taxes and do the work exacted. Even here (Cairo) the beating for the year's taxes is awful."

Steps leading to the deposition of Ismail.

In the years that followed the condition of things grew worse. Thousands of lives were lost and large sums expended in extending Ismail's dominions in the Sudan (*q.v.*) and in futile conflicts with Abyssinia. In 1875 the impoverishment of the fellah had reached such a point that the ordinary resources of the country no longer sufficed for the most urgent necessities of administration; and the khedive Ismail, having repeatedly broken faith with his creditors, could not raise any more loans on the European market. The taxes were habitually collected many months in advance, and the colossal floating debt was increasing rapidly. In these circumstances Ismail had to realize his remaining assets, and among them sold 176,602 Suez Canal shares to the British government for £3,976,582[1] (see BEACONSFIELD). This comparatively small financial operation brought about the long-delayed crisis and paved the way for the future prosperity of Egypt, for it induced the British government to inquire more carefully into the financial condition of the country. In December 1875 Mr Stephen Cave, M.P., and Colonel (afterwards Sir John) Stokes, R.E., were sent to Egypt to inquire into the financial situation; and Mr Cave's report, made public in April 1876, showed that under the existing administration national bankruptcy was inevitable. Other commissions of inquiry followed, and each one brought Ismail more under European control. The establishment of the Mixed Tribunals in 1876, in place of the system of consular jurisdiction in civil actions, made some of the courts of justice international. The Caisse de la Dette, instituted in May 1876 as a result of the Cave mission, led to international control over a large portion of the revenue. Next came (in November 1876) the mission of Mr (afterwards Lord) Goschen and M. Joubert on behalf of the British and French bondholders, one result being the establishment of Dual Control, *i.e.* an English official to superintend the revenue and a French official the expenditure of the country. Another result was the internationalization of the railways and the port of Alexandria. Then came (May 1878) a commission of inquiry of which the principal members were Sir Rivers Wilson, Major Evelyn Baring (afterwards Lord Cromer) and MM. Kremer-Baravelli and de Blignières. One result of that inquiry was the extension of international control to the enormous landed property of the khedive. Driven to desperation, Ismail made a virtue of necessity and accepted, in September 1878, in lieu of the Dual Control, a constitutional ministry, under the presidency of Nubar Pasha (*q.v.*), with Rivers Wilson as minister of finance and de Blignières as minister of public works. Professing to be quite satisfied with this arrangement, he pompously announced that Egypt was no longer in Africa, but a part of Europe; but before seven months had passed he found his constitutional position intolerable, got rid of his irksome cabinet by means of a secretly-organized military riot in Cairo, and reverted to his old autocratic methods of government. England and France could hardly sit still under this affront, and decided to administer chastisement by the hand of the suzerain power, which was delighted to have an opportunity of asserting its authority. On the 26th of June 1879 Ismail suddenly received from the sultan a curt telegram, addressed to him as ex-khedive of Egypt, informing him that his son Tewfik was appointed his successor. Taken unawares, he made no attempt at resistance, and Tewfik was at once proclaimed khedive.

After a short period of inaction, when it seemed as if the change might be for the worse, England and France summoned up courage to look the situation boldly in the face, and, in November 1879, re-established the Dual Control in the persons of Major Baring and M. de Blignières. For two years the Dual Control governed Egypt, and initiated the work of progress

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[1] Part of this money was devoted to an expedition sent against Abyssinia in 1876 to avenge losses sustained in the previous year. The new campaign was, however, equally unsuccessful.

Re-establishment of Dual Control.

that England was to continue alone. Its essential defect was what might be called insecurity of tenure. Without any efficient means of self-protection and coercion at its disposal, it had to interfere with the power, privileges and perquisites of a class which had long misgoverned the country. This class, so far as its civilian members were concerned, was not very formidable, because these were not likely to go beyond the bounds of intrigue and passive resistance; but it contained a military element who had more courage, and who had learned their power when Ismail employed them for overturning his constitutional ministry.

Arabi and the revolt of 1882.

Among the mutinous soldiers on that occasion was a fellah officer calling himself Ahmed Arabi the Egyptian. He was not a man of exceptional intelligence or remarkable powers of organization, but he was a fluent speaker, and could exercise some influence over the masses by a rude kind of native eloquence. Behind him were a group of men, much abler than himself, who put him forward as the figurehead of a party professing to aim at protecting the Egyptians from the grasping tyranny of their Turkish and European oppressors. The movement began among the Arab officers, who complained of the preference shown to the officers of Turkish origin; it then expanded into an attack on the privileged position and predominant influence of foreigners, many of whom, it must be confessed, were of a by no means respectable type; finally, it was directed against all Christians, foreign and native.[1] The government, being too weak to suppress the agitation and disorder, had to make concessions, and each concession produced fresh demands. Arabi was first promoted, then made under-secretary for war, and ultimately a member of the cabinet. The danger of a serious rising brought the British and French fleets in May 1882 to Alexandria, and after a massacre (11th of June) had been perpetrated by the Arab mob in that city, the British admiral bombarded the forts (11th of July 1882). The leaders of the national movement prepared to resist further aggression by force. A conference of ambassadors was held in Constantinople, and the sultan was invited to quell the revolt; but he hesitated to employ his troops against Mussulmans who were professing merely to oppose Christian aggression.

(3) *Egypt occupied by the British.*—At last the British government determined to employ armed force, and invited France to co-operate. The French government declined, and a similar invitation to Italy met with a similar refusal. England therefore, having to act alone, landed troops at Ismailia under Sir Garnet Wolseley, and suppressed the revolt by the battle of Tell-el-Kebir on the 13th of September 1882. The khedive, who had taken refuge in Alexandria, returned to Cairo, and a ministry was formed under Sherif Pasha, with Riaz Pasha as one of its leading members. On assuming office, the first thing it had to do was to bring to trial the chiefs of the rebellion. Had the khedive and Riaz been allowed a free hand, Arabi and his colleagues would have found little mercy. Thanks to the intervention of the British government, their lives were spared. Arabi pleaded guilty, was sentenced to death, the sentence being commuted by the khedive to banishment; and Riaz resigned in disgust. This solution of the difficulty was brought about by Lord Dufferin, then British ambassador at Constantinople, who had been sent to Egypt as high commissioner to adjust affairs and report on the situation. One of his first acts, after preventing the application of capital punishment to the ringleaders of the revolt, was to veto the project of protecting the khedive and his government by means of a Praetorian guard recruited from Asia Minor, Epirus, Austria and Switzerland, and to insist on the principle that Egypt must be governed in a truly liberal spirit. Passing in review all the departments of the administration, he laid down the general lines on which the country was to be restored to order and prosperity, and endowed, if possible, with the elements of self-government for future use.

Sir Evelyn Baring appointed consul-general, 1884.

The laborious task of putting these general indications into a practical shape fell to Sir Evelyn Baring (Lord Cromer), who arrived as consul-general and diplomatic agent, in succession to Sir Edward Malet, in January 1884. At that moment the situation was singularly like that which had existed on two previous occasions: firstly, when Ismail was deposed; and secondly, when the Dual Control had undermined the existing authority without having any power to enforce its own. For the third time in little more than three years the existing authority had been destroyed and a new one had to be created. But there was one essential difference: the power that had now to reorganize the country possessed in the British army of occupation a support sufficient to command respect. Without that support Sir Evelyn Baring could have done little or nothing; with it he did perhaps more than any other single man could have done. His method may be illustrated by an old story long current in Cairo. Mehemet Ali was said to have appointed as *mudir* or governor in a turbulent district a young and inexperienced Turk, who asked, "But how am I to govern these people?" "Listen," replied the pasha; "buy the biggest and heaviest *kurbash* you can find; hang it up in the centre of the *mudirieh*, well within your reach, and you will very seldom require to use it." The British army of occupation was Sir Evelyn's *kurbash*; it was well within his reach, as all the world knew, and its simple presence sufficed to prevent disorder and enforce obedience. He had one other advantage over previous English reformers in Egypt: his position towards France was more independent. The Dual Control had been abolished by a khedivial decree of 18th January 1883, and replaced by an English financial adviser. France naturally objected; but having refused to co-operate with England in suppressing the revolt, she could not reasonably complain that her offer of co-operation in the work of reorganization was declined. But though Dual Control was at an end, the Caisse de la Dette remained, and this body was to prove a constant clog on the financial measures of the Egyptian government.

The Policy of evacuation.

At first the intention of the British government was simply to restore the power of the khedive, to keep his highness for some time in the right path by friendly advice, and to withdraw the British troops as soon as possible. As Lord Granville explained in a circular to the powers, the position of England in Egypt imposed on her "the duty of giving advice with the object of securing that the order of things to be established shall be of a satisfactory character and possess the elements of stability and progress." But there was to be no embarking on a general scheme of reforms, which would increase unnecessarily the responsibilities of the protecting power and necessitate the indefinite prolongation of the military occupation. So far, therefore, as the British government had a definite policy in Egypt, it was a *politique de replâtrage*. Even this policy was not strictly adhered to. Mr Gladstone's cabinet was as unstable as the public opinion it sought to conciliate. It had its hot fits and its cold fits, and it gave orders now to advance and now to retreat. In the long run circumstances proved too strong for it, and it had to undertake a great deal more than it originally intended. Each little change in the administration engendered a multitude of others, so that the modest attempts at reform were found to be like the letting out of water. A tiny rill gradually became a boisterous stream, and the boisterous stream grew into a great river, which spread to all sections of the administration and ended by inundating the whole country.

The Sudan question.

Of the numerous questions awaiting solution, the first to claim immediate attention was that of the Sudan. The British government had begun by excluding it from the problem, and by declaring that for events in these outlying territories it must not be held responsible. In that sphere of activity, therefore, the Egyptian government might do as it thought fit. The principle of limited liability which this attitude assumed was soon found to be utterly untenable. The Sudan was an integral part of the khedive's dominions, and caused, even in ordinary times, a deficit of

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[1] Lord Cromer, writing in 1905, declared that the movement "was, in its essence, a genuine revolt against misgovernment," and "was not essentially anti-European" (vide *Egypt No. 1*, 1905, p. 2).

£200,000 to the Egyptian treasury. At that moment it was in a state of open rebellion, stirred up by a religious fanatic who proclaimed himself a mahdi of Islam. An army of 10,000 men under an English officer, Colonel William Hicks, formerly of the Bombay army, otherwise Hicks Pasha, had been sent to suppress the revolt, and had been annihilated in a great battle fought on the 5th of November 1883, near Obeid. The Egyptian government wished to make a new attempt to recover the lost province, and the idea was certainly very popular among the governing class, but Sir Evelyn Baring vetoed the project on the ground that Egypt had neither soldiers nor money to carry it out. In vain the khedive and his prime minister, Sherif Pasha, threatened to resign, and the latter actually carried out his threat. The British representative remained firm, and it was decided that the Sudan should be, for the moment at least, abandoned to its fate. Nubar, though as strongly opposed to the abandonment policy as Sherif, consented to take his place and accepted somewhat reluctantly the new régime, which he defined as "the administration of Egypt under the government of Baring." By this time the Mahdi was master of the greater part of the Sudan, but Khartum and some other fortified points still held out. The efforts made to extricate the garrisons, including the mission of General Gordon, the fall of Khartum, and the Nile Expedition under Lord Wolseley, are described below separately in the section of this article dealing with the military operations. The practical result was that the khedive's authority was limited to the Nile valley north of Wadi Halfa.

Internal reorganization.

With the internal difficulties Sir Evelyn Baring had been struggling bravely ever since his appointment, trying to evolve out of the ever-changing policy and contradictory orders of the British government some sort of coherent line of action, and to raise the administration to a higher standard. For two or three years it seemed doubtful whether he would succeed. All over Egypt there was a feeling of unrest, and the well-meant but not very successful efforts of the British to improve the state of things were making them very unpopular. The introduction of English officials and English influence into all the administrative departments was resented by the native officials, and the action of the irrigation officers in preventing the customary abuses of the distribution of water was resented by the great landowners, who had been, from time immemorial, in the habit of taking as much as they wanted, to the detriment of the fellahin. Even these latter, who gained most by the reforms, considered that they had good reason to complain, for the defeat of Arabi and the re-establishment of order had enabled the Christian money-lenders to return and insist on the payment of claims, which were supposed to have been extinguished by the rebellion. Worst of all, the government was drifting rapidly towards insolvency, being quite unable to fulfil its obligations to the bondholders and meet the expenses of administration. All departments were being starved, and even the salaries of poorly paid officials were in arrear. To free itself from its financial difficulties the government adopted a heroic remedy which only created fresh troubles. On the advice of Lord Northbrook, who was sent out to Cairo in September 1884 to examine the financial situation, certain revenues which should have been paid into the Caisse for the benefit of the bondholders were paid into the treasury for the ordinary needs of the administration. Immediately the powers protested against this infraction of the law of liquidation, and the Caisse applied for a writ to the Mixed Tribunals. In this way the heroic remedy failed, and to the internal difficulties were added international complications.

Fortunately for Egypt, the British government contrived to solve the international difficulty by timely concessions to the powers, and succeeded in negotiating the London Convention of March 1885, by which the Egyptian government was relieved from some of the most onerous stipulations of the law of liquidation, and was enabled to raise a loan of £9,000,000 for an annual payment of £135,000. After paying out of the capital the sums required for the indemnities due for the burning of Alexandria and the deficits of the years 1882 and 1883, it still had a million sterling, and boldly invested it in the improvement of irrigation. The investment proved most remunerative, and helped very materially to save the country from bankruptcy and internationalism. The danger of being again subjected to the evils of an international administration was very great, for the London Convention contained a stipulation to the effect that if Egypt could not pay her way at the end of two years, another international commission would be appointed.

To obviate this catastrophe the British reformers set to work most energetically. Already something in the way of retrenchment and reform had been accomplished. The public accounts had been put in order, and the abuses in the collection of the land tax removed. The constant drain of money and men for the Sudan had been stopped. A beginning had been made for creating a new army to replace the one that had been disbanded and to allow of a portion of the British garrison being withdrawn. In this work Sir Evelyn Wood had shown much sound judgment as well as great capacity for military organization, and had formed an efficient force out of very unpromising material (see the section above on the *Egyptian Army*). His colleague in the department of public works, Sir Colin Scott-Moncrieff, had been not less active. By mitigating the hardships of the *corvée*, and improving the irrigation system, on which the prosperity of the country mainly depends, he had conferred enormous benefits on the fellahin, and had laid the foundation of permanent budgetary equilibrium for the future. Not less active was Sir Edgar Vincent, the financial adviser, who kept a firm hold on the purse-strings and ruthlessly cut down expenditure in all departments except that of irrigation (see § *Finance*).

The activity of the British officials naturally produced a certain amount of discontent and resistance on the part of their Egyptian colleagues, and Lord Granville was obliged to declare very plainly that such resistance could not be tolerated. Writing (January 1884) to Sir Evelyn Baring, he said:

> "It should be made clear to the Egyptian Ministers and Governors of Provinces that the responsibility which for the time rests on England obliges H.M. Government to insist on the adoption of the policy which they recommend; and that it will be necessary that those Ministers and Governors who do not follow this course should cease to hold their offices."

Relations between British and native officials.

Nubar Pasha, who continued to be prime minister, resisted occasionally. What he chiefly objected to was direct interference in the provincial administration and the native tribunals, and he succeeded for a time in preventing such interference. Sir Benson Maxwell and Mr Clifford Lloyd, who had been sent out to reform the departments of justice and the interior, after coming into conflict with each other were both recalled, and the reforming activity was for a time restricted to the departments of war, public works and finance. Gradually the tension between natives and foreigners relaxed, and mutual confidence was established. Experience had evolved the working principle which was officially formulated at a much later period: "Our task is not to rule the Egyptians, but as far as possible to teach the Egyptians to rule themselves. . . . European initiative suggests measures to be executed by Egyptian agency, while European supervision controls the manner in which they are executed." If that principle had been firmly laid down and clearly understood at the beginning, a good deal of needless friction would have been avoided.

International problems.

The international difficulty remained. The British position in Egypt was anomalous, and might easily give rise to international complications. The sultan might well protest against the military occupation of a portion of his empire by foreign troops. It was no secret that France was ready to give him diplomatic support, and other powers might adopt a similar attitude. Besides this, the British government was anxious to terminate the occupation as soon as possible. With a view to regularizing the situation and accelerating the evacuation, Sir Henry Drummond Wolff was sent to Constantinople in August 1885 on a special mission. On the 24th of October of that year he concluded a preliminary convention by which an Ottoman and a British high commissioner, acting in concert with the khedive, should reorganize the Egyptian army, tranquillize the Sudan by pacific means, and consider what changes might be necessary in the civil administration. When the two commissioners were assured of the security of the frontier and the good working and stability of the Egyptian government, they should present reports to their respective governments, and these should consult as to the conclusion of a convention regulating the withdrawal of the English troops. Mukhtar Pasha and Sir Henry Drummond Wolff were appointed commissioners, and their joint inquiry lasted till the end of 1886, when the former presented his report and the latter went home to report orally. The remaining stipulations of the preliminary convention were duly carried out. Sir Henry Drummond Wolff proceeded to Constantinople and signed on the 22nd of May 1887 the definitive convention, according to which the occupation should come to an end in three years, but England should have a right to prolong or renew it in the event of internal peace or external security being seriously threatened. The sultan authorised the signature of this convention, but under pressure of France and Russia he refused to ratify it. Technically, therefore, the preliminary convention still remains in force, and in reality the Ottoman commissioner continued to reside in Cairo till the close of 1908.

Progress of reform.

The steadily increasing prosperity of the country during the years 1886 and 1887 removed the danger of national bankruptcy and international interference, and induced Sir Evelyn Baring to widen the area of administrative reforms. In the provinces the local administration and the methods of dispensing justice were still scandalously unsatisfactory, and this was the field to which the British representative next directed his efforts. Here he met with unexpected opposition on the part of the prime minister, Nubar Pasha, and a conflict ensued which ended in Nubar's retirement in June 1888. Riaz Pasha took his place, and remained in office till May 1891. During these three years the work of reform and the prosperity of the country made great progress. The new Egyptian army was so far improved that it gained successes over the forces of the Mahdi; the burden of the national debt was lightened by a successful conversion; the *corvée* was abolished;[1] the land tax was reduced 30% in the poorest provinces, and in spite of this and other measures for lightening the public burdens, the budgetary surplus constantly increased; the quasi-judicial special commissions for brigandage, which were at once barbarous and inefficient, were abolished; the native tribunals were improved, and Mr (afterwards Sir John) Scott, an Indian judge of great experience and sound judgment, was appointed judicial adviser to the khedive. This appointment was opposed by Riaz Pasha, and led to his resignation on the plea of ill-health. His successor, Mustafa Pasha Fehmi, continued the work and co-operated cordially with the English officials. The very necessary reform of the native tribunals was then taken seriously in hand. The existing procedure was simplified and accelerated; the working of the courts was greatly improved by a carefully organized system of inspection and control; the incompetent judges were eliminated and replaced by men of better education and higher moral character; and for the future supply of well-qualified judges, barristers, and law officials, an excellent school of law was established. Later on the reforming activity was extended to prisons, public health, and education, and has attained very satisfactory results.

Accession of Abbas.

In January 1892 the khedive Tewfik, who had always maintained cordial relations with Sir Evelyn Baring, died suddenly, and was succeeded by his son, Abbas Hilmi, a young man without political experience, who failed at first to understand the peculiar situation in which a khedive ruling under British protection is necessarily placed. Aspiring to liberate himself at once from foreign control, he summarily dismissed Mustafa Pasha Fehmi (15th January 1893), whom he considered too amenable to English influence, and appointed in his place Fakhri Pasha, who was not a *persona grata* at the British Agency. Such an incident, which might have constituted a precedent for more important acts of a similar kind, could hardly be overlooked by the British representative. He had always maintained that what Egypt most required, and would require for many years to come, was an order of things which would render practically impossible any return to that personal system of government which had well-nigh ruined the country. In this view the British agent was warmly supported by Lord Rosebery, then secretary of state for foreign affairs. The young khedive was made therefore to understand that he must not make such changes in the administration without a previous agreement with the representative of the protecting power; and a compromise was effected by which Fakhri Pasha retired, and the post of premier was confided once more to Riaz. With this compromise the friction between the khedive and Sir Evelyn Baring, who had now become Lord Cromer, did not end. For some time Abbas Hilmi clung to his idea of liberating himself from all control, and secretly encouraged a nationalist and anti-British agitation in the native press; but he gradually came to perceive the folly, as well as the danger to himself, of such a course, and accordingly refrained from giving any overt occasion for complaint or protest. In like manner the relations between the British officials and their Egyptian colleagues gradually became more cordial, so that it was found possible at last to reform the local administration in the provinces according to the recommendations of Mr (afterwards Sir) Eldon Gorst, who had been appointed adviser to the ministry of the interior. Nubar Pasha, it is true, who succeeded Riaz as prime minister in April 1894, objected to some of Mr Gorst's recommendations, and in November 1895 resigned. He was succeeded by Mustafa Fehmi, who had always shown a conciliatory spirit, and who had been on that account, as above stated, summarily dismissed by the khedive in January 1893. After his reinstatement the Anglo-Egyptian condominium worked without serious friction.

Fashoda.

The success of the Anglo-Egyptian condominium, and the consequent economic and financial prosperity of Egypt proper, rendered it possible, during 1896–1898, to recover from the Mahdists the Sudanese provinces (see *Military Operations*), and to delimit in that part of Africa, in accordance with Anglo-Egyptian interests, the respective spheres of influence of Great Britain and France. The arrangement was not effected without serious danger of a European conflict. Taking advantage of the temporary weakness of Egypt, the French government formed the project of seizing the Upper Nile valley and uniting her possessions in West Africa with those at the entrance to the Red Sea. With this object a small force under Major Marchand was sent from the French Congo into the Bahr-el-Ghazal, with orders to occupy Fashoda on the Nile; whilst a Franco-Abyssinian Expedition was despatched from the eastward, to join hands with Major Marchand. The small force from the French Congo reached its destination, and a body of Abyssinian troops, accompanied by French officers, appeared for a short time a little higher up the river; but the grand political scheme was frustrated by the victorious advance of an Anglo-Egyptian force under General Kitchener and the resolute attitude of the British government. Major Marchand had to retire from Fashoda, and as a concession to French susceptibilities he was allowed to retreat by the Abyssinian route. By an agreement signed by Lord Salisbury and the French ambassador on the 21st of March 1899, and appended to Art. IV. of the Anglo-French convention of June 14th, 1898, which dealt with the British and French spheres of influence in the region of the Niger, France was excluded from the basin of the Nile, and a line marking the respective spheres of influence of the two countries was drawn on the map from the northern frontier of the Congo Free State to the southern frontier of the Turkish province of Tripoli.

The administration of the Sudan (*q.v.*) was organized on the basis of an agreement between the British and Egyptian governments signed on the 19th of January 1899. According to that agreement the British and Egyptian flags are used together,

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[1] Except in so far as it was necessary to call out men to guard the banks of the Nile in the season of high flood.

The Anglo-Egyptian Sudan.

and the supreme military and civil command is vested in a governor-general, who is appointed by the khedive on the recommendation of the British government, and who cannot be removed without the British government's consent. Neither consular jurisdiction, nor that of the mixed tribunals, was permitted, the Sudan being made absolutely free of the international fetters which bound Egypt. Sir Reginald Wingate, the sirdar of the Egyptian army (in which post he succeeded Lord Kitchener at the close of 1899) was named governor-general, and in the work of regeneration of the country, the officials, British, Egyptian and Sudanese, had the cordial co-operation of the majority of the inhabitants.

Egypt's growing prosperity.

The growing prosperity of Egypt in the opening years of the 20th century was very marked, and is reflected in the annual reports on the country supplied to the British foreign office by Lord Cromer. Thus, in 1901 he was able to declare that "the foundations on which the well-being and material prosperity of a civilized community should rest have been laid. . . . The institution of slavery is virtually defunct. The *corvée* has been practically abolished. Law and order everywhere reign supreme. The *curbash* is no longer employed as an instrument of government." So little danger to internal peace was apprehended that during this year Arabi Pasha, who had been in exile in Ceylon since 1882, was permitted to return to Egypt. This happy condition had been brought about largely as the result of giving fiscal reform, accompanied by substantial relief to the taxpayers, the first place in the government's programme, and with the abolition of octroi duties in 1902 disappeared the last of the main defects in the fiscal system as existing at the time of the British occupation. In these conditions the machinery of government, despite its many imperfections and anomalies, worked smoothly. Land increased in value as irrigation schemes were completed, and European capital was increasingly eager to find employment in the country. The bulk of the fellahin enjoyed a material prosperity to which they had been strangers for centuries. In the midst of this return of plenty Lord Cromer (in his report for 1903) sounded a note of warning:—

> "As regards moral progress (he wrote), all that can be said is that it must necessarily be slower than advance in a material direction. I hope and believe, however, that some progress is being made. In any case the machinery which will admit of progress has been created. The schoolmaster is abroad. . . . Every possible facility and every encouragement are afforded for the Egyptians to advance along the path of moral improvement. More than this no government can do. It remains for the Egyptians to take advantage of the opportunities offered to them."

The Anglo-French understanding of 1904.

The facilities enjoyed by the British and Egyptian governments for securing the material if not the moral development of Egypt were greatly enlarged in 1904, as the result of the understanding then come to between France and Great Britain. The natural irritation in France arising from the British occupation of the Nile valley, and the non-fulfilment of the pledge to withdraw the British garrison from Egypt, which had grown less acute with the passing of years, flamed out afresh at the time of the Fashoda crisis, while the Anglo-Boer war of 1899–1902 led to another access of irritation against England. During 1903 a great change came over public opinion on both sides of the Channel, with the result that the statesmen of both countries were enabled to complete negotiations settling many points in dispute between the two nations. On the 8th of April 1904 a declaration was signed by the representatives of France and Great Britain which virtually recognized the dominant position of France in Morocco and of Britain in Egypt. The chief provisions concerning Egypt were:—

> "His Britannic Majesty's government declare that they have no intention of altering the political status of Egypt.
>
> "The government of the French Republic, for their part, declare that they will not obstruct the action of Great Britain in that country by asking that a limit of time be fixed for the British occupation, or in any other manner.
>
> "His Britannic Majesty's government, for their part, will respect the rights which France, in virtue of treaties, conventions and usage, enjoys in Egypt."

Similar declarations and engagements were made by Germany, Austria and Italy. Annexed to the Anglo-French agreement was the text of a proposed khedivial decree altering the relations between Egypt and the foreign bond-holders. With the consent of the powers this decree (promulgated on the 28th of November 1904) came into operation on the 1st of January 1905. The combined effect of the declaration and the khedivial decree was great. The first-named put an end to an anomalous situation and gave a practically valid sanction to the presence of Britain in Egypt, removing all ground for the reproach that Great Britain was not respecting its international obligations. In effect it was a European recognition that Britain was the protecting power in Egypt. It put a period to a question which had long embittered the relations between England and France, and locally it caused the cessation of the systematic opposition of the French agents in Cairo to everything tending to strengthen the British position—however beneficial to Egypt the particular scheme opposed might be. Scarcely less important were the results of the khedivial decree. By it Egypt achieved in effect financial independence. The power of the Caisse de la Dette, which had virtually controlled the execution of the international agreements concerning the finances, was swept away, together with almost all the other financial fetters binding Egypt. The Railway and Port of Alexandria Board ceased to exist. For the first time since 1875 Egypt was free to control her own revenue. In return she pledged the greater part of the land tax to the service of the debt. The functions of the Caisse were restricted to the receipt of the funds necessary for this service. It was entirely deprived of its former power to interfere in the machinery of government. Moreover, some £10,000,000, being accumulated surpluses in the hands of the Caisse after meeting the charges of the debt, were handed over to the Egyptian treasury. The Egyptian government was henceforth free to take full advantage of the financial prosperity of the country.

Evils of the Capitulations.

In one respect the Anglo-French agreement made no alteration—it left untouched the extra-territoriality enjoyed by Europeans in Egypt in virtue of the treaties with Turkey, *i.e.* the system of Capitulations. One of the anomalies under that system had, it is true, been got rid of, for, as has been stated, consular jurisdiction in civil matters had been replaced in 1876 by that of the Mixed Tribunals. In criminal cases, however, foreign consuls still exercised jurisdiction, but the main evil of the Capitulations régime was the absence of any proper machinery for enacting laws applicable to the whole of the inhabitants of Egypt. No change could be made in any law applicable to Europeans without the unanimous consent of fifteen foreign powers—a state of affairs wholly incompatible with the condition of Egypt in the 20th century, "an oriental country which has assimilated a very considerable portion of European civilization and which is mainly governed by European methods." It was, however, far easier to acknowledge that the Capitulations régime was defective and had outlived its time than to devise a remedy and get all the nations interested to accept it. The solution favoured by Lord Cromer (*vide* Blue-books, *Egypt No. 1* (1906), pp. 1-8, and *Egypt No. 1* (1907), pp. 10-26) was the creation of a council—distinct from the existing native legislative council and assembly—composed of Europeans, which should have the power to pass legislation which when promulgated by the Egyptian government, with the assent of the British government, would bind all foreigners resident in Egypt. Every reservation for the benefit of British subjects should enure for the benefit of subjects of other powers. The jurisdiction exercised by consuls in civil and criminal affairs Lord Cromer proposed should cease *pari passu* with the provision by the Egyptian government, under the powers conferred by the treaty required to set up the new council, of courts having competence to deal with such matters, various safeguards being introduced to prevent injustice in criminal cases. As to civil cases the proposal was to make permanent the Mixed Tribunals, hitherto appointed for quinquennial periods (so that if not reappointed consular jurisdiction in civil cases would revive).

The pan-Islamic movement.

While the removal of ancient jealousies among the European powers interested in Egypt helped to smooth the path pursued by the Egyptian administration under the guiding hand of Great Britain, the intrigues of the Turks and the danger of a revival of Moslem fanaticism threatened during 1905–1906 to disturb the peace of the country. A party had also arisen, whose best-known leader was Mustafa Kamel Pasha (1874–1908), which held that Egypt was ready for self-government and which saw in the presence of the British a hindrance to the attainment of their ideal. This "national" party lent what weight it had to the pan-Islamic agitation which arose in the summer and autumn of 1905, regardless of the fact that a pan-Islamic triumph meant the re-assertion of direct Turkish rule in Egypt and the end of the liberty the Egyptians enjoyed. The pan-Islamic press, allowed full licence by the Cairo authorities, spread abroad rumours that the Egyptian government intended to construct fortifications in the Sinai peninsula with the design of menacing the railway, under construction by Turkey, from Damascus to Mecca. This baseless report led to what is known as the Taba incident (see below). This incident inflamed the minds of many Egyptians, and almost all the opposition elements in the country were united by the appeal to religious fanaticism, of which the incident was partly the effect and partly the cause. The inflammatory writing of the newspapers indicated, encouraged by many persons holding high positions both inside and outside Egypt, created, by every process of misrepresentation, an anti-Christian and anti-European feeling among the mass of the people. After more than a quarter of a century of just rule, *i.e.* since the accession of Tewfik, the tyranny of the Turkish system was apt to be forgotten, while the appeal to rally in support of their khalif found a response in the hearts of many Egyptians. The feeling entertained by large numbers even of the educated class of Egyptians was strikingly illustrated by the terms of an anonymous letter received by Lord Cromer in May 1906. The writer, probably a member of the Ulema class, addressing the British agent as the reformer of Egypt, said:—

> ". . . He must be blind who sees not what the English have wrought in Egypt; the gates of justice stand open to the poor; the streams flow through the land and are not stopped by order of the strong; the poor man is lifted up and the rich man pulled down, the hand of the oppressor and the briber is struck when outstretched to do evil. Our eyes see these things and they know from whom they come. . . . While peace is in the land the spirit of Islam sleeps. . . . But it is said, 'There is war between England and Abdul Hamid Khan.' If that be so a change must come. The words of the Imam are echoed in every heart, and every Moslem hears only the cry of the Faith. . . . Though the Khalif were hapless as Bayezid, cruel as Murad, or mad as Ibrahim, he is the shadow of God, and every Moslem must leap up at his call. . . . You will say, 'The Egyptian is more ungrateful than a dog, which remembers the hand that fed him. He is foolish as the madman who pulls down the roof-tree of his house upon himself.' It may be so to worldly eyes, but in the time of danger to Islam the Moslem turns away from the things of this world and thirsts only for the service of his Faith, even though he looks in the face of death. . . ."

To establish confidence in the minds of the Egyptian public that the authorities could maintain order and tranquillity, it was determined to increase permanently the strength of the British garrison. An incident occurred in June 1906 which illustrated the danger which might arise if anything happened to beget the idea that the protecting power had weakened its hold. While mounted infantry of the British army were marching from Cairo to Alexandria, five officers went (on the 13th of June) to the village of Denshawai to shoot pigeons.[1] An attack was made on the party by the villagers. The officers were told by their guide that they might shoot, but the villagers had not given permission and were incensed at the shooting of their pigeons by other officers in the previous year. A premeditated attack was made on the officers; a gun seized from one of them went off and slightly injured four natives—one a woman. The attack had been preceded by a trifling fire at a threshing floor, either accidentally caused (but not by the officers' shots) or lit as a signal for the assault. Captain S. C. Bull of the 6th Dragoons received serious injuries and died a few hours later, and two other officers were seriously injured. A number of persons were arrested and tried by a special tribunal created in 1895 to deal with offences against the army of occupation. On the 27th of the same month four of the ringleaders were sentenced to death, others received various terms of imprisonment,[2] and seven were sentenced to fifty lashes. The executions and floggings were carried out the next day at the scene of the outrage and in the presence of some five hundred natives. The quieting effect that this drastic action might have had was marred by the fact that certain members of the British parliament called in question the justice of the sentences—passed unanimously by a court of which the best English and the best native judge were members. For a time there was considerable ferment in Egypt. The Anglo-Egyptian authorities received, however, the firm support of Sir Edward Grey, the foreign secretary in the liberal administration formed in December 1905. As far as responsible statesmen were concerned the change of government in Great Britain made no difference in the conduct of Egyptian affairs.

Denshawai.

The Taba incident.

The Taba incident, to which reference has been made, arose in the beginning of 1906 over the claim of the sultan of Turkey to jurisdiction in the Sinai peninsula. The origin of the dispute dated back, however, to 1892, when Abbas Hilmi became khedive. Mehemet Ali and his successors up to and including Tewfik had not only administered the Sinai peninsula but certain posts on the Hejaz or Arabian side of the gulf of Akaba. The firman of investiture issued by the sultan on the occasion of the succession of Abbas differed, however, from the text of former firmans, the intention being, apparently, to exclude Egypt from the administration of the Sinai peninsula. The British government intervened and after considerable pressure upon Turkey obtained a telegram (dated the 8th of April 1892) from the grand vizier in which it was declared that the *status quo* was maintained in the Sinai peninsula, but that the sultan resumed possession of the posts in the Hejaz heretofore garrisoned by Egypt. To this last course Great Britain raised no objection. As officially stated by the British government at the time, the eastern frontier of the Sinai peninsula was taken to be a line running in a south-easterly direction from Rafa, a place on the Mediterranean, east of El Arish, to the head of the gulf of Akaba. The fort of Akaba and other posts farther east Egypt abandoned. So matters rested until in 1905 in consequence of lawlessness among the Bedouins of the peninsula a British official was appointed commandant and inspector of the peninsula and certain administrative measures taken. The report was spread by pan-Islamic agents that the intention of the Egyptian government was to construct fortifications on the frontier near Akaba, to which place the Turks were building a branch railway from the Damascus-Mecca line. In January 1906 the sultan complained to the British ambassador at Constantinople of Egyptian encroachments on Turkish territory, whereupon the khedive asked that the frontier should be delimited, a request which Turkey rejected. A small Egyptian force was then directed to occupy Taba, a port near Akaba but on the western side of the gulf. Before this force could reach Taba that place had been seized by the Turkish commandant at Akaba. A period of considerable tension ensued, the Turks removing the boundary posts at Rafa and sending strong reinforcements to the frontier. The British government intervened on behalf of the khedive and consistently maintained that the Rafa-Akaba line must be the frontier. In April a conference was held between the khedive and Mukhtar Pasha, the Ottoman commissioner. It then appeared that Turkey was unwilling to recognize the British interpretation of the telegram of the 8th of April 1892. Turkey claimed that the peninsula of Sinai consisted only of the territory south of a straight line from Akaba to Suez, and that Egyptian territory north of that line was traced from Rafa to Suez. As a compromise Mukhtar Pasha suggested as the frontier a line drawn direct from Rafa to Ras Mahommed (the most southern point of the Sinai peninsula), which would have left the whole of the gulf of Akaba in Turkish territory. In other words the claim of the Porte was, to quote Lord Cromer:—

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[1] The Egyptians keep large numbers of pigeons, which are allowed to be shot only by permission of the village omdeh (head-man). After the occurrence here related, officers were prohibited from shooting pigeons in any circumstances.

[2] On the 8th of January 1908, the anniversary of the khedive's accession, the whole of the Denshawai prisoners were pardoned and released. For the Denshawai incident see the British parliamentary papers, *Egypt No. 3* and *Egypt No. 4* of 1906.

> "to carry the Turkish frontier and strategical railways to Suez on the banks of the canal; or that if the Ras Mahommed line were adopted, the Turkish frontier would be advanced to the neighbourhood of Nekhl, *i.e.* within easy striking distance of Egypt, and that . . . the gulf of Akaba . . . would practically become a *mare clausum* in the possession of Turkey and a standing menace to the security of the trade route to the East."

Such proposals could not be entertained by Great Britain; and as the sultan remained obstinate the British ambassador on the 3rd of May presented a note to the Porte requiring compliance with the British proposals within ten days. The Turkish ambassador in London was informed by Sir Edward Grey, foreign secretary, that if it were found that Turkish suzerainty in Egypt were incompatible with the rights of the British government to interfere in Egyptian affairs, and with the British occupation, the British position in Egypt would be upheld by the whole force of the empire. Thereupon the sultan gave way and agreed (on the 14th of May) that the line of demarcation should start at Rafa and run towards the south-east "in an approximately straight line as far as a point on the gulf of Akaba at least 3 m. distant from Akaba."[1] The Turkish troops were withdrawn from Taba, and the delimitation of the frontier was undertaken by a joint Turco-Egyptian commission. An agreement was signed on the 1st of October finally settling the frontier line.

With the ending of this dispute and the strengthening of the British garrison in Egypt a demonstration was given of the ability of the protecting power to maintain its position. At the same time encouragement was given to that section of Egyptian society which sought the reform of various Moslem institutions without injury to the principles underlying the faith of Islam: a more truly national movement than that of the agitators who clamoured for parliamentary government.

Resignation of Lord Cromer.

In April 1907, a few days after the appearance of his report for 1906, in which the "Nationalist" and pan-Islamic movements were shown to be detrimental to the welfare of Egypt, Lord Cromer resigned his post of British agent and consul-general. His resignation, dictated by reasons of health, was described by Sir Edward Grey as "the greatest personal loss which the public service of this country (Britain) could suffer." Lord Cromer's work was in a sense complete. He left the country in a state of unexampled material prosperity, free from the majority of the international fetters with which it was bound when he took up his task in 1883, and with the legitimate expectation that the work he had done would endure. The magnitude of the task he had accomplished is shown by the preceding pages, and it need only be added that the transformation effected in Egypt and the Sudan, during his twenty-four years' occupancy of the British Agency, was carried out in every department under his guidance and inspiration. Lord Cromer was succeeded by Sir Eldon Gorst, who had served in Egypt eighteen years under him, and was at the time of his appointment to Cairo an assistant under secretary of state for foreign affairs.

Notwithstanding, or, rather, as a consequence of, the unexampled material prosperity of the country, 1907 was a year of severe financial crisis, due to over-trading, excessive credit and the building mania induced by the rapid economic progress of Egypt, and aggravated by the unfavourable monetary conditions existing in America and Europe during the latter part of the year. Though the crisis had results disastrous to the speculators, the position of the fellahin was hardly affected; the cotton crop was marketed with regularity and at an average price higher than that of 1906, while public revenue showed a satisfactory increase. The noisy "Nationalist" agitation which was maintained during this period of financial stringency reacted unfavourably on public order. Although the degree of insecurity prevailing in the provinces was greatly exaggerated—serious crime in 1907 being less than in the preceding year—an increasing number of crimes were left untraced to their authors. The release of the Denshawai prisoners in January 1908 and the death of Mustafa Kamel in the following month had a quieting effect on the public mind; while the fact that in the elections (December 1907) for the legislative council and the general assembly only 5% of the electors went to the polls, afforded a striking commentary alike on the appreciation of the average Egyptian of the value of parliamentary institutions and of the claims of the "Nationalist" members of the assembly to represent the Egyptian people. The "Nationalists" were, too, divided into many warring sections—Mahommed Bey Ferid, chosen as successor to Mustafa Kamel, had to contend with the pretensions of several other "leaders." The khedive, moreover, markedly abstained from any association with the agitation of the Nationalists, who viewed with disfavour his highness's personal friendship with Sir Eldon Gorst. The agitators gained their chief strength from the support accorded them by certain Radical politicians in England. A number of members of the council and assembly visited England in July 1908 and were received by Sir Edward Grey, who gave them assurances that Great Britain would always strive to remedy the legitimate grievances of Egyptians.

The establishment of constitutional rule in Turkey in the summer of 1908 excited the hopes of the Egyptian Nationalists, and a deputation was sent to Constantinople to confer with the Young Turk committee. From the Young Turks, however, the deputation received no encouragement for their agitation and returned with the advice to work in co-operation with the British. In view of the rumours current, Sir Eldon Gorst, in the form of an interview in *El Mokattam*, a widely read native paper, restated (October 1908) the British view as to the occupation of the country and the demand for a parliament. Great Britain, he declared, had no intention of proclaiming a protectorate over Egypt; on the other hand, recent events in Turkey in no way affected the question of self-government in Egypt. It would be folly to think of introducing unrestricted parliamentary government at present, the conditions for its successful working not existing. The "wild and foolish" agitation on this question only served to confirm the impression that the Egyptians were not yet fit to govern themselves. At the same time steps were being taken to give them a much greater part in the management of local affairs. If the Egyptians showed that the existing institutions and the new provincial councils could do useful work, it would prove the best argument for extending their powers. Sir Eldon Gorst's statements were approved by the British government.

In November 1908 Mustafa Fehmi, who had been premier since 1895, resigned and was succeeded by Boutros Pasha, a Copt of marked ability, who had been for several years foreign minister. Boutros incurred the enmity of the "Nationalists" and was murdered in February 1910. (D. M. W.; F. R. C.)

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For the period immediately preceding and during the British occupation the standard authority is Lord Cromer's *Modern Egypt* (2 vols., London, 1908). In this invaluable work the history of Egypt from 1875 to 1892 and that of the Anglo-Egyptian Sudan from 1882 to 1907 is treated fully. Lord Cromer's annual reports (1888–1906) to the British government on the affairs of Egypt should also be consulted. Next in interest are Alfred (Lord) Milner's *England in Egypt* (11th ed., London, 1904), and Sir A. Colvin's *The Making of Modern Egypt* (London, 1906). Consult also *Khedives and Pashas* (London, 1884), by C. F. Moberly Bell (published anonymously); D. M. Wallace, *Egypt and the Egyptian Question* (London, 1883); W. S. Blunt, *Secret History of the English Occupation of Egypt* (2nd ed., London, 1907), a partisan record; C. v. Malortie, *Egypt*,

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[1] See *Egypt No. 2* (1906), Correspondence respecting the Turco-Egyptian Frontier in the Sinai Peninsula (with a map).

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For military operations 1882–1899 see C. Royle, *The Egyptian Campaigns 1882 to 1899*, revised ed. (London, 1900); H. Brackenbury, *Narrative of the Advance of the River Column of the Nile Expeditionary Force* (Edinburgh, 1885); Sir W. F. Butler, *Campaign of the Cataracts* (London, 1887); Count A. E. W. Gleichen, *With the Camel Corps up the Nile* (London, 1888); *Gordon's Last Journal* (London, 1885); Sir C. W. Wilson, *From Korti to Khartum* (Edinburgh, 1886); J. Grant, *Cassell's History of the War in the Soudan*, 6 vols. (London, 1885 et seq.); "An Officer," *Sudan Campaigns 1896–1899* (London, 1899); G. W. Steevens, *With Kitchener to Khartum* (Edinburgh, 1898); W. S. Churchill, *The River War*, new edition (London, 1902).

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MILITARY OPERATIONS OF 1882–1885

In February 1879 a slight outbreak of discharged officers and soldiers occurred at Cairo, which led to the despatch of British and French ships to Alexandria. On the 26th of June of that year Ismail Pasha was removed from Egypt, and Tewfik assumed the khediviate, becoming practically the *protégé* of the two western powers. On the 1st of February 1881 a more serious disturbance arose at Cairo from the attempt to try three colonels, Ahmed Arabi, Ali Fehmy, and Abd-el-Al, who had been arrested as the ringleaders of the military party. The prisoners were released by force, and proceeded to dictate terms to the khedive. Again British and French warships were despatched to Alexandria, and were quickly withdrawn, their presence having produced no apparent impression. It soon became clear that the khedive was powerless, and that the military party, headed by Arabi, threatened to dominate the country. The "dual note," communicated to the khedive on the 6th of January 1881, contained an intimation that Great Britain and France were prepared to afford material support if necessary; but the fall of Gambetta's ministry produced a reaction, and both governments proceeded to minimize the meaning of their language. The khedive was practically compelled to form a government in which Arabi was minister of war and Mahmud Sami premier, and Arabi took steps to extend his influence throughout his army. The situation now became critically serious: for the third time ships were sent to Alexandria, and on the 25th of May 1882 the consuls-general of the two powers made a strong representation to Mahmud Sami which produced the resignation of the Egyptian ministry, and a demand, to which the khedive yielded, by the military party for the reinstatement of Arabi. The attitude of the troops in Alexandria now became threatening; and on the 29th the British residents pointed out that they were "absolutely defenceless." This warning was amply justified by the massacres of the 11th of June, during which more than one hundred persons, including an officer and two seamen, were killed in the streets of Alexandria, almost under the guns of the ships in harbour. It was becoming clear that definite action would have to be taken, and on the 15th the channel squadron was ordered to Malta. By the end of June twenty-six warships, representing the navies of Great Britain, France, Germany, Italy, Austria, Russia, the United States, Spain, Greece and Turkey, lay off the port of Alexandria, and large numbers of refugees were embarked. The order received by Admiral Sir Beauchamp Seymour (afterwards Lord Alcester) on the 3rd of July was as follows:—

Bombardment of Alexandria.

> "Prevent any attempt to bar channel into port. If work is resumed on earthworks, or fresh guns mounted, inform military commander that you have orders to prevent it; and if not immediately discontinued, destroy earthworks and silence batteries if they open fire, having given sufficient notice to population, shipping and foreign men-of-war."

On the 9th the admiral received a report that working parties had been seen in Fort Silsileh "parbuckling two smoothbore guns—apparently 32-pounders—towards their respective carriages and slides, which were facing in the direction of the harbour." Fort Silsileh was an old work at the extreme east of the defences of Alexandria, and its guns do not bear on the harbour. On the 10th an ultimatum was sent to Toulba Pasha, the military commandant, intimating that the bombardment would commence at sunrise on the following morning unless "the batteries on the isthmus of Ras-el-Tin and the southern shore of the harbour of Alexandria" were previously surrendered "for the purpose of disarming." The fleet prepared for action, and the bearer of the reply, signed by the president of the council, and offering to dismount three guns in the batteries named, only succeeded in finding the flagship late at night. This proposal was rejected, and at 7 A.M. on the 11th of July the "Alexandra" opened fire and the action became general. The attacking force was disposed in three groups: (1) the "Alexandra," "Sultan" and "Superb," outside the reef, to engage the Ras-el-Tin and the earthworks under weigh; (2) the "Monarch," "Invincible" and "Penelope," inside the harbour, to engage the Meks batteries; and (3) the "Inflexible" and "Temeraire," to take up assigned stations outside the reef and to co-operate with the inshore squadron. The gunboats "Beacon," "Bittern," "Condor," "Cygnet" and "Decoy" were to keep out of fire at first and seek opportunities of engaging the Meks batteries. Meks fort was silenced by about 12.45 P.M., and a party from the "Invincible" landed and disabled the guns. As the fire delivered under weigh was not effective, the offshore squadron anchored at about 10.30 A.M., and succeeded in silencing Fort Ras-el-Tin at about 12.30 P.M., and Fort Adda, by the explosion of the main magazine, at 1.35 P.M. The "Inflexible" weighed soon after 8 A.M. and engaged Ras-el-Tin, afterwards attacking Forts Pharos and Adda. The "Condor," followed by the "Beacon," "Bittern" and "Decoy," engaged Fort Marabout soon after 8 A.M. till 11 A.M., when the gunboats were recalled. After the works were silenced, the ships moved in closer, with a view to dismount the Egyptian guns. The bombardment ceased at 5 P.M.; but a few rounds were fired by the "Inflexible" and "Temeraire" on the morning of the 12th at the right battery in Ras-el-Tin lines.

The bombardment of the forts of Alexandria is interesting as a gauge of the effect to be expected from the fire of ships under specially favourable conditions. The Egyptians at different times during the day brought into action about 33 R.M.L. guns (7-in. to 10-in.), 3 R.B.L. guns (40 prs.), and 120 S.B. guns (6 5-in. and 10-in.), with a few mortars. These guns were disposed over a coast-line of about 10 sea miles, and were in many cases indifferently mounted. The Egyptian gunners had been little trained, and many of them had never once practised with rifled ordnance. Of seventy-five hits on the hulls of the ships only five can with certainty be ascribed to projectiles from rifled guns, and thirty were unquestionably due to the old smoothbores, which were not provided with sights. The total loss inflicted was 6 killed and 27 wounded. The British ships engaged fired 1741 heavy projectiles (7-in to 16-in.) and 1457 light (7-prs. to 64-prs.), together with 33,493 machine-gun and rifle bullets. The result was comparatively small. About 8 rifled guns and 19 smoothbores were dismounted or disabled and 4 and 1 temporarily put out of action respectively. A considerable portion of this injury was inflicted, after the works had been silenced, by the deliberate fire of the ships. As many as twenty-eight rifled guns and 140 smoothbores would have opened fire on the following day. The Egyptians made quite as good a stand as could be expected, but were driven from their guns, which they were unable to use with adequate effect; and the bombardment of Alexandria confirms previous experience that the fire of ships cannot really compete with that of well-mounted and well-handled guns on shore.

In the afternoon of the 12th, fires, which were the work of incendiaries, began to break out in the best quarters of Alexandria; and the town was left to murder and pillage till the following day, when a party of bluejackets and marines was landed at about 3 P.M.

Military intervention being now imperatively demanded, a vote of credit for £2,300,000 was passed in the British House of Commons on the 27th of July. Five days later the French government failed to secure a similar vote, and Great Britain was left to deal with the Egyptian question alone. An expeditionary force detailed from home stations and from Malta was organized in two divisions, with a cavalry division, corps troops, and a siege train, numbering in all about 25,000 men. An Indian contingent numbering about 7000 combatants, complete in all arms and with its own transport, was prepared for despatch to Suez. General Sir Garnet Wolseley was appointed commander-in-chief, with Lieutenant-General Sir J. Adye as chief of the staff. The plan of operations contemplated the seizure of Ismailia as the base for an advance on Cairo, Alexandria and its suburbs to be held defensively, and the Egyptian forces in the neighbourhood to be occupied by demonstrations. The expeditionary force having rendezvoused at Alexandria, means were taken by Rear-Admiral Hoskins and Sir W. Hewett for the seizure of the Suez canal. Under orders from the former, Captain Fairfax, R.N., occupied Port Said on the night of 19th August, and Commander Edwards, R.N., proceeded down the canal, taking possession of the *gares* and dredgers, while Captain Fitzroy, R.N., occupied Ismailia after slight opposition. Before nightfall on the 20th of August the canal was wholly in British hands. Meanwhile, leaving Sir E. Hamley in command at Alexandria, Sir G. Wolseley with the bulk of the expeditionary force arrived at Port Said on the 20th of August, a naval demonstration having been made at Abukir with a view to deceive the enemy as to the object of the great movement in progress. The advance from Ismailia now began. On the 21st Major-General Graham moved from Ismailia with about 800 men and a small naval force, occupying Nefiche, the junction with the Suez line, at 1.30 A.M. without opposition. On the 22nd he made a reconnaissance towards Suez, and on the 23rd another to El-Magfar, 4 m. from Nefiche. It now appeared that the enemy had dammed the sweet-water canal and blocked the railway at Tell-el-Mahuta, where entrenchments had been thrown up and resistance seemed to be contemplated. At 4 A.M. on the 24th Sir Garnet Wolseley advanced with 3 squadrons of cavalry, 2 guns, and about 1000 infantry, placed under the orders of Lieutenant-General Willis. The enemy showed in force, estimated at 7000 with 12 guns, and a somewhat desultory action ensued. Reinforcements from Ismailia were ordered up, and the British cavalry, operating on the right, helped to check the enemy's attack, which showed little vigour. At night the troops, now reinforced by the Guards Brigade, an infantry battalion, 2 cavalry regiments and 10 guns, bivouacked on the ground. Early on the morning of the 25th the advance was continued to Tell-el-Mahuta, which the enemy evacuated, while the mounted troops and horse artillery pressed on to Mahsama, capturing the Egyptian camp, with 7 guns and large quantities of ammunition and supplies. On the same evening Major-General Graham, with about 1200 marines (artillery and light infantry), reached Mahsama, and on the following day he occupied Kassassin without opposition. The advance guard had now outrun its communications and was actually short of food, while a considerable force was distributed at intervals along the line Ismailia-Kassassin. The situation on the 27th tempted attack by an enterprising enemy, and Major-General Graham's force, consisting of a squadron of the 19th Hussars, the York and Lancaster Regiment, the duke of Cornwall's Light Infantry, the Marine Artillery Battalion and two R.H.A. guns, short of ammunition, was in danger of being overwhelmed by vastly superior numbers from Tell-el-Kebir. On the 28th Major-General Graham's troops were attacked, and after repulsing the enemy, made a general advance about 6.45 P.M. The cavalry, summoned by heliograph from Mahsama, co-operated, and in a moonlight charge inflicted considerable loss. The British casualties amounted to 14 killed and 83 wounded. During the lull which followed the first action of Kassassin, strenuous efforts were made to bring up supplies and troops and to open up railway communication to the front. On the 9th of September the Egyptians again attacked Kassassin, but were completely repulsed by 9 A.M., with a loss of 4 guns, and were pursued to within extreme range of the guns of Tell-el-Kebir. The British casualties were 3 killed and 78 wounded. The three following days were occupied in concentrating troops at Kassassin for the attack on Tell-el-Kebir, held by about 38,000 men with 60 guns. The Egyptian defences consisted of a long line of trench (2½ m.) approximately at right angles to the railway and the sweet-water canal. At 11 P.M. on the 12th of September the advance of about 15,000 men commenced; the 1st division, under Lieutenant-General Willis, was on the right, and the 2nd division, under Lieutenant-General Hamley, was on the left. Seven batteries of artillery, under Brigadier-General Goodenough, were placed in the centre. The cavalry, under Major-General Drury Lowe, was on the right flank, and the Indian contingent, under Major-General Macpherson, starting one hour later, was ordered to move south of the sweet-water canal. The night was moonless, and the distance to be covered about 6½ m. The ground was perfectly open, slightly undulating, and generally firm gravel. The conditions for a night march were thus ideal; but during the movement the wings closed towards each other, causing great risk of an outbreak of firing. The line was, however, rectified, and after a halt the final advance began. By a fortunate accident the isolated outwork was just missed in the darkness by the left flank of the 2nd Division; otherwise a premature alarm would have been given, which must have changed all the conditions of the operation. At dawn the Highland Brigade of the 2nd Division struck the enemy's trenches, and carried them after a brief struggle. The 1st Division attacked a few minutes later, and the cavalry swept round the left of the line of entrenchments, cutting down any fugitives who attempted resistance and reaching the enemy's camp in rear. The Indian contingent, on the south of the canal, co-operated, intercepting the Egyptians at the canal bridge. The opposition encountered at some points was severe, but by 6 A.M. all resistance was at an end. The British loss amounted to 58 killed, 379 wounded and 22 missing; nearly 2000 Egyptians were killed, and more than 500 wounded were treated in hospital. An immediate pursuit was ordered, and the Indian contingent, under Major-General Macpherson, reached Zagazig, while the cavalry, under Major-General Drury Lowe, occupied Belbeis and pushed on to Cairo, 65 m. from Tell-el-Kebir, next day. On the evening of the 14th the 10,000 troops occupying Abbasia barracks, and 5000 in the citadel of Cairo, surrendered. On the 15th General Sir Garnet Wolseley, with the brigade of Guards under H.R.H. the duke of Connaught, entered the city

British expedition under Sir Garnet Wolseley.

Tell-el-Kebir.

The prompt following up of the victory at Tell-el-Kebir saved Cairo from the fate of Alexandria and brought the rebellion to an end. The Egyptian troops at Kafr Dauar, Abukir and Rosetta surrendered without opposition, and those at Damietta followed on the 23rd of September, after being threatened with attack. On the 25th the khedive entered Cairo, where a review of the British troops was held on the 30th. The expeditionary force was now broken up, leaving about 10,000 men, under Major-General Sir A. Alison, to maintain the authority of the khedive. In twenty-five days, from the landing at Ismailia to the occupation of Cairo, the rebellion was completely suppressed, and the operations were thus signally successful.

The Sudan question.

The authority of the khedive and the maintenance of law and order now depended absolutely on the British forces left in occupation. Lord Dufferin, who had been sent to Cairo to draw up a project of constitutional reforms, advocated the re-establishment of a native army, not to exceed 5000 to 6000 men, with a proportion of British officers, for purely defence purposes within the Delta; and on the 13th of December 1882 Sir Evelyn Wood left England to undertake the organization of this force, with the title of sirdar. Lord Dufferin further advised the formation of a gendarmerie, which "should be in a great measure a mounted force and empowered with a semi-military character" (despatch of January 1st, 1883). The strength of this military police force was fixed at 4400 men with 2562 horses, and Baker Pasha (General Valentine Baker) was entrusted with its formation, with the title of inspector-general.

In a despatch of the 6th of February 1883 Lord Dufferin dealt with the Sudan, and stated that Egypt "could hardly be expected to acquiesce" in a policy of withdrawal from her Southern territories. At the same time he pointed out that,

> "Unhappily, Egyptian administration in the Sudan had been almost uniformly unfortunate. The success of the present mahdi in raising the tribes and extending his influence over great tracts of country was a sufficient proof of the government's inability either to reconcile the inhabitants to its rule or to maintain order. The consequences had been most disastrous. Within the last year and a half the Egyptians had lost something like 9000 men, while it was estimated that 40,000 of their opponents had perished."

Moreover, to restore tranquillity in the Sudan,

> "the first step necessary was the construction of a railway from Suakin to Berber, or what, perhaps, would be more advisable, to Shendi, on the Nile. The completion of this enterprise would at once change all the elements of the problem."

Disaster to Hicks Pasha.

The immense responsibilities involved were most imperfectly understood by the British government. Egyptian sovereignty in the Sudan dates from 1820, when Mehemet Ali sent a large force into the country, and ultimately established his authority over Sennar and Kordofan. In 1865 Suakin and Massawa were assigned to Egyptian rule by the sultan, and in 1870 Sir Samuel Baker proceeded up the Nile to the conquest of the Equatorial provinces, of which General Gordon was appointed governor-general in 1874. In the same year Darfur and Harrar were annexed, and in 1877 Gordon became governor-general of the Sudan, where, with the valuable assistance of Gessi Pasha, he laboured to destroy the slave trade and to establish just government. In August 1879 he returned to Cairo, and was succeeded by Raouf Pasha. Misrule and oppression in every form now again prevailed throughout the Sudan, while the slave traders, exasperated by Gordon's stern measures, were ready to revolt. The authority of Egypt was represented by scattered garrisons of armed men, badly officered, undisciplined and largely demoralized. In such conditions a leader only was required to ensure widespread and dangerous rebellion. A leader appeared in the person of Mahommed Ahmed, born in 1848, who had taken up his abode on Abba Island, and, acquiring great reputation for sanctity, had actively fomented insurrection. In August 1881 a small force sent by Raouf Pasha to arrest Mahommed Ahmed was destroyed, and the latter, proclaiming himself the mahdi, stood forth as the champion of revolt. Thus, at the time when the Egyptian army was broken up at Tell-el-Kebir, the Sudan was already in flames. On the 7th of June 1882, 6000 men under Yusef Pasha, advancing from Fashoda, were nearly annihilated by the mahdists. Payara and Birket in Kordofan quickly fell, and a few days before the battle of Tell-el-Kebir was fought, the mahdi, with a large force, was besieging El Obeid. That town was captured, after an obstinate defence, on the 17th of January 1883, by which time almost the whole of the Sudan south of Khartum was in open rebellion, except the Bahr-el-Ghazal and the Equatorial provinces, where for a time Lupton Bey and Emin Pasha were able to hold their own. Abd-el-Kader, who had succeeded Raouf, telegraphed to Cairo for 10,000 additional troops, and pointed out that if they were not sent at once four times this number would be required to re-establish the authority of the government in the Sudan. After gaining some small successes, Abd-el-Kader was superseded by Suliman Niagi on the 20th of February 1883, and on the 26th of March Ala-ed-din Pasha was appointed governor-general. Meanwhile 5000 men, who had served in the Egyptian army, were collected and forcibly despatched to Khartum via Suakin. In March 1883 Colonel William Hicks, late of the Bombay army, who in January had been appointed by the khedive chief of the staff of the army of the Sudan, found himself at Khartum with nine European officers and about 10,000 troops of little military value. The reconquest of the Sudan having been determined upon, although Sir E. Malet reported that the Egyptian government could not supply the necessary funds, and that there was great risk of failure, Colonel Hicks, who had resigned his post on the 23rd of July, and had been appointed commander-in-chief, started from Khartum on 9th September, with a total force of about 10,000 men, including non-combatants, for Kordofan. On the 22nd of May Sir E. Malet had informed Sherif Pasha that,

> "although Colonel Hicks finds it convenient to communicate with Lord Dufferin or with me, it must not be supposed that we endorse in any way the contents of his telegrams. . . . Her Majesty's government are in no way responsible for his operations in the Sudan, which have been undertaken under the authority of His Highness's government."

Colonel Hicks was fully aware of the unfitness of his rabble forces for the contemplated task, and on the 5th of August he telegraphed: "I am convinced it would be best to keep the two rivers and province of Sennar, and wait for Kordofan to settle itself." Early in November the force from Khartum was caught by the mahdists short of water at Kashgil, near El Obeid, and was almost totally destroyed, Colonel Hicks, with all his European officers, perishing. Sinister rumours having reached Cairo, Sir E. Baring (Lord Cromer), who had succeeded Sir E. Malet, telegraphed that "if Colonel Hicks's army is destroyed, the Egyptian government will lose the whole of the Sudan, unless some assistance from the outside is given," and advised the withdrawal to some post on the Nile. On the following day Lord Granville replied: "We cannot lend English or Indian troops; if consulted, recommend abandonment of the Sudan within certain limits"; and on the 25th he added that "Her Majesty's government can do nothing in the matter which would throw upon them the responsibilities for operations in the Sudan." In a despatch of the 3rd of December Sir E. Baring forcibly argued against British intervention in the affairs of the Sudan, and on the 13th of December Lord Granville telegraphed that "Her Majesty's government recommend the ministers of khedive to come to an early decision to abandon all territory south of Assuan, or, at least, of Wadi Halfa." On the 4th of January 1884 Sir E. Baring was directed to insist upon the policy of evacuation, and on the 18th General Gordon left London to assist in its execution.

Defeat of General Baker.

The year 1883 brought a great accession of power to the mahdi, who had captured about 20,000 rifles, 19 guns and large stores of ammunition. On the Red Sea littoral Osman Digna, a slave dealer of Suakin, appointed amir of the Eastern Sudan, raised the local tribes and invested Sinkat and Tokar. On the 16th of October and the 4th of November Egyptian reinforcements intended for the former place were destroyed, and on the 2nd of December a force of 700 men was annihilated near Tamanieb. On the 23rd of December General Valentine Baker, followed by about 2500 men, gendarmerie, blacks, Sudanese and Turks, with 10 British officers, arrived at Suakin to prepare for the relief of Sinkat and Tokar. The khedive appears to have been aware of the risks to be incurred, and in a private letter he informed the general that "I rely upon your prudence and ability not to engage the enemy except under the most favourable circumstances." The tragedy of Kashgil was repeated on the 4th of February 1884, when General Baker's heterogeneous force, on the march from Trinkitat to Tokar, was routed at El Teb by an inferior body of tribesmen. Of 3715 men, 2375, with 11 European officers, were killed. Suakin was now in danger, and on the 6th of February British bluejackets and marines were landed for the defence of the town.

British expedition under Sir G. Graham; battles of El Teb and Tamanieb.

Two expeditions in the Sudan led by British officers having thus ended in disaster, and General Gordon with Lieutenant-Colonel J. D. Stewart having reached Khartum on the 18th of February, the policy of British non-intervention in regard to Sudan affairs could no longer be maintained. Public opinion in England was strongly impressed by the fact that the Egyptian garrisons of Tokar and Sinkat were perishing within striking distance of the Red Sea littoral. A British force about 4400 strong, with 22 guns, made up of troops from Egypt and from units detained on passage from India, was rapidly concentrated at Suakin and placed under the orders of Major-General Sir G. Graham, with Major-Generals Sir R. Buller and J. Davis as brigadiers. News of the fall of Sinkat, where the starving garrison, under Tewfik Bey, made a gallant sortie and was cut to pieces, reached Suakin on the 12th of February. On the 24th General Graham's force disembarked at Trinkitat and received information of the surrender of Tokar. At 8 A.M. on the 29th the force advanced towards Tokar in square, and came under fire at 11.20 A.M. from the enemy entrenched at El Teb. The tribesmen made desperate efforts to rush the square, but were repulsed, and the position was taken by 2 P.M. The cavalry, 10th and 19th Hussars, under Brigadier-General Sir H. Stewart, became involved in a charge against an unbroken enemy, and suffered somewhat severely. The total British loss was 34 killed and 155 wounded; that of the tribesmen was estimated at 1500 killed. On the following day Tokar was reached, and on the 2nd of March the force began its return to Suakin, bringing away about 700 people belonging to the late garrison and the civil population, and destroying 1250 rifles and a quantity of ammunition found in a neighbouring village. On the 9th of March the whole force was back at Suakin, and on the evening of the 11th an advance to Tamai began, and the force bivouacked and formed a zeriba in the evening. Information was brought by a native that the enemy had assembled in the Khor Ghob, a deep ravine not far from the zeriba. At about 8.30 A.M. on the 13th the advance began in echelon of brigade squares from the left. The left and leading square (2nd Brigade) moved towards the khor, approaching at a point where a little ravine joined it. The enemy showing in front, the leading face of the square was ordered to charge up to the edge of the khor. This opened the square, and a mass of tribesmen rushed in from the small ravine. The brigade was forced back in disorder, and the naval guns, which had been left behind, were temporarily captured. After a severe hand-to-hand struggle, in which the troops behaved with great gallantry, order was restored and the enemy repulsed, with the aid of the fire from the 1st Brigade square and from dismounted cavalry. The 1st Brigade square, having a sufficient field of fire, easily repelled all attempts to attack, and advancing as soon as the situation had been restored, occupied the village of Tamai. The British loss was 109 killed and 104 wounded; of the enemy nearly 2000 were killed. On the following day the force returned to Suakin.

Two heavy blows had now been inflicted on the followers of Osman Digna, and the road to Berber could have been opened, as General Graham and Brigadier-General Sir H. Stewart suggested. General Gordon, questioned on the point, telegraphed from Khartum, on the 7th of March, that he might be cut off by a rising at Shendi, adding, "I think it, therefore, most important to follow up the success near Suakin by sending a small force to Berber." He had previously, on the 29th of February, urged that the Suakin-Berber road should be opened up by Indian troops. This, and General Gordon's proposal to send 200 British troops to Wadi Halfa, was opposed by Sir E. Baring, who, realizing soon afterwards the gravity of the situation, telegraphed on the 16th of March:—

> "It has now become of the utmost importance not only to open the road between Suakin and Berber, but to come to terms with the tribes between Berber and Khartum."

The government refused to take this action, and Major-General Graham's force was employed in reconnaissances and small skirmishes, ending in the destruction of the villages in the Tamanieb valley on 27th March. On the 28th the whole force was reassembled at Suakin, and was then broken up, leaving one battalion to garrison the town.

Entanglement of General Gordon at Khartum.

The abrupt disappearance of the British troops encouraged the tribesmen led by Osman Digna, and effectually prevented the formation of a native movement, which might have been of great value. The first attempt at intervention in the affairs of the Sudan was made too late to save Sinkat and Tokar. It resulted only in heavy slaughter of the tribesmen, which afforded no direct or indirect aid to General Gordon or to the policy of evacuation. The public announcement of the latter was a grave mistake, which increased General Gordon's difficulties, and the situation at Khartum grew steadily worse. On the 24th of March Sir E. Baring telegraphed:—

> "The question now is, how to get General Gordon and Colonel Stewart away from Khartum. . . . Under present circumstances, I think an effort should be made to help General Gordon from Suakin, if it is at all a possible military operation. . . . We all consider that, however difficult the operations from Suakin may be, they are more practicable than any operations from Korosko and along the Nile."

A telegram from General Gordon, received at Cairo on the 19th of April, stated that

> "We have provisions for five months and are hemmed in. . . . Our position will be much strengthened when the Nile rises. . . . Sennar, Kassala and Dongola are quite safe for the present."

At the same time he suggested "an appeal to the millionaires of America and England" to subscribe money for the cost of "2000 or 3000 nizams" (Turkish regulars) to be sent to Berber. A cloud now settled down upon Khartum, and subsequent communications were few and irregular. The foreign office and General Gordon appeared to be somewhat at cross purposes. The former hoped that the garrisons of the Sudan could be extricated without fighting. The latter, judging from the tenor of some of his telegrams, believed that to accomplish this work entailed the suppression of the mahdi's revolt, the strength of which he at first greatly underestimated. He had pressed strongly for the employment of Zobeir as "an absolute necessity for success" (3rd of March); but this was refused, since Sir H. Gordon advised at this time that it would be dangerous. On the 9th of March General Gordon proposed, "if the immediate evacuation of Khartum is determined upon irrespective of outlying towns," to send down the "Cairo *employés*" and the garrison to Berber with Lieutenant-Colonel J. D. Stewart, to resign his commission, and to proceed with the stores and the steamers to the equatorial provinces, which he would consider as placed under the king of the Belgians. On the 13th of March Lord Granville gave full power to General Gordon to "evacuate Khartum and save that garrison by conducting it himself to Berber without delay," and expressed a hope that he would not resign his commission.

Relief expedition: question of route.

By the end of March 1884 Sir E. Baring and the British officers in Egypt were convinced that force would have to be employed, and the growing danger of General Gordon, with the grave national responsibility involved, began to be realized in Great Britain. Sir Henry Gordon, however, who was in personal communication with Mr Gladstone, considered that his brother was in no peril, and for some time disbelieved in the need for a relief expedition. Meanwhile it was at least necessary to evolve some plan of action, and on the 8th of April the adjutant-general addressed a memorandum to the secretary of state for war detailing the measures required for placing 6500 British troops "in the neighbourhood of Shendi." The battle of the routes began much earlier, and was continued for some months. Practically the choice lay between the Nile and the Suakin-Berber road. The first involved a distance of 1650 m. from Cairo along a river strewn with cataracts, which obstructed navigation to all but small boats, except during the period of high water. So great was this obstruction that the Nile had never been a regular trade route to the Sudan. The second entailed a desert march of about 250 m., of which one section, Obak-Bir Mahoba (52 m.), was waterless, and the rest had an indifferent water supply (except at Ariab, about half-way to Berber), capable, however, of considerable development. From Berber the Nile is followed (210 m.) to Khartum. This was an ancient trade route with the Sudan, and had been used without difficulty by the reinforcements sent to Hicks Pasha in 1883, which were accompanied by guns on wheels. The authorities in Egypt, headed by General Stephenson, subsequently supported by the Admiral Lord John Hay, who sent a naval officer to examine the river as far as Dongola, were unanimous in favour of the Suakin-Berber route. From the first Major-General Sir A. Clarke, then inspector-general of fortifications, strongly urged this plan, and proposed to begin at once a metre gauge railway from Suakin, to be constructed by Indian labour under officers skilled in laying desert lines. Some preliminary arrangements were made, and on the 14th of June the government sanctioned certain measures of preparation at Suakin. On the other side were the adjutant-general (Lord Wolseley) and a small number of officers who had taken part in the Red River expedition of 1870. The memorandum of the adjutant-general above referred to was based on the hypothesis that Khartum could not hold out beyond the 15th of November, and that the expedition should reach Berber by the 20th of October. Steamers were to be employed in such reaches as proved practicable, but the force was to be conveyed in special whale-boats, by which "the difficulty of transport is reduced to very narrow limits." The mounted force was to consist of 400 men on native horses and 450 men on horses or camels. The question of routes continued to be the subject of animated discussion, and on the 29th of July a committee of three officers who had served in the Red River expedition reported:—

> "We believe that a brigade can easily be conveyed in small boats from Cairo to Dongola in the time stated by Lord Wolseley; and, further, that should it be necessary to send a still larger force by water to Khartum, that operation will present no insuperable difficulties."

Lord Wolseley sent out; Nile route adopted.

This most inconclusive report, and the baseless idea that the adoption of the Nile route would involve no chance of bloodshed, which the government was anxious to avoid, seem to have decided the question. On the 8th of August the secretary of state for war informed General Stephenson that "the time had arrived when some further measures for obtaining accurate information as to his (General Gordon's) position, and, if necessary, for rendering him assistance, should be adopted." General Stephenson still urged the Suakin-Berber route, and was informed on the 26th of August that Lord Wolseley would be appointed to take over the command in Egypt for the purposes of the expedition, for which a vote of credit had been taken in the House of Commons on the 5th of August. On the 9th of September Lord Wolseley arrived at Cairo, and the plan of operations was somewhat modified. A camel corps of 1100 men selected from twenty-eight regiments at home was added, and the "fighting force to be placed in line somewhere in the neighbourhood of Shendi" was fixed at 5400. The construction of whale-boats began on the 12th of August, and the first batch arrived at Wadi Halfa on the 14th of October, and on the 25th the first boat was hauled through the second cataract. The mounted forces proceeded up the banks, and the first half-battalion embarked at Gemai, 870 m. from Khartum, on the 5th of November, ten days before the date to which it had been assumed General Gordon could hold out. In a straggling procession the boats worked their way up to Korti, piloted by Canadian *voyageurs*. The labour was very great, and the troops, most of whom were having their first lesson in rowing, bore the privations of their unaccustomed conditions with admirable cheerfulness. By the 25th of December 2220 men had reached Korti, of whom about 800 only had been conveyed by the whale-boats, the last of which did not arrive till the 27th of January. Beyond Korti lay the very difficult section of the river to Abu Hamed, which was quite unknown. Meanwhile news of the loss of the "Abbas" and of the murder of Colonel J. D. Stewart and his party on the 18th of September had been received. A letter from Gordon, dated the 4th of November and received on the 17th of November, stated that his steamers would await the expedition at Metemma, and added, "We can hold out forty days with ease; after that it will be difficult." In his diary, on the 13th of December, when his difficulties had become extreme, he noted that "if the expeditionary force does not come in ten days, the town may fall."

It was clear at Korti that something must be done at once; and on the 13th of December 1100 men, with 2200 camels, under General Sir H. Stewart, were despatched to occupy Jakdul wells, 96 m. on the desert route to Metemma. Stewart returned on the 5th of January, and started again on the 8th, with orders to establish a fort at Abu Klea and to occupy Metemma. The Desert Column, 1800 men, with 2880 camels in poor condition and 153 horses, found the enemy in possession of Abu Klea wells on the 16th, and was desperately attacked on the 17th. The want of homogeneity of the force, and the unaccustomed tactics imposed upon the cavalry, somewhat hampered the defence, and the square was broken at the left rear corner. Driven back upon the camels in the centre, the troops fought hand to hand with the greatest gallantry. Order was quickly restored, and the attack was repulsed, with a loss of 74 killed and 94 wounded. At least 1100 of the enemy were killed. The wells being occupied and a zeriba formed, the column started on the evening of the 18th. The wrong road was taken, and great confusion occurred, during the night, but at dawn this was rectified; and after forming a rough fort under fire, by which General Sir H. Stewart was fatally wounded, an advance was made at 3 P.M. The square was again heavily attacked, but the Arabs could not get to close quarters and in the evening a bivouac was formed on the Nile. The British losses on this day were 23 killed and 98 wounded. The Desert Column was now greatly exhausted. On the 20th the village of Gubat was occupied; and on the following day Sir C. Wilson, on whom the command had devolved, advanced against Metemma, which was found too strong to assault. On this day General Gordon's four steamers arrived; and on the morning of the 24th Sir C. Wilson, with 20 British soldiers in red coats and about 280 Sudanese, started in the "Bordein" and "Telahawiyeh" for Khartum. The "Bordein" grounded on the following day, and again on the 26th, by which twenty-four hours were lost. At 11 A.M. on the 28th Khartum was sighted, and it soon became clear that the town was in the hands of the enemy. After reconnoitring farther, the steamers turned and proceeded down stream under a heavy fire, the Sudanese crews showing signs of disaffection. The "Telahawiyeh" was wrecked on the 29th of January and the "Bordein" on the 31st, Sir C. Wilson's party being rescued on the 4th of February by Lord C. Beresford in the "Safieh," which had come up from Gubat on receipt of news carried there by Lieutenant Stuart Wortley in a row-boat. Khartum had been taken and General Gordon killed on the morning of the 26th of January 1885; having thus held out thirty-four days beyond the date when he had expected the end. The garrison had been reduced to starvation; and the arrival of twenty British soldiers, with orders to return at once, could not have affected the situation. The situation of the Desert Column and of its transport was most imperfectly understood at Korti, where impossible plans were formed. Fortunately Major-General Sir R. Buller, who arrived at Gubat on the 11th of February, decided upon withdrawal, thus averting impending disaster, and by the 16th of March the Desert Column had returned to Korti.

Stewart's Desert Column; battle of Abu Klea wells.

Failure of relief expedition.

The advance from Korti of the River Column, under Major-General Earle, began on the 28th of December, and great difficulties of navigation were encountered. On the 10th of February an action was fought at Kirbekan with about 800 of the enemy, entailing a loss of 10 killed, including Major-General Earle, and 47 wounded. The column, now commanded by Brigadier-General Brackenbury, continued its slow advance, and on the morning of the 24th of February it was about 26 m. below Abu Hamed, a point where the Korosko desert route strikes the Nile, 350 m. from Khartum. Here it received orders to retire, and it reached Korti on the 8th of March.

Suakin operations.

The verbal message received from General Gordon on the 30th of December 1884 rendered the extreme danger of the position at Khartum painfully apparent, and the secretary of state for war, acting on Sir E. Baring's advice, offered to make an active demonstration from Suakin. To this proposal Lord Wolseley demurred, but asked that ships of war should be sent to Suakin, and that "marines in red coats should be frequently landed and exercised." Lord Hartington replied that the government did not consider that a demonstration of this kind could be effective, and again suggested stronger measures. On the 8th of January 1885 Lord Wolseley repeated that "the measures you propose will not assist my operations against Khartum," adding:—

> "I have from first endeavoured to impress on government that I am strong enough to relieve Khartum, and believe in being able to send a force, when returning by way of Berber, to Suakin, to open road and crush Osman Digna."

On this very day the small Desert Column started from Korti on its hazardous mission to the relief of a town fully 270 m. distant, held by a starving garrison, and invested by 30,000 fighting men, mostly armed with good rifles. Before reaching the Nile the Desert Column had lost 300 men and was unable to take Metemma, while its transport had completely broken down. On the 8th of February Lord Wolseley telegraphed, "The sooner you can now deal with Osman Digna the better," and recommended the despatch of Indian troops to Suakin, to "co-operate with me in keeping road to Berber open." On the 11th of February, the day on which Sir R. Buller most wisely decided to withdraw the Desert Column from a position of extreme danger, it was determined at Korti that the River Column should proceed to attack Berber, and Lord Wolseley accepted the proposal of the government to make a railway from Suakin, telegraphing to Lord Hartington:—

> "By all means make railway by contract to Berber, or as far as you can, during summer. It will be invaluable as a means of supply, and I recommend it being begun immediately. Contract to be, if possible, for so much per ton military stores and supplies and men carried, per mile."

Every effort was now concentrated upon sending an expeditionary force to Suakin, and before the end of March about 13,000 men, including a brigade from India and a field battery from New South Wales, with nearly 7000 camels and 1000 mules, were there assembled. Lieutenant-General Sir G. Graham was placed in command of this force, with orders to break down the power of Osman Digna and to press the construction of the railway towards Berber. The troops at Suakin, on arrival, were much harassed by small night attacks, which ceased as soon as the scattered camps were drawn together. On the 19th of March Sir G. Graham, with the cavalry brigade and the infantry of the Indian contingent, reconnoitred as far as Hashin, finding the country difficult on account of the dense mimosa scrub. The enemy occupied the hills and fired upon the cavalry. On the 20th Sir G. Graham, with about 9000 men, again advanced to Hashin, and Dehilbat hill was taken by the Berkshire regiment and the Royal Marines. A squadron of the 9th Royal Lancers, which was dismounted in the thick bush, was driven back with the loss of 9 men; but elsewhere the Arabs never succeeded in closing, and the troops returned to Suakin in the afternoon, leaving the East Surrey regiment in a zeriba covering some low hills near Hashin village. The total British loss was 9 killed and 39 wounded.

Battle of Hashin.

McNeill's zeriba.

On the 22nd of March a force, consisting of two British and three Indian battalions, with a naval brigade, a squadron of lancers, two companies of engineers, and a large convoy of camels carrying water and supplies, under Major-General Sir J. McNeill, started from Suakin for Tamai, with orders to form a half-way zeriba. The advance was much impeded by the dense bush, and the force halted at Tofrik, about 6 m. out, at 10.30 A.M. A native had brought information that the enemy intended to attack while the zeriba was being formed, and this actually occurred. The force was caught partly unprepared soon after 2.30 P.M., and severe fighting took place. The enemy were repulsed in about twenty minutes, the naval brigade, the Berkshire regiment, the Royal Marines, and the 15th Sikhs showing the greatest gallantry. The casualties, including those among non-combatants, were 150 killed, 148 missing, and 174 wounded. More than 500 camels were killed. The tribesmen lost more than 1000 killed. As soon as firing was heard at Suakin, Sir G. Graham, with two battalions of Guards and a battery of horse artillery, started for Tofrik, but returned on being assured that reinforcements were not required. On the 24th and 26th convoys proceeding in square to Tofrik were attacked, the enemy being repulsed without difficulty. On the 2nd of April a force exceeding 7000 men, with 14 guns and 1600 transport animals, started from Suakin at 4.30 A.M., and bivouacked twelve hours later at Tesela Hill. Next morning an advance was made towards Tamai, and a number of huts in the Khor Ghob were burned. The force then returned to Suakin. The railway was now pushed on without interruption, reaching Otao on the 30th. On the night of the 6th of May a combined movement was made from Suakin and Otao, which resulted in the surprise and break-up of a force of the enemy under Mahommed Sardun, and the capture of a large number of sheep and goats. The moral effect of this operation was marked, and large numbers of tribesmen placed themselves unconditionally at the disposal of Sir G. Graham. A great native movement could now have been organized, which would have kept the route to Berber and enabled the railway to be rapidly pushed forward.

Political and military situation at end of operations.

Meanwhile many communications had passed between the war office and Lord Wolseley, who at first believed that Berber could be taken before the summer. In a long despatch of the 6th of March he discussed the general situation, and pointed out that although the force at his disposal "was amply sufficient" for raising the siege of Khartum and defeating the mahdi, the conditions were changed by the fall of the town. It was now "impossible . . . to undertake any offensive operations until about the end of the summer," when twelve additional British battalions, four strong squadrons of British cavalry, and two R.H.A. batteries, together with a large extension of the Wadi Halfa railway, eleven steamers, and three hundred more whale-boats, would be required. He considered it necessary to hold Dongola, and he reported that he was "distributing this army along the left bank of the Nile, on the open reach of water" between the Hanneck cataract and Abu Dom, opposite Merawi. On the 30th of March Lord Wolseley quitted the army and proceeded to Cairo. A cloud having arisen on the frontiers of Afghanistan, the withdrawal of the troops from the Sudan was ordered on the 11th of May. On the formation of Lord Salisbury's cabinet, the new secretary of state for war, Mr W. H. Smith, inquired whether the retirement could be arrested, but Major-General Sir R. Buller reported that the difficulties of reoccupation would be great, and that if Dongola was to be held, a fresh expedition would be required. On the 22nd of June, before the British rearguard had left Dongola, the mahdi died. The withdrawal of the Suakin force began on the 17th of May, and the friendly tribes, deprived of support, were compelled to make terms with Osman Digna, who was soon able to turn his attention to Kassala, which capitulated in August, nearly at the same time as Sennar.

The failure of the operations in the Sudan had been absolute and complete, and the reason is to be sought in a total misconception of the situation, which caused vacillation and delay, and in the choice of a route by which, having regard to the date of the decision, the relief of General Gordon and Khartum was impossible. (G. S. C.)

Military Operations in Egypt and the Sudan, 1885 to 1896

The operations against Mahdism during the eleven years from the end of the Nile expedition and the withdrawal from the Sudan to the commencement of the Dongola campaign will be more easily understood if, instead of narrating them in one chronological sequence, the operations in each province are considered separately. The mahdi, Mahommed Ahmed, died at Omdurman on the 22nd of June 1885. He was succeeded by the principal khalifa, Abdullah el Taaisha, a Baggara Arab, who for the next thirteen years ruled the Sudan with despotic power. Cruel, vicious, unscrupulous and strong, the country groaned beneath his oppression. He removed all possible rivals, concentrated at Omdurman a strong military force composed of men of his own tribe, and maintained the ascendancy of that tribe over all others. As the British troops retired to Upper Egypt, his followers seized the evacuated country, and the khalifa cherished the idea, already formulated by the mahdi, of the conquest of Egypt, but for some years he was too much occupied in quelling risings, massacring the Egyptians in the Sudan, and fighting Abyssinia, to move seriously in the matter.

Upper Egypt.—Mahommed el Kheir, dervish amir of Dongola, however, advanced towards the frontier in the autumn of 1885, and at the end of November came in touch with the frontier field force, a body of some 3000 men composed in nearly equal parts of British and Egyptian troops. A month of harassing skirmishes ensued, during which the Egyptian troops showed their mettle at Mograka, where 200 of them held the fort against a superior number of dervishes, and in combats at Ambigol, Kosha and Firket. Sir Frederick Stephenson, commanding the British army of occupation in Egypt, then concentrated the frontier field force at Firket, and attacked the main body of the enemy at Ginnis on the 30th of December 1885, completely defeating it and capturing two guns and twenty banners. It was here the new Egyptian army received its baptism of fire and acquitted itself very creditably. Although checked, the dervishes were not discouraged, and continued to press upon the frontier in frequent raids, and thus in many bloody skirmishes the fighting qualities of the Egyptian troops were developed. In April 1886 the frontier was drawn back to Wadi Halfa, a fortified camp at the northern end of the desolate defile, Batn-el-Hagar, through which the Nile tumbles amid black, rocky hills in a succession of rapids, and debouches on a wide plain. The protection of the frontier was now left in the hands of the Egyptian army, a British force remaining at Assuan, 200 m. to the north, as a reserve in case of emergency, and two years later even this precaution was deemed unnecessary.

In October 1886 Wad en Nejumi, the amir who had defeated Hicks Pasha in Kordofan three years before, and led the assault at Khartum when General Gordon was slain in January 1885, replaced Mahommed el Kheir as "commander of the force for the conquest of Egypt," and brought large reinforcements to Dongola. An advanced column under Nur-el-Kanzi occupied Sarras in April 1887, was attacked by the Egyptian force under Colonel H. Chermside on the 28th of that month, and after a stubborn resistance was defeated with great loss. Nur-el-Kanzi was killed and ten standards taken.

The troubles in Darfur and with Abyssinia (*q.v.*) induced the khalifa to reduce the garrisons of the north; nevertheless, the dervishes reoccupied Sarras, continued active in raids and skirmishes, and destroyed the railway south of Sarras, which during the Nile expedition of 1884 and 1885 had been carried as far as Akasha. It was not until May 1889 that an invasion of the frontier on a large scale was attempted. At this time the power and prestige of the khalifa were at their height: the rebellions in Darfur and Kordofan had been stamped out, the anti-mahdi was dead, and even the dervish defeat by the Abyssinians had been converted by the death of King John and the capture of his body into a success. It was therefore an opportune time to try to sweep the Turks and the British into the sea. On the 22nd of June Nejumi was at Sarras with over 6000 fighting men and 8000 followers. On the 2nd of July Colonel J. Wodehouse headed off a part of this force from the river at Argin, and, after a sharp action, completely defeated it, killing 900, among whom were many important amirs, and taking 500 prisoners and 12 banners, with very small loss to his own troops. A British brigade was on its way up stream, but the sirdar, who had already arrived to take the command in person, decided not to wait for it. The Egyptian troops, with a squadron of the 20th Hussars, concentrated at Toski, and thence, on the 3rd of August, General Grenfell, with slight loss, gained a decisive victory. Wad en Nejumi, most of his amirs, and more than 1200 Arabs were killed; 4000 prisoners and 147 standards were taken, and the dervish army practically destroyed. No further serious attempts were made to disturb the frontier, of which the most southerly outpost was at once advanced to Sarras.

Battle of Toski.

The escape from Omdurman of Father Ohrwalder and of two of the captive nuns in December 1891, of Father Rossignoli in October 1894, and of Slatin Bey in February 1895, revealed the condition of the Sudan to the outside world, threw a vivid light on the rule of the khalifa, and corroborated information already received of the discontent which existed among the tribes with the oppression and despotism under which they lived.

The Eastern Sudan.—In 1884 Colonel Chermside, governor of the Red Sea littoral, entered into arrangements with King John of Abyssinia for the relief of the beleaguered Egyptian garrisons. Gera, Amadib, Senhit and Gallabat were, in consequence, duly succoured, and their garrisons and Egyptian populations brought away to the coast by the Abyssinians in 1885. Unfortunately famine compelled the garrison of Kassala to capitulate on the 30th of July of that year, and Osman Digna hurried there from Tamai to raise a force with which to meet the Abyssinian general, Ras Alula, who was preparing for its relief. By the end of August Osman Digna had occupied Kufit, in the Barea country, with 10,000 men and entrenched himself. On the 23rd of September Ras Alula attacked him there with an equal number of men and routed him with great slaughter. Over 3000 dervishes with their principal amirs, except Osman Digna, lay dead on the field, and many more were killed in the pursuit. The Abyssinians lost 40 officers and 1500 men killed, besides many more wounded. Instead of marching on to Kassala, Ras Alula, who at this time was much offended by the transfer of Massawa by the Egyptians to Italy, made a triumphant entry into Asmara, and absolutely refused to make any further efforts to extricate Egyptian garrisons from the grip of the khalifa. Meanwhile Osman Digna, who had fled from Kufit to Kassala, wreaked his vengeance upon the unhappy captives at Kassala.

In the neighbourhood of Suakin there were many tribes disaffected to the khalifa's cause, and in the autumn of 1886 Colonel H. Kitchener, who was at the time governor of the Red Sea littoral, judiciously arranged a combination of them to overthrow Osman Digna, with the result that his stronghold at Tamai was captured on the 7th of October, 200 of his men killed, and 50 prisoners, 17 guns and a vast store of rifles and ammunition captured. For about a year there was comparative quiet. Then at the end of 1887 Osman Digna again advanced towards Suakin, but his force at Taroi was routed by the "Friendlies," and he fell back on Handub. Kitchener unsuccessfully endeavoured to capture Osman Digna on the 17th of January 1888, but in the attack was himself severely wounded, and was shortly after invalided. Later in the year Osman Digna collected a large force and besieged Suakin. In December the sirdar arrived with reinforcements from Cairo, and on the 20th sallied out and attacked the dervishes in their trenches at Gemaiza, clearing the whole line and inflicting considerable loss on the enemy, who retired towards Handub, and the country was again fairly quiet for a time. During 1889 and 1890 Tokar became the centre of dervish authority, while Handub continued to be occupied for the khalifa. In January 1891 Osman Digna showed signs of increased activity, and Colonel (afterwards Sir Charles) Holled Smith, then governor of the Red Sea littoral, attacked Handub successfully on the 27th and occupied it, then seized Trinkitat and Teb, and on the 19th of February fought the decisive action of Afafit, occupied Tokar, and drove Osman Digna back to Temrin with a loss of 700 men, including all his chief amirs. This action proved the final blow to the dervish power in the neighbourhood of Suakin, for although raiding continued on a small scale, the tribes were growing tired of the khalifa's rule and refused to support Osman Digna.

Handub.

Battle of Afafit.

In the spring of 1891 an agreement was made between England and Italy by which the Italian forces in Eritrea were at liberty, if they were able, to capture and occupy Kassala, which lay close to the western boundary of their new colony, on condition that they restored it to Egypt at a future day when required to do so. Three years passed before they availed themselves of this agreement. In 1893 the dervishes, 12,000 strong, under Ahmed Ali, invaded Eritrea, and were met on the 29th of December at Agordat by Colonel Arimondi with 2000 men of a native force. Ahmed Ali's force was completely routed and himself killed, and in the following July Colonel Baratieri, with 2500 men, made a fine forced march from Agordat, surprised and captured

Kassala on the 17th of that month, and continued to hold it for three years and a half.

The Abyssinian Frontier.—On the Abyssinian frontier Ras Adal was in command of a considerable force of Abyssinians early in 1886, and in June of that year he invaded Gallabat and defeated the dervishes on the plain of Madana; the dervish amir Mahommed Wad Ardal was killed and his camp captured. In the following year the amir Yunis ed Dekeim made two successful raids into Abyssinian territory, upon which Ras Adal collected an enormous army, said to number 200,000 men, for the invasion of the Sudan. The khalifa sent the amir Hamdan Abu Angar, a very skilful leader, with an army of over 80,000 men against him. Abu Angar entered Abyssinia and, in August 1887, attacked Ras Adal in the plain of Debra Sin and, after a prolonged battle, defeated the Abyssinians, captured their camp, and marched on Gondar, the ancient capital of Abyssinia, which he sacked, and then returned into Gallabat. King John, the negus of Abyssinia, burning to avenge this defeat, marched, in February 1889, with an enormous army to Gallabat, where the amir Zeki Tumal commanded the khalifa's forces, some 60,000 strong, and had strongly fortified the town and the camp. On the 9th of March 1889 the Abyssinians made a terrific onslaught, stormed and burnt the town, and took thousands of prisoners. A small party of dervishes still held a zeriba when King John was struck by a stray bullet. The Abyssinians decided to retire, fighting ceased, and they moved off with their prisoners and the wounded negus. That night the king died, and the greater part of the army having gone ahead with the prisoners, a party of Arabs pursued the rearguard, which consisted of the king's bodyguard, routed them, and captured the king's body, which was sent to Omdurman to confirm the report of a brilliant victory sent by Zeki Tumal to the khalifa. Internal strife prevented the new negus of Abyssinia from prosecuting the war, which thus, in spite of the Abyssinian success, resulted in the increased prestige of the khalifa. From this time, however, the dervishes ceased to trouble the Abyssinians.

Darfur and Kordofan.—On the outbreak of the mahdi's rebellion Slatin Bey was governor of the province, and when Madibbo, the insurgent sheikh of Rizighat, attacked and occupied Shakka and was following up his success, Slatin twice severely defeated him, and, having concentrated his forces at El Fasher, repulsed the enemy again at Om Shanga. Mahdism, however, spread over Darfur in spite of Slatin's efforts to stay it. He fought no fewer than twenty-seven actions in various parts of his province, but his own troops, in course of time, became infected with the new faith and deserted him. He was obliged to surrender at Dara in December 1883, and was a prisoner, first at Obeid and then at Omdurman, until he escaped in 1895. In January 1884 Zogal, the new dervish amir of the province, attacked El Fasher, where Said Bey Guma and an Egyptian garrison 1000 strong with 10 guns was still holding out, and captured it. He also reduced the Jebel Marra district, where the loyal hill-people gave him some trouble.

After the death of the mahdi in 1885, Madibbo revolted against the khalifa, but was defeated by Karamalla, the dervish amir of the Bahr-el-Ghazal, and was caught and executed. A war then sprang up between Karamalla and Sultan Yusef, who had succeeded Zogal as amir of Darfur. Yusef was joined in 1887 by Sultan Zayid, the black ruler of Jebel Marra, and Karamalla's trusted general, Ketenbur, was defeated with great slaughter at El Towaish on the 29th of June 1887. Osman wad Adam (Ganu), amir of Kordofan, was sent by the khalifa to Karamalla's assistance. He forced back the Darfurians near Dara on the 26th of December, routed Zayid in a second battle, entered El Fasher, and, in 1888, became complete master of the situation, the two sultans being killed. The Darfurian chiefs then allied themselves with Abu Gemaiza, sheikh of the Masalit Arabs, who had proclaimed himself "Khalifa Osman," and was known as the anti-mahdi. The revolt assumed large proportions, and became the more dangerous to Abdullah, the khalifa, by reason of its religious character, wild rumours spreading over the country and reaching to Egypt and Suakin of the advent to power of an opposition mahdi. Abu Gemaiza attacked a portion of Osman Adam's force, under Abd-el-Kader, at Kebkebia, 30 m. from El Fasher, and almost annihilated it on the 16th of October 1888; and a week later another large force of Osman Adam met with the same fate at the same place. Instead of following up his victories, Abu Gemaiza retired to Dar Tama to augment his army, to which thousands flocked as the news of his achievements spread far and wide. He again advanced to El Fasher in February 1889, but was seized with smallpox. His army, however, under Fiki Adam, fought a fierce battle close to El Fasher on the 22nd, which resulted in its defeat and dispersion, and Abu Gemaiza himself dying the following day, the movement collapsed.

In 1891 Darfur and Kordofan were again disturbed, and Sultan Abbas succeeded in turning the dervishes out of the Jebel Marra district. Two years later a saint of Sokoto, Abu Naal Muzil el Muhan, collected many followers and for a time threatened the khalifa's power, but the revolt gradually died out.

The Bahr-el-Ghazal.—The first outbreak in favour of Mahdism in the Bahr-el-Ghazal took place at Liffi in August 1882, when the Dinka tribe, under Jango, revolted and was defeated by Lupton Bey with considerable slaughter at Tel Gauna, and again in 1883 near Liffi. In September of that year Lupton's captain, Rufai Aga, was massacred with all his men at Dembo, and Lupton, short of ammunition, was forced to retire to Dem Suliman, where he was completely cut off from Khartum. After gallantly fighting for eighteen months he was compelled by the defection of his troops to surrender on the 21st of April 1884 to Karamalla, the dervish amir of the province. He died at Omdurman in 1888.

In 1890 the Shilluks in the neighbourhood of Fashoda rose against the khalifa, and the dervish amir of Gallabat, Zeki Tumal, was engaged for two years in suppressing the rebellion. He got the upper hand in 1892, and was recalled to oppose an Italian force said to be advancing from Massawa; but on reporting that it was impossible to invade Eritrea, as the khalifa wished him to do, he was summoned to Omdurman and put to death. The country then relapsed into its original barbarous condition, and dervish influence was nominal only. In 1892 the Congo State expedition established posts up to the seventh parallel of north latitude. In 1893 the dervish amir, Abu Mariam, fought with the Dinka tribe and was killed and his force destroyed, the fugitives taking refuge in Shakka. In the following year the Congo expedition established further posts, and in consequence the khalifa sent 3000 men, under the amir Khatem Musa, from Shakka to reoccupy the Bahr-el-Ghazal. The Belgians at Liffi retired before him, and he entered Faroga. Famine and disease broke out in Khatem Musa's camp in 1895, and a retreat was made towards Kordofan.

Equatoria.—In the Equatorial Province, which extended from the Albert Nyanza to Lado, Emin Bey, who had a force of 1300 Egyptian troops and 3000 irregulars, distributed among many stations, held out, hoping for reinforcements. In March 1885, however, Amadi fell to the dervishes, and on the 18th of April Karamalla arrived near Lado, the capital, and sent to inform Emin of the fall of Khartum. Emin and Captain Casati, an Italian, moved south to Wadelai, giving up the northern posts, and opened friendly relations with Kabarega, king of Unyoro. On the 26th of February 1886 Emin received despatches from Cairo via Zanzibar, from which he learned all that had occurred during the previous three years, and that "he might take any step he liked, should he decide to leave the country." He determined to remain where he was and "hold together, as long as possible, the remnant of the last ten years." His troops were in a mutinous state, wishing to go north rather than south, as Emin had ordered them to do, and unsuccessfully endeavoured to carry him with them by force.

His communications to Europe through Zanzibar led to the relief expedition under H. M. Stanley, which went to his rescue by way of the Congo in 1887, and after encountering incredible dangers and experiencing innumerable sufferings, met with Emin and Casati at Nsabé, on the Albert Nyanza, on the 29th of April 1888. Stanley went back in May to pick up his belated rearguard, leaving Mounteney Jephson and a small escort to accompany Emin round his province. The southern garrisons decided to go with Emin, but the troops at Labore mutinied, and a general revolt broke out, headed by Fadl-el-Maula, governor of Fabbo. On arriving at Dufile in August 1888, Emin and Jephson were made prisoners by the Egyptian mutineers. In the meantime the arrival of Stanley at Lake Albert had caused rumours, which quickly spread to Omdurman, of a great invading white pasha, with the result that in July the khalifa sent up the river three steamers and six barges, containing 4000 troops, to oppose this new-comer. In October Omar-Saleh, the Mahdist commander, took Rejaf and sent messengers to Dufile to summon Emin to surrender; but on the 15th of November the mutineers released both Emin and Jephson, who returned to Lake Albert with some 600 refugees, and joined Stanley in February 1889. The expedition arrived at Zanzibar at the end of the year.

Emin's mutinous troops kept the dervishes at bay between Wadelai and Rejaf, and eventually severely defeated them, driving them back to Rejaf. They did not, however, follow up their victory, and under the leadership of Fadl-el-Maula Bey remained about Wadelai, while the dervishes strengthened their post at Rejaf. In 1893 Fadl-el-Maula Bey and many of his men took service with Baert of the Congo State expedition. The bey was killed fighting the dervishes at Wandi in January 1894, and the remnant of his men eventually were found by Captain Thruston from Uganda on the 23rd of March 1894 at Mahagi, on the Albert Nyanza, whither they had drifted from Wadelai in search of supplies. They were enlisted by Thruston and brought back under the British flag to Uganda.

In consequence of the Franco-Congolese Treaty of 1894, Major Cunningham and Lieutenant Vandeleur were sent from Uganda to Dufile, where they planted the British flag on the 15th of January 1895.

SUDAN OPERATIONS, 1896–1900

The wonderful progress—political, economical and social—which Egypt had made during British occupation, so ably set forth in Sir Alfred Milner's *England in Egypt* (published in 1892), together with the revelation in so strong a light of the character of the khalifa's despotism in the Sudan and the miserable condition of his misgoverned people, as detailed in the accounts

Dongola campaign, 1896.

of their captivity at Omdurman by Father Ohrwalder and Slatin Bey published in 1892 and 1896), stirred public opinion in Great Britain, and brought the question of the recovery of the Sudan into prominence. A change of ministry took place in 1895, and Lord Salisbury's cabinet, which had consistently assailed the Egyptian policy of the old, was not unwilling to consider whether the flourishing condition of Egyptian finance, the prosperity of the country and the settled state of its affairs, with a capable and proved little army ready to hand, did not warrant an attempt being made to recover gradually the Sudan provinces abandoned by Egypt in 1885 on the advice of Mr Gladstone's government.

Such being the condition of public and official sentiment, the crushing defeat of the Italians by the Abyssinians at the battle of Adowa on the 1st of March 1896, and the critical state of Kassala—held by Italy at British suggestion, and now closely invested by the dervishes—made it not only desirable but necessary to take immediate action.

On the 14th of March 1896 Major-General Sir H. Kitchener, who succeeded Sir Francis Grenfell as sirdar of the Egyptian army in 1892, received orders to reoccupy Akasha, 50 m. south of Sarras, and to carry the railway on from Sarras. Subsequent operations were to depend upon the amount of resistance he encountered. On the 20th of March Akasha was occupied without opposition by an advanced column of Egyptian troops under Major J. Collinson, who formed an entrenched camp there. The reserves of the Egyptian army were called out, and responded with alacrity. The troops were concentrated at Wadi Halfa; the railway reconstruction, under Lieutenant E. P. Girouard, R.E., pushed southward; and a telegraph line followed the advance. At the commencement of the campaign the Egyptian army, including reserves, consisted of 16 battalions of infantry, of which 6 were Sudanese, 10 squadrons of cavalry, 5 batteries of artillery, 3 companies of garrison artillery, and 8 companies of camel corps, and it possessed 13 gunboats for river work. Colonel H. M. L. Rundle was chief of the staff; Major F. R. Wingate was head of the intelligence department, with Slatin Bey as his assistant; and Colonel A. Hunter was in command of Sarras, and south. The 1st battalion of the North Staffordshire regiment moved up from Cairo to join the Egyptian army.

In the meantime the advance to Akasha had already relieved the pressure at Kassala, Osman Digna having withdrawn a considerable force from the investing army and proceeded with it to Suakin. To meet Osman Digna's movement Lieutenant-Colonel G. E. Lloyd, the Suakin commandant, advanced to the Taroi Wells, 19 m. south of Suakin, on the 15th of April to co-operate with the "Friendlies," and with Major H. M. Sidney, advancing with a small force from Tokar. His cavalry, under Major M. A. C. B. Fenwick, went out to look for Sidney's force, and were surprised by a large number of dervishes. Fenwick, with some 40 officers and men, seized an isolated hill and held it through the night, repulsing the dervishes, who were the same night driven back with such heavy loss in attacking Lloyd's zeriba that they retired to the hills, and comparative quiet again reigned at Suakin. At the end of May an Indian brigade arrived for garrison duty, and the Egyptian troops were released for service on the Nile.

The dervishes first came in contact with the Egyptian cavalry on the Nile near Akasha, on the 1st of May, and were repulsed. The army concentrated at Akasha early in June, and on the 6th Kitchener moved to the attack of Firket 16 m. away, where the amir Hamuda, with 3000 men, was encamped. The attack was made in two columns: one, under Colonel Hunter, marching along the river-bank, approached Firket from the north; while the other, under Major Burn-Murdoch, making a detour through the desert, approached it from the south. The co-operation of the two columns was admirably timed, and on the morning of the 7th the dervish camp was surrounded, and, after a sharp fight, Hamuda and many amirs and about 1000 men were killed, and 500 prisoners taken. The dash and discipline of the Egyptian troops in this victory were a good augury for the future.

By the end of June the railway was advanced beyond Akasha, and headquarters were at Kosha, 10 m. farther south. Cholera and fever were busy both with the North Staffordshire regiment at Gemai, whither they had been moved on its approach, and with the Egyptian troops at the front, and carried off many officers and men. The railway reached Kosha early in August; the cholera disappeared, and stores were collected and arrangements steadily made for a farther advance. The North Staffordshire moved up to the front, and in September the army moved on Kerma, which was found to be evacuated, the dervishes having crossed the river to Hafir. There they were attacked by the gunboats and Kitchener's artillery from the opposite bank, and forced to retire, with their commander, Wad Bishara, seriously wounded. Dongola was bombarded by the gunboats and captured by the army on the 23rd of September. Bishara and his men retreated, but were pursued by the Egyptians until the retreat became a hopeless rout. Guns, small arms and ammunition, with large stores of grain and dates, were captured, many prisoners taken, while hundreds surrendered voluntarily, among them a brother of the amir Wad en Nejumi. The dervish Dongola army had practically ceased to exist. Debba was seized on the 3rd October, Korti and Merawi occupied soon after, and the principal sheiks came in and submitted to the sirdar. The Dongola campaign was over, and the province recovered to Egypt. The Indian brigade at Suakin returned to India, and was replaced by Egyptians. The North Staffordshire returned to Cairo. The work of consolidation began, and preparations were made for a farther advance when everything should be ready.

The Sudan campaign, 1897.

The railway up the right bank of the Nile was continued to Kerma, in order to evade the difficulties of the 3rd cataract; but the sirdar had conceived the bold project of cutting off the great angle of the Nile from Wadi Halfa to Abu Hamed, involving nearly 600 m. of navigation and including the 4th cataract, by constructing a railway across the Nubian desert, and so bringing his base at Wadi Halfa within a few hours of his force, when it should have advanced to Abu Hamed, instead of ten days. Early in 1897 this new line of railway was commenced from Wadi Halfa across the great Nubian desert 230 m. to Abu Hamed. The first-mentioned line reached Kerma in May, and by July the second had advanced 130 m. into the desert towards Abu Hamed, when it became necessary, before it was carried farther, to secure that terminus by an advance from Merawi.

In the meantime the khalifa was not idle. He occupied Abu Klea wells and Metemma; recalled the amir Ibrahim Khalil, with 4000 men, from the Ghezira; brought to Omdurman the army of the west under Mahmud—some 10,000 men; entrusted the line of the Atbara—Ed Damer, Adarama, Asubri and El Fasher—to Osman Digna; constructed defences in the Shabluka gorge; and personally superintended the organization and drill of the forces gathered at Omdurman, and the collection of vast stores of food and supplies of camels for offensive expeditions.

Towards the end of June the chief of the Jaalin tribe, Abdalla wad Said, who occupied Metemma, angered by the khalifa, made his submission to Kitchener and asked for support, at the same time foolishly sending a defiant letter to the khalifa. The sirdar sent him rifles and ammunition across the desert from Korti; but before they arrived, Mahmud's army, sent by the khalifa, swept down on Metemma on the 1st of July and massacred Abdalla wad Said and his garrison.

On the 29th of July, after several reconnaissances, Major-General Hunter, with a flying column, marched up the Nile from near Merawi to Abu Hamed, 133 m. distant, along the edge of the Monassir desert. He arrived on the 7th of August and captured it by storm, the dervishes losing 250 killed and 50 prisoners. By the end of the month the gunboats had surmounted the 4th cataract and reached Abu Hamed. Berber was found to be deserted, and occupied by Hunter on the 5th of September, and in the following month a large force was entrenched there. The khalifa, fearing an attack on Omdurman, moved Osman Digna from Adarama to Shendi. In the 23rd of October Hunter, with a flying column lightly equipped, left

Berber for Adarama, which he burned on the 2nd of November, and after reconnoitring for 40 m. up the Atbara, returned to Berber. The Nile was falling, and Kitchener decided to keep the gunboats above the impassable rapid at Um Tuir, 4 m. north of the confluence of the Atbara with the Nile, where he constructed a fort. The gunboats made repeated reconnaissances up the river, bombarding Metemma with effect. The railway reached Abu Hamed on the 4th of November, and was pushed rapidly forward along the right bank of the Nile towards Berber.

The forces of the khalifa remaining quiet, the sirdar visited Kassala and negotiated with the Italian General Caneva for its restoration to Egypt. The Italians were anxious to leave it; and on Christmas day 1897 Colonel (afterwards General Sir Charles) Parsons, with an Egyptian force from Suakin, took it formally over, together with a body of Arab irregulars employed by the Italians. These troops were at once despatched to capture the dervish posts at Asabri and El Fasher, which they did with small loss.

Sudan campaign, 1898.

On his return from Kassala to Berber the sirdar received information of an intended advance of the khalifa northward. He at once ordered a concentration of Egyptian troops towards Berber, and telegraphed to Cairo for a British brigade. By the end of January the concentration was complete, and the British brigade, under Major-General Gatacre, was at Dakhesh, south of Abu Hamed. Disagreement among the khalifa's generals postponed the dervish advance and gave Kitchener much-needed time. But at the end of February, Mahmud crossed the Nile to Shendi with some 12,000 fighting men, and with Osman Digna advanced along the right bank of the Nile to Aliab, where he struck across the desert to Nakheila, on the Atbara, intending to turn Kitchener's left flank at Berber The sirdar took up a position at Ras el Hudi, on the Atbara. His force consisted of Gatacre's British brigade (1st Warwicks, Lincolns, Seaforths and Camerons) and Hunter's Egyptian division (3 brigades under Colonels Maxwell, MacDonald and Lewis respectively), Broadwood's cavalry, Tudway's camel corps and Long's artillery. The dervish army reached Nakheila on the 20th of March, and entrenched themselves there in a formidable zeriba. After several reconnaissances in which fighting took place with Mahmud's outposts, it was ascertained from prisoners that their army was short of provisions and that great leakage was going on. Kitchener, therefore, did not hurry. He sent his flotilla up the Nile and captured Shendi, the dervish depot, on the 27th of March. On the 4th of April he advanced to Abadar. A final reconnaissance was made on the 5th. On the following day he bivouacked at Umdabia, where he constructed a strong zeriba, which was garrisoned by an Egyptian battalion, and on the night of the 7th he marched to the attack of Mahmud's zeriba, which, after an hour's bombardment on the morning of the 8th of April, was stormed with complete success. Mahmud and several hundred dervishes were captured, 40 amirs and 3000 Arabs killed, and many more wounded; the rest escaped to Gedaref. The sirdar's casualties were 80 killed and 472 wounded.

Preparations were now made for the attack on the khalifa's force at Omdurman; and in the meantime the troops were camped in the neighbourhood of Berber, and the railway carried on to the Atbara. At the end of July reinforcements were forwarded from Cairo; and on the 24th of August the following troops were concentrated for the advance at Wad Hamad, above Metemma, on the western bank of the 6th cataract:—British division, under Major-General Gatacre, consisting of 1st Brigade, commanded by Colonel A. G. Wauchope (1st Warwicks, Lincolns, Seaforths and Camerons), and 2nd Brigade, commanded by Colonel the Hon. N. G. Lyttelton (1st Northumberlands and Grenadier Guards, 2nd Lancashire and Rifle Brigade); Egyptian division, under Major-General Hunter, consisting of four brigades, commanded by Colonels MacDonald, Maxwell, Lewis and Collinson; mounted troops—21st Lancers, camel corps, and Egyptian cavalry; artillery, under Colonel Long, 2 British batteries, 5 Egyptian batteries, and 20 machine guns; detachment of Royal Engineers. The flotilla, under Commander Keppel, R.N., consisted of 10 gunboats and 5 transport steamers. The total strength was nearly 26,000 men.

Battle of Omdurman.

While the army moved along the west bank of the river, a force of Arab irregulars or "Friendlies" marched along the east bank, under command of Major Stuart-Wortley and Lieutenant Wood, to clear it of the enemy as far as the Blue Nile; and on the 1st of September the gunboats bombarded the forts on both sides of the river and breached the great wall of Omdurman. Kitchener met with no opposition; and on the 1st of September the army bivouacked in zeriba at Egeiga, on the west bank of the Nile, within 4 m. of Omdurman. Here, on the morning of the 2nd of September, the khalifa's army, 40,000 strong, attacked the zeriba, but was repulsed with slaughter. Kitchener then moved out and marched towards Omdurman, when he was again twice fiercely attacked on the right flank and rear, MacDonald's brigade bearing the brunt. MacDonald distinguished himself by his tactics, and completely repulsed the enemy. The 21st Lancers gallantly charged a body of 2000 dervishes which was unexpectedly met in a khor on the left flank, and drove them westward, the Lancers losing a fifth of their number in killed and wounded. The khalifa was now in full retreat, and the sirdar, sending his cavalry in pursuit, marched into Omdurman. The dervish loss was over 10,000 killed, as many wounded, and 5000 prisoners. The khalifa's black flag was captured and sent home to Queen Victoria. The British and Egyptian casualties together were under 500. The European prisoners of the khalifa found in Omdurman—Charles Neufeld, Joseph Ragnotti, Sister Teresa Grigolini, and some 30 Greeks—were released; and on Sunday the 4th of September the sirdar, with representatives from every regiment, crossed the river to Khartum, where the British and Egyptian flags were hoisted, and a short service held in memory of General Gordon, near the place where he met his death.

The results of the battle of Omdurman were the practical destruction of the khalifa's army, the extinction of Mahdism in the Sudan, and the recovery of nearly all the country formerly under Egyptian authority.

The khalifa fled with a small force to Obeid in Kordofan. The British troops were quickly sent down stream to Cairo, and the sirdar, shortly afterwards created Lord Kitchener of Khartum, was free to turn his attention to the reduction of the country to some sort of order.

Captain Marchand at Fashoda.

He had first, however, to deal with a somewhat serious matter—the arrival of a French expedition at Fashoda, on the White Nile, some 600 m. above Khartum. He started for the south on the 10th of September, with 5 gunboats and a small force, dispersed a body of 700 dervishes at Reng on the 15th, and four days later arrived at Fashoda, to find the French Captain Marchand, with 120 Senegalese soldiers, entrenched there and the French flag flying. He arranged with Marchand to leave the political question to be settled by diplomacy, and contented himself with hoisting the British and Egyptian flags to the south of the French flag, and leaving a gunboat and a Sudanese battalion to guard them. He then steamed up the river and established a post at Sobat; and after sending a gunboat up the Bahr-el-Ghazal to establish another post at Meshra-er-Rek, he returned to Omdurman. The French expedition had experienced great difficulties in the swampy region of the Bahr-el-Ghazal, and had reached Fashoda on the 10th of July. It had been attacked by a dervish force on the 25th of August, and was expecting another attack when Kitchener arrived and probably saved it from destruction. The Fashoda incident was the subject of important diplomatic negotiations, which at one time approached an acute phase; but ultimately the French position was found to be untenable, and on the 11th of December Marchand and his men returned to France by the Sobat, Abyssinia and Jibuti. In the following March the spheres of interest of Great Britain and France in the Nile basin were defined by a declaration making an addition to Article IV. of the Niger convention of the previous year.

During the sirdar's absence from Omdurman Colonel Hunter commanded an expedition up the Blue Nile, and by the end of

September had occupied and garrisoned Wad Medani, Sennar, Karkoj and Roseires. In the meantime Colonel Parsons marched with 1400 men from Kassala on the 7th of September, to capture Gedaref. He encountered 4000 dervishes under the amir Saadalla outside the town, and after a desperate fight, in which he lost 50 killed and 80 wounded, defeated them and occupied the town on the 22nd. The dervishes left 500 dead on the field, among whom were four amirs. Having strongly entrenched himself, Parsons beat off, with heavy loss to the dervishes, two impetuous attacks made on the 28th by Ahmed Fedil. But the garrison of Gedaref suffered from severe sickness, and Colonel Collinson was sent to their aid with reinforcements from Omdurman. He steamed up the Blue Nile and the Rahad river to Ain-el-Owega, whence he struck across the desert, reaching Gedaref on the 21st of October, to find that Ahmed Fedil had gone south with his force of 5000 men towards Roseires. Colonel Lewis, who was at Karkoj with a small force, moved to Roseires, where he received reinforcements from Omdurman, and on the 26th of December caught Ahmed Fedil's force as it was crossing the Blue Nile at Dakheila, and after a very severe fight cut it up. The dervish loss was 500 killed, while the Egyptians had 24 killed and 118 wounded. Two thousand five hundred fighting men surrendered later, and the rest escaped with Ahmed Fedil to join the khalifa in Kordofan.

Operations in the Sudan, 1899.

On the 25th of January 1899 Colonel Walter Kitchener was despatched by his brother, in command of a flying column of 2000 Egyptian troops and 1700 Friendlies, which had been concentrated at Faki Kohi, on the White Nile, some 200 m. above Khartum, to reconnoitre the khalifa's camp at Sherkela, 130 m. west of the river, in the heart of the Baggara country in Kordofan, and if possible to capture it. The position was found to be a strong one, occupied by over 6000 men; and as it was not considered prudent to attack it with an inferior force at such a distance from the river base, the flying column returned. No further attempt was made to interfere with the khalifa in his far-off retreat until towards the end of the year, when, good order having been generally established throughout the rest of the Sudan, it was decided to extend it to Kordofan.

Death of the khalifa.

In the autumn of 1899 the khalifa was at Jebel Gedir, a hill in southern Kordofan, about 80 m. from the White Nile, and was contemplating an advance. Lord Kitchener concentrated 8000 men at Kaka, on the river, 380 m. south of Khartum, and moved inland on the 20th of October. On arriving at Fongor it was ascertained that the khalifa had gone north, and the cavalry and camel corps having reconnoitred Jebel Gedir, the expedition returned. On the 13th November the amir Ahmed Fedil debouched on the river at El Alub, but retired on finding Colonel Lewis with a force in gunboats. Troops and transport were then concentrated at Faki Kohi, and Colonel Wingate sent with reinforcements from Khartum to take command of the expedition and march to Gedid, where it was anticipated the khalifa would be obliged to halt. A flying column, comprising a squadron of cavalry, a field battery, 6 machine guns, 6 companies of the camel corps, and a brigade of infantry and details, in all 3700 men, under Wingate, left Faki Kohi on the 21st of November. The very next day he encountered Ahmed Fedil at Abu Aadel, drove him from his position with great loss, and captured his camp and a large supply of grain he was convoying to the khalifa. Gedid was reached on the 23rd, and the khalifa was ascertained to be at Om Debreikat. Wingate marched at midnight of the 24th, and was resting his troops on high ground in front of the khalifa's position, when at daybreak of the 25th his picquets were driven in and the dervishes attacked. They were repulsed with great slaughter, and Wingate advancing, carried the camp. The khalifa Abdullah el Taaisha, unable to rally his men, gathered many of his principal amirs around him, among whom were his sons and brothers, Ali Wad Helu, Ahmed Fedil, and other well-known leaders, and they met their death unflinchingly from the bullets of the advancing Sudanese infantry. Three thousand men and 29 amirs of importance, including Sheik-ed-din, the khalifa's eldest son and intended successor, surrendered. The dervish loss in the two actions was estimated at 1000 killed and wounded, while the Egyptian casualties were only 4 killed and 29 wounded. Thus ended the power of the khalifa and of Mahdism.

On the 19th of January 1900 Osman Digna, who had been so great a supporter of Mahdism in the Eastern Sudan, and had always shown great discretion in securing the safety of his own person, was surrounded and captured at Jebel Warriba, as he was wandering a fugitive among the hills beyond Tokar.

The reconquest of Dongola and the Sudan provinces during the three years from March 1896 to December 1898, considering the enormous extent and difficulties of the country, was achieved at an unprecedentedly small cost, while the main item of expenditure—the railway—remains a permanent benefit to the country. The figures are:—

Railways	£E.1,181,372
Telegraphs	21,825
Gunboats	154,934
Military	996,223
Total	£E.2,354,354

Towards this expense the British government gave a grant-in-aid of £800,000, and the balance was borne by the Egyptian treasury. The railway, delayed by the construction of the big bridge over the Atbara, was opened to the Blue Nile opposite Khartum, 187 m. from the Atbara, at the end of 1899. (R. H. V.)

EHRENBERG, CHRISTIAN GOTTFRIED (1795–1876), German naturalist, was born at Delitzsch in Saxony on the 19th of April 1795. After studying at Leipzig and Berlin, where he took the degree of doctor of medicine in 1818, he was appointed professor of medicine in the university of Berlin (1827). Meanwhile in 1820 he was engaged in a scientific exploration conducted by General von Minutoli in Egypt. They investigated parts of the Libyan desert, the Nile valley and the northern coasts of the Red Sea, where Ehrenberg made a special study of the corals. Subsequently parts of Syria, Arabia and Abyssinia were examined. Some results of these travels and of the important collections that had been made were reported on by Humboldt in 1826; and afterwards Ehrenberg was enabled to bring out two volumes *Symbolae physicae* (1828–1834), in which many particulars of the mammals, birds, insects, &c., were made public. Other observations were communicated to scientific societies. In 1829 he accompanied Humboldt through eastern Russia to the Chinese frontier. On his return he gave his attention to microscopical researches. These had an important bearing on some of the infusorial earths used for polishing and other economic purposes; they added, moreover, largely to our knowledge of the microscopic organisms of certain geological formations, especially of the chalk, and of the modern marine and freshwater accumulations. Until Ehrenberg took up the study it was not known that considerable masses of rock were composed of minute forms of animals or plants. He demonstrated also that the phosphorescence of the sea was due to organisms. He continued until late in life to investigate the microscopic organisms of the deep sea and of various geological formations. He died in Berlin on the 27th of June 1876.

PUBLICATIONS.—*Die Infusionsthierchen als vollkommene Organismen* (2 vols. fol., Leipzig, 1838); *Mikrogeologie* (2 vols. fol., Leipzig, 1854); and "Fortsetzung der mikrogeologischen Studien," in *Abhandl. der k. Akad. der Wissenschaft* (Berlin, 1875).

EHRENBREITSTEIN, a town of Germany, in the Prussian Rhine province, on the right bank of the Rhine, facing Coblenz, with which it is connected by a railway bridge and a bridge of boats, on the main line of railway Frankfort-on-Main-Cologne. Pop. (including the garrison) 5300. It has an Evangelical and two Roman Catholic churches, a Capuchin monastery, tanneries, soap-works and a considerable trade in wine. Above the town, facing the mouth of the Mosel, on a rock 400 ft. high, lies the magnificent fortress of Ehrenbreitstein, considered practically impregnable. The sides towards the Rhine and the south and south-east are precipitous, and on the south side, on which is the winding approach, strongly defended. The central fort or citadel is flanked by a double line of works with three tiers of casemate batteries. The works towards the north and north-east end in a separate outlying fort. The whole forms a part of the system of fortifications which surround Coblenz.

The site of the castle is said to have been occupied by a Roman fort built in the time of the emperor Julian. In the 11th century the castle was held by a noble named Erembert, from whom it is said to have derived its name. In the 12th century it came into the possession of Archbishop Hillin (de Fallemagne) of Trier, who strengthened the defences in 1153. These were again extended by Archbishop Henry II. (de Fénétrange) in 1286, and by Archbishop John II. of Baden in 1481. In 1631 it was surrendered by the archbishop elector Philip Christopher von Soetern to the French, but was recovered by the Imperialists in 1637 and given to the archbishop elector of Cologne. It was restored to the elector of Trier in 1650, but was not strongly fortified until 1672. In 1688 the French bombarded it in vain, but in 1759 they took it and held it till 1762. It was again blockaded in 1795, 1796 and 1797, in vain; but in 1799 they starved it into surrender, and at the peace of Lunéville in 1801 blew it up before evacuating it. At the second peace of Paris the French paid 15,000,000 francs to the Prussian government for its restoration, and from 1816 to 1826 the fortress was reconstructed by General E. L. Aster (1778–1855).

EHUD, in the Bible, a "judge" who delivered Israel from the Moabites (Judg iii. 12-30). He was sent from Ephraim to bear tribute to Eglon king of Moab, who had crossed over the Jordan and seized the district around Jericho. Being, like the Benjamites, left-handed (cf xx. 16), he was able to conceal a dagger and strike down the king before his intentions were suspected. He locked Eglon in his chamber and escaped. The men from Mt Ephraim collected under his leadership and by seizing the fords of the Jordan were able to cut off the Moabites. He is called the son of Gera a Benjamite, but since both Ehud and Gera are tribal names (2 Sam. xvi. 5, 1 Chron. viii. 3, 5 sq.) it has been thought that this notice is not genuine. The tribe of Benjamin rarely appears in the old history of the Hebrews before the time of Saul. See further BENJAMIN; JUDGES.

EIBENSTOCK, a town of Germany, in the kingdom of Saxony, near the Mulde, on the borders of Bohemia, 17 m. by rail S.S.E. of Zwickau. Pop. (1905) 7460. It is a principal seat of the tambour embroidery which was introduced in 1775 by Clara Angermann. It possesses chemical and tobacco manufactories, and tin and iron works. It has also a large cattle market. Eibenstock, together with Schwarzenberg, was acquired by purchase in 1533 by Saxony and was granted municipal rights in the following year.

EICHBERG, JULIUS (1824–1893), German musical composer, was born at Düsseldorf on the 13th of June 1824. When he was nineteen he entered the Brussels Conservatoire, where he took first prizes for violin-playing and composition. For eleven years he occupied the post of professor in the Conservatoire of Geneva. In 1857 he went to the United States, staying two years in New York and then proceeding to Boston, where he became director of the orchestra at the Boston Museum. In 1867 he founded the Boston Conservatory of Music. Eichberg published several educational works on music; and his four operettas, *The Doctor of Alcantara*, *The Rose of Tyrol*, *The Two Cadis* and *A Night in Rome*, were highly popular. He died in Boston on the 18th of January 1893.

EICHENDORFF, JOSEPH, FREIHERR VON (1788–1857), German poet and romance-writer, was born at Lubowitz, near Ratibor, in Silesia, on the 10th of March 1788. He studied law at Halle and Heidelberg from 1805 to 1808. After a visit to Paris he went to Vienna, where he resided until 1813, when he joined the Prussian army as a volunteer in the famous Lützow corps. When peace was concluded in 1815, he left the army, and in the following year he was appointed to a judicial office at Breslau. He subsequently held similar offices at Danzig, Königsberg and Berlin. Retiring from public service in 1844, he lived successively in Danzig, Vienna, Dresden and Berlin. He died at Neisse on the 26th of November 1857. Eichendorff was one of the most distinguished of the later members of the German romantic school. His genius was essentially lyrical. Thus he is most successful in his shorter romances and dramas, where constructive power is least called for. His first work, written in 1811, was a romance, *Ahnung und Gegenwart* (1815). This was followed at short intervals by several others, among which the foremost place is by general consent assigned to *Aus dem Leben eines Taugenichts* (1826), which has often been reprinted. Of his dramas may be mentioned *Ezzelin von Romano* (1828); and *Der letzte Held von Marienburg* (1830), both tragedies; and a comedy, *Die Freier* (1833). He also translated several of Calderon's religious dramas (*Geistliche Schauspiele*, 1846). It is, however, through his lyrics (*Gedichte*, first collected 1837) that Eichendorff is best known; he is the greatest lyric poet of the romantic movement. No one has given more beautiful expression than he to the poetry of a wandering life; often, again, his lyrics are exquisite word pictures interpreting the mystic meaning of the moods of nature, as in *Nachts*, or the old-time mystery which yet haunts the twilight forests and feudal castles of Germany, as in the dramatic lyric *Waldesgespräch* or *Auf einer Burg*. Their language is simple and musical, which makes them very suitable for singing, and they have been often set, notably by Schubert and Schumann.

In the later years of his life Eichendorff published several works on subjects in literary history and criticism such as *Über die ethische und religiöse Bedeutung der neuen romantischen Poesie in Deutschland* (1847), *Der deutsche Roman des 18. Jahrhunderts in seinem Verhältniss zum Christenthum* (1851), and *Geschichte der poetischen Litteratur Deutschlands* (1856), but the value of these works is impaired by the author's reactionary standpoint. An edition of his collected works in six volumes, appeared at Leipzig in 1870.

Eichendorff's *Sämtliche Werke* appeared in 6 vols., 1864 (reprinted 1869–1870); his *Sämtliche poetische Werke* in 4 vols. (1883). The latest edition is that edited by R. von Gottschall in 4 vols. (1901). A good selection edited by M. Koch will be found in vol. 145 of Kürschner's *Deutsche Nationallitteratur* (1893). Eichendorff's critical writings were collected in 1866 under the title *Vermischte Schriften* (5 vols.). Cp. H. von Eichendorff's biographical introduction to the *Sämtliche Werke*; also H. Keiter, *Joseph von Eichendorff* (Cologne, 1887); H. A. Krüger, *Der junge Eichendorff* (Oppeln, 1898).

EICHHORN, JOHANN GOTTFRIED (1752–1827), German theologian, was born at Dörrenzimmern, in the principality of Hohenlohe-Oehringen, on the 16th of October 1752. He was educated at the state school in Weikersheim, where his father was superintendent, at the gymnasium at Heilbronn and at the university of Göttingen (1770–1774), studying under J. D. Michaelis. In 1774 he received the rectorship of the gymnasium at Ohrdruf, in the duchy of Gotha, and in the following year was made professor of Oriental languages at Jena. On the death of Michaelis in 1788 he was elected professor *ordinarius* at Göttingen, where he lectured not only on Oriental languages and on the exegesis of the Old and New Testaments, but also on political history. His health was shattered in 1825, but he continued his lectures until attacked by fever on the 14th of June 1827. He died on the 27th of that month. Eichhorn has been called "the founder of modern Old Testament criticism." He first properly recognized its scope and problems, and began many of its most important discussions. "My greatest trouble," he says in the preface to the second edition of his *Einleitung*, "I had to bestow on a hitherto unworked field—on the investigation of the inner nature of the Old Testament with the help of the Higher Criticism (not a new name to any humanist)." His investigations led him to the conclusion that "most of the writings of the Hebrews have passed through several hands." He took for granted that all the so-called supernatural facts relating to the Old and New Testaments were explicable on natural principles. He sought to judge them from the standpoint of the ancient world, and to account for them by the superstitious beliefs which were then generally in vogue. He did not perceive in the biblical books any religious ideas of much importance for modern times; they interested him merely historically and for the light they cast upon antiquity. He regarded many books of the Old Testament as spurious, questioned the genuineness of *2 Peter* and *Jude*, denied the Pauline authorship of *Timothy* and *Titus*, and suggested that the canonical gospels were based upon various translations and editions of a primary Aramaic gospel. He did not appreciate as sufficiently as David Strauss and the Tübingen critics the difficulties which a natural theory has to surmount, nor did he support his conclusions by such elaborate discussions as they deemed necessary.

His principal works were—*Geschichte des Ostindischen Handels vor Mohammed* (Gotha, 1775); *Allgemeine Bibliothek der biblischen Litteratur* (10 vols., Leipzig, 1787–1801); *Einleitung in das Alte Testament* (3 vols., Leipzig, 1780–1783); *Einleitung in das Neue Testament* (1804–1812); *Einleitung in die apokryphischen Bücher des Alten Testaments* (Gött., 1795); *Commentarius in apocalypsin Joannis* (2 vols., Gött., 1791); *Die Hebr. Propheten* (3 vols., Gött., 1816–1819); *Allgemeine Geschichte der Cultur und Literatur des neuern Europa* (2 vols., Gött., 1796–1799); *Literärgeschichte* (1st vol., Gött., 1799, 2nd ed. 1813, 2nd vol. 1814); *Geschichte der Literatur von ihrem Anfange bis auf die neuesten Zeiten* (5 vols., Gött., 1805–1812); *Übersicht der Französischen Revolution* (2 vols., Gött., 1797); *Weltgeschichte* (3rd ed., 5 vols., Gött., 1819–1820); *Geschichte der drei letzten Jahrhunderte* (3rd ed., 6 vols., Hanover, 1817–1818); *Urgeschichte des erlauchten Hauses der Welfen* (Hanover, 1817).

See R. W. Mackay, *The Tübingen School and its Antecedents* (1863), pp. 103 ff.; Otto Pfleiderer, *Development of Theology* (1890), p. 209. T. K. Cheyne, *Founders of Old Testament Criticism* (1893), pp. 13 ff.

EICHHORN, KARL FRIEDRICH (1781–1854), German jurist, son of the preceding, was born at Jena on the 20th of November 1781. He entered the university of Göttingen in 1797. In 1805 he obtained the professorship of law at Frankfort-on-Oder, holding it till 1811, when he accepted the same chair at Berlin. On the call to arms in 1813 he became a captain of horse, and received at the end of the war the decoration of the Iron Cross. In 1817 he was offered the chair of law at Göttingen, and, preferring it to the Berlin professorship, taught there with great success till ill-health compelled him to resign in 1828. His successor in the Berlin chair having died in 1832, he again entered on its duties, but resigned two years afterwards. In 1832 he also received an appointment in the ministry of foreign affairs, which, with his labours on many state committees and his legal researches and writings, occupied him till his death at Cologne on the 4th of July 1854. Eichhorn is regarded as one of the principal authorities on German constitutional law. His chief work is *Deutsche Staats- und Rechtsgeschichte* (Göttingen, 1808–1823, 5th ed. 1843–1844). In company with Savigny and J. F. L. Göschen he founded the *Zeitschrift für geschichtliche Rechtswissenschaft*. He was the author besides of *Einleitung in das deutsche Privatrecht mit Einschluss des Lehnrechts* (Gött., 1823) and the *Grundsätze des Kirchenrechts der Katholischen und der Evangelischen Religionspartei in Deutschland*, 2 Bde. (*ib.*, 1831–1833).

See Schulte, *Karl Friedrich Eichhorn, sein Leben und Wirken* (1884).

EICHSTÄTT, a town and episcopal see of Germany, in the kingdom of Bavaria, in the deep and romantic valley of the Altmühl, 35 m. S. of Nuremberg, on the railway to Ingolstadt and Munich. Pop. (1905) 7701. The town, with its numerous spires and remains of medieval fortifications, is very picturesque. It has an Evangelical and seven Roman Catholic churches, among the latter the cathedral of St Wilibald (first bishop of Eichstätt),—with the tomb of the saint and numerous pictures and relics,—the church of St Walpurgis, sister of Wilibald, whose remains rest in the choir, and the Capuchin church, a copy of the Holy Sepulchre. Of its secular buildings the most noticeable are the town hall and the Leuchtenberg palace, once the residence of the prince bishops and later of the dukes of Leuchtenberg (now occupied by the court of justice of the district), with beautiful grounds. The Wilibaldsburg, built on a neighbouring hill in the 14th century by Bishop Bertold of Hohenzollern, was long the residence of the prince bishops of Eichstätt, and now contains an historical museum. There are an episcopal lyceum, a clerical seminary, a classical and a modern school, and numerous religious houses. The industries of the town include bootmaking, brewing and the production of lithographic stones.

Eichstätt (Lat. *Aureatum* or *Rubilocus*) was originally a Roman station which, after the foundation of the bishopric by Boniface in 745, developed into a considerable town, which was surrounded with walls in 908. The bishops of Eichstätt were princes of the Empire, subject to the spiritual jurisdiction of the archbishops of Mainz, and ruled over considerable territories in the Circle of Franconia. In 1802 the see was secularized and incorporated in Bavaria. In 1817 it was given, with the duchy of Leuchtenberg, as a mediatized domain under the Bavarian crown, by the king of Bavaria to his son-in-law Eugene de Beauharnais, ex-viceroy of Italy, henceforth styled duke of Leuchtenberg. In 1855 it reverted to the Bavarian crown.

EICHWALD, KARL EDUARD VON (1795–1876), Russian geologist and physician, was born at Mitau in Courland on the 4th of July 1795. He became doctor of medicine and professor of zoology in Kazañ in 1823; four years later professor of zoology and comparative anatomy at Vilna; in 1838 professor of zoology, mineralogy and medicine at St Petersburg; and finally professor of palaeontology in the institute of mines in that city. He travelled much in the Russian empire, and was a keen observer of its natural history and geology. He died at St Petersburg on the 10th of November 1876. His published works include *Reise auf dem Caspischen Meere und in den Caucasus*, 2 vols. (Stuttgart and Tübingen, 1834–1838); *Die Urwelt Russlands* (St Petersburg, 1840–1845); *Lethaea Rossica, ou paléontologie de la Russie*, 3 vols. (Stuttgart, 1852–1868), with Atlases.

EIDER, a river of Prussia, in the province of Schleswig-Holstein. It rises to the south of Kiel, in Lake Redder, flows first north, then west (with wide-sweeping curves), and after a course of 117 m. enters the North Sea at Tönning. It is navigable up to Rendsburg, and is embanked through the marshes across which it runs in its lower course. Since the reign of Charlemagne, the Eider (originally *Ägyr Dör*—Neptune's gate) was known as *Romani terminus imperii* and was recognized as the boundary of the Empire in 1027 by the emperor Conrad II., the founder of the Salian dynasty. In the controversy arising out of the Schleswig-Holstein Question, which culminated in the war of Austria and Prussia against Denmark in 1864, the Eider gave its name to the "Eider Danes," the *intransigeant* Danish party which maintained that Schleswig (Sonderjylland, South Jutland) was by nature and historical tradition an integral part of Denmark. The Eider Canal (*Eider-Kanal*), which was constructed between 1777 and 1784, leaves the Eider at the point where the river turns to the west and enters the Bay of Kiel at Holtenau. It was hampered by six sluices, but was used annually by some 4000 vessels, and until its conversion in 1887–1895 into the Kaiser Wilhelm Canal afforded the only direct connexion between the North Sea and the Baltic.

EIDER (Icelandic, *Æður*), a large marine duck, the *Somateria mollissima* of ornithologists, famous for its down, which, from its extreme lightness and elasticity, is in great request for filling bed-coverlets. This bird generally frequents low rocky islets near the coast, and in Iceland and Norway has long been afforded every encouragement and protection, a fine being inflicted for killing it during the breeding-season, or even for firing a gun near its haunts, while artificial nesting-places are in many localities contrived for its further accommodation. From the care thus taken of it in those countries it has become exceedingly tame at its chief resorts, which are strictly regarded as property, and the taking of eggs or down from them, except by authorized persons, is severely punished by law. In appearance the eider is somewhat clumsy, though it flies fast and dives admirably. The female is of a dark reddish-brown colour barred with brownish-black. The adult male in spring is conspicuous by his pied plumage of velvet-black beneath, and white above: a patch of shining sea-green on his head is only seen on close inspection. This plumage he is considered not to acquire until his third year, being when young almost exactly like the female, and it is certain that the birds which have not attained their full dress remain in flocks by themselves without going to the breeding-stations. The nest is generally in some convenient corner among large stones, hollowed in the soil, and furnished with a few bits of dry grass, seaweed or heather. By the time that the full number of eggs (which rarely if ever exceeds five) is laid the down is added. Generally the eggs and down are taken at intervals of a few days by the owners of the "eider-fold," and the birds are thus kept depositing both during the whole season; but some experience is needed to ensure the greatest profit from each commodity. Every duck is ultimately allowed to hatch an egg or two to keep up the stock, and the down of the last nest is gathered after the birds have left the spot. The story of the drake's furnishing down, after the duck's supply is exhausted is a fiction. He never goes near the nest. The eggs have a strong flavour, but are much relished by both Icelanders and Norwegians. In the Old World the eider breeds in suitable localities from Spitsbergen to the Farne Islands off the coast of Northumberland—where it is known as St Cuthbert's duck. Its food consists of marine animals (molluscs and crustaceans), and hence the young are not easily reared in captivity. The eider of the New World differs somewhat, and has been described as a distinct species (*S. dresseri*). Though much diminished in numbers by persecution, it is still abundant on the coast of Newfoundland and thence northward. In Greenland also eiders are very plentiful, and it is supposed that three-fourths of the supply of down sent to Copenhagen comes from that country. The limits of the eider's northern range are not known, but the Arctic expedition of 1875 did not meet with it after leaving the Danish settlements, and its place was taken by an allied species, the king-duck (*S. spectabilis*), a very beautiful bird which sometimes appears on the British coast. The female greatly resembles that of the eider, but the male has a black chevron on his chin and a bright orange prominence on his forehead, which last seems to have given the species its English name. On the west coast of North America the eider is represented by a species (*S. v-nigrum*) with a like chevron, but otherwise resembling the Atlantic bird. In the same waters two other fine species are also found (*S. fischeri* and *S. stelleri*), one of which (the latter) also inhabits the Arctic coast of Russia and East Finmark and has twice reached England. The Labrador duck (*S. labradoria*), now extinct, also belongs to this group. (A. N.)

EIFEL, a district of Germany, in the Prussian Rhine Province, between the Rhine, the Moselle and the frontier of the grand duchy of Luxemburg. It is a hilly region, most elevated in the eastern part (Hohe Eifel), where there are several points from 2000 up to 2410 ft. above sea-level. In the west is the Schneifels or Schnee-Eifel; and the southern part, where the most picturesque scenery and chief geological interest is found, is called the Vorder Eifel.

The Eifel is an ancient massif of folded Devonian rocks upon the margins of which, near Hillesheim and towards Bitburg and Trier, rest unconformably the nearly undisturbed sandstones, marls and limestones of the Trias. On the southern border, at Wittlich, the terrestrial deposits of the Permian Rothliegende are also met with. The slates and sandstones of the Lower Devonian form by far the greater part of the region; but folded amongst these, in a series of troughs running from south-west to north-east lie the fossiliferous limestones of the Middle Devonian, and occasionally, as for example near Büdesheim, a few small patches of the Upper Devonian. Upon the ancient floor of folded Devonian strata stand numerous small volcanic cones, many of which, though long extinct, are still very perfect in form. The precise age of the eruptions is uncertain. The only sign of any remaining volcanic activity is the emission in many places of carbon dioxide and of heated waters. There is no historic or legendary record of any eruption, but nevertheless the eruptions must have continued to a very recent geological period. The lavas of Papenkaule are clearly posterior to the excavation of the valley of the Kyll, and an outflow of basalt has forced the Uess to seek a new course. The volcanic rocks occur both as tuffs and as lava-flows. They are chiefly leucite and nepheline rocks, such as leucitite, leucitophyre and nephelinite, but basalt and trachyte also occur. The leucite lavas of Niedermendig contain haüyne in abundance. The most extensive and continuous area of volcanic rocks is that surrounding the Laacher See and extending eastwards to Neuwied and Coblenz and even beyond the Rhine.

The numerous so-called crater-lakes or *maare* of the Eifel present several features of interest. They do not, as a rule, lie in true craters at the summit of volcanic cones, but rather in hollows which have been formed by explosions. The most remarkable group is that of Daun, where the three depressions of Gemünd, Weinfeld and Schalkenmehren have been hollowed out in the Lower Devonian strata. The first of these shows no sign of either lavas or scoriae, but volcanic rocks occur on the margins of the other two. The two largest lakes in the Eifel region, however, are the Laacher See in the hills west of Andernach on the Rhine, and the Pulvermaar S.E. of the Daun group, with its shores of peculiar volcanic sand, which also appears in its waters as a black powder (*pulver*).

EIFFEL TOWER. Erected for the exposition of 1889, the Eiffel Tower, in the Champ de Mars, Paris, is by far the highest artificial structure in the world, and its height of 300 metres (984 ft.) surpasses that of the obelisk at Washington by 429 ft., and that of St Paul's cathedral by 580 ft. Its framework is composed essentially of four uprights, which rise from the corners of a square measuring 100 metres on the side; thus the area it covers at its base is nearly 2½ acres. These uprights are supported on huge piers of masonry and concrete, the foundations for which were carried down, by the aid of iron caissons and compressed air, to a depth of about 15 metres on the side next the Seine, and about 9 metres on the other side. At first they curve upwards at an angle of 54°; then they gradually become straighter, until they unite in a single shaft rather more than half-way up. The first platform, at a height of 57 metres, has an area of 5860 sq. yds., and is reached either by staircases or lifts. The next, accessible by lifts only, is 115 metres up, and has an area of 32 sq. yds; while the third, at 276, supports a pavilion capable of holding 800 persons. Nearly 25 metres higher up still is the lantern, with a gallery 5 metres in diameter. The work of building this structure, which is mainly composed of iron lattice-work, was begun on the 28th of January 1887, and the full height was reached on the 13th of March 1889. Besides being one of the sights of Paris, to which visitors resort in order to enjoy the extensive view that can be had from its higher galleries on a clear day, the tower is used to some extent for scientific and semi-scientific purposes; thus meteorological observations are carried on. The engineer under whose direction the tower was constructed was Alexandre Gustave Eiffel (born at Dijon on the 15th of December 1832), who had already had a wide experience in the construction of large metal bridges, and who designed the huge sluices for the Panama Canal, when it was under the French company.

EILDON HILLS, a group of three conical hills, of volcanic origin, in Roxburghshire, Scotland, 1 m. S. by E. of Melrose, about equidistant from Melrose and St Boswells stations on the North British railway. They were once known as Eldune—the *Eldunum* of Simeon of Durham (fl. 1130)—probably derived from the Gaelic *aill*, "rock," and *dun*, "hill"; but the name is also said to be a corruption of the Cymric *moeldun*, "bald hill." The northern peak is 1327 ft. high, the central 1385 ft. and the southern 1216 ft. Whether or not the Roman station of *Trimontium* was situated here is matter of controversy. According to General William Roy (1726–1790) Trimontium—so called, according to this theory, from the triple Eildon heights—was Old Melrose; other authorities incline to place the station on the northern shore of the Solway Firth. The Eildons have been the subject of much legendary lore. Michael Scot (1175–1234), acting as a confederate of the Evil One (so the fable runs) cleft Eildon Hill, then a single cone, into the three existing peaks. Another legend states that Arthur and his knights sleep in a vault beneath the Eildons. A third legend centres in Thomas of Erceldoune. The Eildon Tree Stone, a large moss-covered boulder, lying on the high road as it bends towards the west within 2 m. of Melrose, marks the spot where the Fairy Queen led him into her realms in the heart of the hills. Other places associated with this legend may still be identified. Huntly Banks, where "true Thomas" lay and watched the queen's approach, is half a mile west of the Eildon Tree Stone, and on the west side of the hills is Bogle Burn, a streamlet that feeds the Tweed and probably derives its name from his ghostly visitor. Here, too, is Rhymer's glen, although the name was invented by Sir Walter Scott, who added the dell to his Abbotsford estate. Bowden, to the south of the hills, was the birthplace of the poets Thomas Aird (1802–1876) and James Thomson, and its parish church contains the burial-place of the dukes of Roxburghe. Eildon Hall is a seat of the duke of Buccleuch.

EILENBURG, a town of Germany, in the Prussian province of Saxony, on an island formed by the Mulde, 31 m. E. from Halle, at the junction of the railways Halle-Cottbus and Leipzig-Eilenburg. Pop. (1905) 15,145. There are three churches, two Evangelical and one Roman Catholic. The industries of the town include the manufacture of chemicals, cloth, quilting, calico, cigars and agricultural implements, bleaching, dyeing, basket-making, carriage-building and trade in cattle. In the neighbourhood is the iron foundry of Erwinhof. Opposite the town, on the steep left bank of the Mulde, is the castle from which it derives its name, the original seat of the noble family of Eulenburg. This castle (Ilburg) is mentioned in records of the reigns of Henry the Fowler as an important outpost against the Sorbs and Wends. The town itself, originally called Mildenau, is of great antiquity. It is first mentioned as a town in 981, when it belonged to the house of Wettin and was the chief town of the East Mark. In 1386 it was incorporated in the margraviate of Meissen. In 1815 it passed to Prussia.

See Gundermann, *Chronik der Stadt Eilenburg* (Eilenburg, 1879).

EINBECK, or **Eimbeck**, a town of Germany, in the Prussian province of Hanover, on the Ilm, 50 m. by rail S. of Hanover. Pop. (1905) 8709. It is an old-fashioned town with many quaint wooden houses, notable among them the "Northeimhaus," a beautiful specimen of medieval architecture. There are several churches, among them the Alexanderkirche, containing the tombs of the princes of Grubenhagen, and a synagogue. The schools include a *Realgymnasium* (*i.e.* predominantly for "modern" subjects), technical schools for the advanced study of machine-making, for weaving and for the textile industries, a preparatory training-college and a police school. The industries include brewing, weaving and the manufacture of cloth, carpets, tobacco, sugar, leather-grease, toys and roofing-felt.

Einbeck grew up originally round the monastery of St Alexander (founded 1080), famous for its relic of the True Blood. It is first recorded as a town in 1274, and in the 14th century was the seat of the princes of Grubenhagen, a branch of the ducal house of Brunswick. The town subsequently joined the Hanseatic League. In the 15th century it became famous for its beer ("Eimbecker," whence the familiar "Bock"). In 1540 the Reformation was introduced by Duke Philip of Brunswick-Saltzderhelden (d. 1551), with the death of whose son Philip II. (1596) the Grubenhagen line became extinct. In 1626, during the Thirty Years' War, Einbeck was taken by Pappenheim and in October 1641 by Piccolomini. In 1643 it was evacuated by the Imperialists. In 1761 its walls were razed by the French.

See H. L. Harland, *Gesch. der Stadt Einbeck*, 2 Bde. (Einbeck, 1854–1859; abridgment, *ib.* 1881).

EINDHOVEN, a town in the province of North Brabant, Holland, and a railway junction 8 m. by rail W. by S. of Helmond. Pop. (1900) 4730. Like Tilburg and Helmond it has developed in modern times into a flourishing industrial centre, having linen, woollen, cotton, tobacco and cigar, matches, &c., factories and several breweries.

EINHARD (*c.* 770–840), the friend and biographer of Charlemagne; he is also called Einhartus, Ainhardus or Heinhardus, in some of the early manuscripts. About the 10th century the name was altered into Agenardus, and then to Eginhardus, or Eginhartus, but, although these variations were largely used in the English and French languages, the form Einhardus, or Einhartus, is unquestionably the right one.

According to the statement of Walafrid Strabo, Einhard was born in the district which is watered by the river Main, and his birth has been fixed at about 770. His parents were of noble birth, and were probably named Einhart and Engilfrit, and their son was educated in the monastery of Fulda, where he was certainly residing in 788 and in 791. Owing to his intelligence and ability he was transferred, not later than 796, from Fulda to the palace of Charlemagne by abbot Baugulf, and he soon became very intimate with the king and his family, and undertook various important duties, one writer calling him *domesticus palatii regalis*. He was a member of the group of scholars who gathered around Charlemagne and was entrusted with the charge of the public buildings, receiving, according to a fashion then prevalent, the scriptural name of Bezaleel (Exodus xxxi. 2 and xxxv. 30-35) owing to his artistic skill. It has been supposed that he was responsible for the erection of the basilica at Aix-la-Chapelle, where he resided with the emperor, and the other buildings mentioned in chapter xvii. of his *Vita Karoli Magni*, but there is no express statement to this effect. In 806 Charlemagne sent him to Rome to obtain the signature of Pope Leo III. to a will which he had made concerning the division of his empire; and it was possibly owing to Einhard's influence that in 813, after the death of his two elder sons, the emperor made his remaining son, Louis, a partner with himself in the imperial dignity. When Louis became sole emperor in 814 he retained his father's minister in his former position; then in 817 made him tutor to his son, Lothair, afterwards the emperor Lothair I.; and showed him many other marks of favour. Einhard married Emma, or Imma, a sister of Bernharius, bishop of Worms, and a tradition of the 12th century represented this lady as a daughter of Charlemagne, and invented a romantic story with regard to the courtship which deserves to be noticed as it frequently appears in literature. Einhard is said to have visited the emperor's daughter regularly and secretly; and on one occasion a fall of snow made it impossible for him to walk away without leaving footprints, which would lead to his detection. This risk, however, was obviated by the foresight of Emma, who carried her lover across the courtyard of the palace; a scene which was witnessed by Charlemagne, who next morning narrated the occurrence to his counsellors, and asked for their advice. Very severe punishments were suggested for the clandestine lover, but the emperor rewarded the devotion of the pair by consenting to their marriage. This story is, of course, improbable, and is further discredited by the fact that Einhard does not mention Emma among the number of Charlemagne's children. Moreover, a similar story has been told of a daughter of the emperor Henry III. It is uncertain whether Einhard had any children. He addressed a letter to a person named Vussin, whom he calls *fili* and *mi nate*, but, as Vussin is not mentioned in documents in which his interests as Einhard's son would have been concerned, it is possible that he was only a young man in whom he took a special interest. In January 815 the emperor Louis I. bestowed on Einhard and his wife the domains of Michelstadt and Mulinheim in the Odenwald, and in the charter conveying these lands he is called simply Einhardus, but, in a document dated the 2nd of June of the same year, he is referred to as abbot. After this time he is mentioned as head of several monasteries: St Peter, Mount Blandin and St Bavon at Ghent, St Servais at Maastricht, St Cloud near Paris, and Fontenelle near Rouen, and he also had charge of the church of St John the Baptist at Pavia.

During the quarrels which took place between Louis I. and his sons, in consequence of the emperor's second marriage, Einhard's efforts were directed to making peace, but after a time he grew tired of the troubles and intrigues of court life. In 818 he had given his estate at Michelstadt to the abbey of Lorsch, but he retained Mulinheim, where about 827 he founded an abbey and erected a church, to which he transported some relics of St Peter and St Marcellinus, which he had procured from Rome. To Mulinheim, which was afterwards called Seligenstadt, he finally retired in 830. His wife, who had been his constant helper, and whom he had not put away on becoming an abbot, died in 836, and after receiving a visit from the emperor, Einhard died on the 14th of March 840. He was buried at Seligenstadt, and his epitaph was written by Hrabanus Maurus. Einhard was a man of very short stature, a feature on which Alcuin wrote an epigram. Consequently he was called *Nardulus*, a diminutive form of Einhardus, and his great industry and activity caused him to be likened to an ant. He was also a man of learning and culture. Reaping the benefits of the revival of learning brought about by Charlemagne, he was on intimate terms with Alcuin, was well versed in Latin literature, and knew some Greek. His most famous work is his *Vita Karoli Magni*, to which a prologue was added by Walafrid Strabo. Written in imitation of the *De vitis Caesarum* of Suetonius, this is the best contemporary account of the life of Charlemagne, and could only have been written by one who was very intimate with the emperor and his court. It is, moreover, a work of some artistic merit, although not free from inaccuracies. It was written before 821, and having been very popular during the middle ages, was first printed at Cologne in 1521. G. H. Pertz collated more than sixty manuscripts for his edition of 1829, and others have since come to light. Other works by Einhard are: *Epistolae*, which are of considerable importance for the history of the times; *Historia translationis beatorum Christi martyrum Marcellini et Petri*, which gives a curious account of how the bones of these martyrs were stolen and conveyed to Seligenstadt, and what miracles they wrought; and *De adoranda cruce*, a treatise which has only recently come to light, and which has been published by E. Dümmler in the *Neues Archiv der Gesellschaft für ältere deutsche Geschichtskunde*, Band xi. (Hanover, 1886). It has been asserted that Einhard was the author of some of the Frankish annals, and especially of part of the annals of Lorsch (*Annales Laurissenses majores*), and part of the annals of Fulda (*Annales Fuldenses*). Much discussion has taken place on this question, and several of the most eminent of German historians, Ranke among them, have taken part therein, but no certain decision has been reached.

The literature on Einhard is very extensive, as nearly all those who deal with Charlemagne, early German and early French literature, treat of him. Editions of his works are by A. Teulet, *Einhardi omnia quae extant opera* (Paris, 1840–1843), with a French translation; P. Jaffé, in the *Bibliotheca rerum Germanicarum*, Band iv. (Berlin, 1867); G. H. Pertz in the *Monumenta Germaniae historica*, Bände i. and ii. (Hanover, 1826–1829), and J. P. Migne in the *Patrologia Latina*, tomes 97 and 104 (Paris, 1866). The *Vita Karoli Magni*, edited by G. H. Pertz and G. Waitz, has been published separately (Hanover, 1880). Among the various translations of the *Vita* may be mentioned an English one by W. Glaister (London, 1877) and a German one by O. Abel (Leipzig, 1893). For a complete bibliography of Einhard, see A. Potthast, *Bibliotheca historica*, pp. 394-397 (Berlin, 1896), and W. Wattenbach, *Deutschlands Geschichtsquellen*, Band i. (Berlin, 1904). (A. W. H.*)

EINHORN, DAVID (1809–1879), leader of the Jewish reform movement in the United States of America, was born in Bavaria. He was a supporter of the principles of Abraham Geiger (*q.v.*), and while still in Germany advocated the introduction of prayers in the vernacular, the exclusion of nationalistic hopes from the synagogue service, and other ritual modifications. In 1855 he migrated to America, where he became the acknowledged leader of reform, and laid the foundation of the régime under which the mass of American Jews (excepting the newly arrived Russians) now worship. In 1858 he published his revised prayer book, which has formed the model for all subsequent revisions. In 1861 he strongly supported the anti-slavery party, and was forced to leave Baltimore where he then ministered. He continued his work first in Philadelphia and later in New York. (I. A.)

EINSIEDELN, the most populous town in the Swiss canton of Schwyz. It is built on the right bank of the Alpbach (an affluent of the Sihl), at a height of 2908 ft. above the sea-level on a rather bare moorland, and by rail is 25 m S E. of Zürich, or by a roundabout railway route about 38 m. north of Schwyz, with which it communicates directly over the Hacken Pass (4649 ft) or the Holzegg Pass (4616 ft.). In 1900 the population was 8496, all (save 75) Romanists and all (save 111) German-speaking. The town is entirely dependent on the great Benedictine abbey that rises slightly above it to the east. Close to its present site Meinrad, a hermit, was murdered in 861 by two robbers, whose crime was made known by Meinrad's two pet ravens. Early in the 10th century Benno, a hermit, rebuilt the holy man's cell, but the abbey proper was not founded till about 934, the church having been consecrated (it is said by Christ Himself) in 948. In 1274 the dignity of a prince of the Holy Roman Empire was confirmed by the emperor to the reigning abbot. Originally under the protection of the counts of Rapperswil (to which town on the lake of Zürich the old pilgrims' way still leads over the Etzel Pass, 3146 ft., with its chapel and inn), this position passed by marriage with their heiress in 1295 to the Laufenburg or cadet line of the Habsburgs, but from 1386 was permanently occupied by Schwyz. A black wooden image of the Virgin and the fame of St Meinrad caused the throngs of pilgrims to resort to Einsiedeln in the middle ages, and even now it is much frequented, particularly about the 14th of September. The existing buildings date from the 18th century only, while the treasury and the library still contain many precious objects, despite the sack by the French in 1798. There are now about 100 fully professed monks, who direct several educational institutions. The Black Virgin has a special chapel in the stately church. Zwingli was the parish priest of Einsiedeln 1516–1518 (before he became a Protestant), while near the town Paracelsus (1493–1541), the celebrated philosopher, was born.

See Father O. Ringholz, *Geschichte d. fürstl. Benediktinerstiftes Einsiedeln*, vol. i. (to 1526), (Einsiedeln, 1904). (W. A. B. C.)

EISENACH, a town of Germany, second capital of the grand-duchy of Saxe-Weimar-Eisenach, lies at the north-west foot of the Thuringian forest, at the confluence of the Nesse and Hörsel, 32 m. by rail W. from Erfurt. Pop. (1905) 35,123. The town mainly consists of a long street, running from east to west. Off this are the market square, containing the grand-ducal palace, built in 1742, where the duchess Hélène of Orleans long resided, the town-hall, and the late Gothic St Georgenkirche; and the square on which stands the Nikolaikirche, a fine Romanesque building, built about 1150 and restored in 1887. Noteworthy are also the Klemda, a small castle dating from 1260; the Lutherhaus, in which the reformer stayed with the Cotta family in 1498; the house in which Sebastian Bach was born, and that (now a museum) in which Fritz Reuter lived (1863–1874). There are monuments to the two former in the town, while the resting-place of the latter in the cemetery is marked by a less pretentious memorial. Eisenach has a school of forestry, a school of design, a classical school (*Gymnasium*) and modern school (*Realgymnasium*), a deaf and dumb school, a teachers' seminary, a theatre and a Wagner museum. The most important industries of the town are worsted-spinning, carriage and wagon building, and the making of colours and pottery. Among others are the manufacture of cigars, cement pipes, iron-ware and machines, alabaster ware, shoes, leather, &c., cabinet-making, brewing, granite quarrying and working, tile-making, and saw- and corn-milling.

The natural beauty of its surroundings and the extensive forests of the district have of late years attracted many summer residents. Magnificently situated on a precipitous hill, 600 ft. above the town to the south, is the historic Wartburg (*q.v.*), the ancient castle of the landgraves of Thuringia, famous as the scene of the contest of Minnesingers immortalized in Wagner's Tannhäuser, and as the place where Luther, on his return from the diet of Worms in 1521, was kept in hiding and made his translation of the Bible. On a high rock adjacent to the Wartburg are the ruins of the castle of Mädelstein.

Eisenach (*Isenacum*) was founded in 1070 by Louis II. the Springer, landgrave of Thuringia, and its history during the middle ages was closely bound up with that of the Wartburg, the seat of the landgraves. The Klemda, mentioned above, was built by Sophia (d. 1284), daughter of the landgrave Louis IV, and wife of Duke Henry II. of Brabant, to defend the town against Henry III., margrave of Meissen, during the succession contest that followed the extinction of the male line of the Thuringian landgraves in 1247. The principality of Eisenach fell to the Saxon house of Wettin in 1440, and in the partition of 1485 formed part of the territories given to the Ernestine line. It was a separate Saxon duchy from 1596 to 1638, from 1640 to 1644, and again from 1662 to 1741, when it finally fell to Saxe-Weimar. The town of Eisenach, by reason of its associations, has been a favourite centre for the religious propaganda of Evangelical Germany, and since 1852 it has been the scene of the annual conference of the German Evangelical Church, known as the Eisenach conference.

See Trinius, *Eisenach und Umgebung* (Minden, 1900); and H. A. Daniel, *Deutschland* (Leipzig, 1895), and further references in U. Chevalier, "Répertoire des sources," &c., *Topo-bibliogr.* (Montbéliard, 1894–1899), s.v.

EISENBERG (*Isenberg*), a town of Germany, in the duchy of Saxe-Altenburg, on a plateau between the rivers Saale and Elster, 20 m. S.W. from Zeitz, and connected with the railway Leipzig-Gera by a branch to Crossen. Pop. (1905) 8824. It possesses an old castle, several churches, and monuments to Duke Christian of Saxe-Eisenberg (d. 1707), Bismarck, and the philosopher Karl Christian Friedrich Krause (*q.v.*). Its principal industries are weaving, and the manufacture of machines, ovens, furniture, pianos, porcelain and sausages.

See Back, *Chronik der Stadt und des Amtes Eisenberg* (Eisenb., 1843).

EISENERZ ("Iron ore"), a market-place and old mining town in Styria, Austria, 68 m. N.W. of Graz by rail. Pop. (1900) 6494. It is situated in a deep valley, dominated on the east by the Pfaffenstein (6140 ft.), on the west by the Kaiserschild (6830 ft.), and on the south by the Erzberg (5030 ft.). It has an interesting example of a medieval fortified church, a Gothic edifice founded by Rudolph of Habsburg in the 13th century and rebuilt in the 16th. The Erzberg or Ore Mountain furnishes such rich ore that it is quarried in the open air like stone, in the summer months. There is documentary evidence of the mines having been worked as far back as the 12th century. They afford employment to two or three thousand hands in summer and about half as many in winter, and yield some 800,000 tons of iron per annum. Eisenerz is connected with the mines by the Erzberg railway, a bold piece of engineering work, 14 m. long, constructed on the Abt's rack-and-pinion system. It passes through some beautiful scenery, and descends to Vordernberg (pop. 3111), an important centre of the iron trade situated on the south side of the Erzberg. Eisenerz possesses, in addition, twenty-five furnaces, which produce iron, and particularly steel, of exceptional excellence. A few miles to the N.W. of Eisenerz lies the castle of Leopoldstein, and near it the beautiful Leopoldsteiner Lake. This lake, with its dark-green water, situated at an altitude of 2028 ft., and surrounded on all sides by high peaks, is not big, but is very deep, having a depth of 520 ft.

EISLEBEN (Lat. *Islebia*), a town of Germany, in the Prussian province of Saxony, 24 m. W. by N. from Halle, on the railway to Nordhausen and Cassel. Pop. (1905) 23,898. It is divided into an old and a new town (Altstadt and Neustadt). Among its principal buildings are the church of St Andrew (Andreaskirche), which contains numerous monuments of the counts of Mansfeld; the church of St Peter and St Paul (Peter-Paulkirche), containing the font in which Luther was baptized; the royal gymnasium (classical school), founded by Luther shortly before his death in 1546; and the hospital. Eisleben is celebrated as the place where Luther was born and died. The house in which he was born was burned in 1689, but was rebuilt in 1693 as a free school for orphans. This school fell into decay under the régime of the kingdom of Westphalia, but was restored in 1817 by King Frederick William III. of Prussia, who, in 1819, transferred it to a new building behind the old house. The house in which Luther died was restored towards the end of the 19th century, and his death chamber is still preserved. A bronze statue of Luther by Rudolf Siemering (1835–1905) was unveiled in 1883. Eisleben has long been the centre of an important mining district (Luther was a miner's son), the principal products being silver and copper. It possesses smelting works and a school of mining.

The earliest record of Eisleben is dated 974. In 1045, at which time it belonged to the counts of Mansfeld, it received the right to hold markets, coin money, and levy tolls. From 1531 to 1710 it was the seat of the cadet line of the counts of Mansfeld-Eisleben. After the extinction of the main line of the counts of Mansfeld, Eisleben fell to Saxony, and, in the partition of Saxony by the congress of Vienna in 1815, was assigned to Prussia.

See G. Grössler, *Urkundliche Gesch. Eislebens bis zum Ende des 12. Jahrhunderts* (Halle, 1875); *Chronicon Islebiense; Eisleben Stadtchronik aus den Jahren 1520–1738*, edited from the original, with notes by Grössler and Sommer (Eisleben, 1882).

EISTEDDFOD (plural Eisteddfodau), the national bardic congress of Wales, the objects of which are to encourage bardism and music and the general literature of the Welsh, to maintain the Welsh language and customs of the country, and to foster and cultivate a patriotic spirit amongst the people. This institution, so peculiar to Wales, is of very ancient origin.[1] The term *Eisteddfod*, however, which means "a session" or "sitting," was probably not applied to bardic congresses before the 12th century.

The Eisteddfod in its present character appears to have originated in the time of Owain ap Maxen Wledig, who at the close of the 4th century was elected to the chief sovereignty of the Britons on the departure of the Romans. It was at this time, or soon afterwards, that the laws and usages of the Gorsedd were codified and remodelled, and its motto of "Y gwir yn erbyn y byd" (The truth against the world) given to it. "Chairs" (with which the Eisteddfod as a national institution is now inseparably connected) were also established, or rather perhaps resuscitated, about the same time. The chair was a kind of convention where disciples were trained, and bardic matters discussed preparatory to the great Gorsedd, each chair having a distinctive motto. There are now existing four chairs in Wales,—namely, the "royal" chair of Powys, whose motto is "A laddo a leddir" (He that slayeth shall be slain); that of Gwent and Glamorgan, whose motto is "Duw a phob daioni" (God and all goodness), that of Dyfed, whose motto is "Calon wrth galon" (Heart with heart), and that of Gwynedd, or North Wales, whose motto is "Iesu," or "O Iesu! na'd gamwaith" (Jesus, or Oh Jesus! suffer not iniquity).

The first Eisteddfod of which any account seems to have descended to us was one held on the banks of the Conway in the 6th century, under the auspices of Maelgwn Gwynedd, prince of North Wales. Maelgwn on this occasion, in order to prove the superiority of vocal song over instrumental music, is recorded to have offered a reward to such bards and minstrels as should swim over the Conway. There were several competitors, but on their arrival on the opposite shore the harpers found themselves unable to play owing to the injury their harps had sustained from the water, while the bards were in as good tune as ever. King Cadwaladr also presided at an Eisteddfod about the middle of the 7th century

Griffith ap Cynan, prince of North Wales, who had been born in Ireland, brought with him from that country many Irish musicians, who greatly improved the music of Wales. During his long reign of 56 years he offered great encouragement to bards, harpers and minstrels, and framed a code of laws for their better regulation. He held an Eisteddfod about the beginning of the 12th century at Caerwys in Flintshire, "to which there repaired all the musicians of Wales, and some also from England and Scotland." For many years afterwards the Eisteddfod appears to have been held triennially, and to have enforced the rigid observance of the enactments of Griffith ap Cynan. The places at which it was generally held were Aberffraw, formerly the royal seat of the princes of North Wales; Dynevor, the royal castle of the princes of South Wales; and Mathrafal, the royal palace of the princes of Powys; and in later times

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[1] According to the Welsh Triads and other historical records, the *Gorsedd* or assembly (an essential part of the modern Eisteddfod, from which indeed the latter sprung) is as old at least as the time of Prydain the son of Ædd the Great, who lived many centuries before the Christian era. Upon the destruction of the political ascendancy of the Druids, the Gorsedd lost its political importance, though it seems to have long afterwards retained its institutional character as the medium for preserving the laws, doctrines and traditions of bardism.

Caerwys in Flintshire received that honourable distinction, it having been the princely residence of Llewelyn the Last. Some of these Eisteddfodau were conducted in a style of great magnificence, under the patronage of the native princes. At Christmas 1107 Cadwgan, the son of Bleddyn ap Cynfyn, prince of Powys, held an Eisteddfod in Cardigan Castle, to which he invited the bards, harpers and minstrels, "the best to be found in all Wales"; and "he gave them chairs and subjects of emulation according to the custom of the feasts of King Arthur." In 1176 Rhys ab Gruffydd, prince of South Wales, held an Eisteddfod in the same castle on a scale of still greater magnificence, it having been proclaimed, we are told, a year before it took place, "over Wales, England, Scotland, Ireland and many other countries."

On the annexation of Wales to England, Edward I. deemed it politic to sanction the bardic Eisteddfod by his famous statute of Rhuddlan. In the reign of Edward III. Ifor Hael, a South Wales chieftain, held one at his mansion. Another was held in 1451, with the permission of the king, by Griffith ab Nicholas at Carmarthen, in princely style, where Dafydd ab Edmund, an eminent poet, signalized himself by his wonderful powers of versification in the Welsh metres, and whence "he carried home on his shoulders the silver chair" which he had fairly won. Several Eisteddfodau, were held, one at least by royal mandate, in the reign of Henry VII. In 1523 one was held at Caerwys before the chamberlain of North Wales and others, by virtue of a commission issued by Henry VIII. In the course of time, through relaxation of bardic discipline, the profession was assumed by unqualified persons, to the great detriment of the regular bards. Accordingly in 1567 Queen Elizabeth issued a commission for holding an Eisteddfod at Caerwys in the following year, which was duly held, when degrees were conferred on 55 candidates, including 20 harpers. From the terms of the royal proclamation we find that it was then customary to bestow "a silver harp" on the chief of the faculty of musicians, as it had been usual to reward the chief bard with "a silver chair." This was the last Eisteddfod appointed by royal commission, but several others of some importance were held during the 16th and 17th centuries, under the patronage of the earl of Pembroke, Sir Richard Neville, and other influential persons. Amongst these the last of any particular note was one held in Bewper Castle, Glamorgan, by Sir Richard Basset in 1681.

During the succeeding 130 years Welsh nationality was at its lowest ebb, and no general Eisteddfod on a large scale appears to have been held until 1819, though several small ones were held under the auspices of the Gwyneddigion Society, established in 1771,—the most important being those at Corwen (1789), St Asaph (1790) and Caerwys (1798).

At the close of the Napoleonic wars, however, there was a general revival of Welsh nationality, and numerous Welsh literary societies were established throughout Wales, and in the principal English towns. A large Eisteddfod was held under distinguished patronage at Carmarthen in 1819, and from that time to the present they have been held (together with numerous local Eisteddfodau), almost without intermission, annually. The Eisteddfod at Llangollen in 1858 is memorable for its archaic character, and the attempts then made to revive the ancient ceremonies, and restore the ancient vestments of druids, bards and ovates.

To constitute a provincial Eisteddfod it is necessary that it should be proclaimed by a graduated bard of a Gorsedd a year and a day before it takes place. A local one may be held without such a proclamation. A provincial Eisteddfod generally lasts three, sometimes four days. A president and a conductor are appointed for each day. The proceedings commence with a Gorsedd meeting, opened with sound of trumpet and other ceremonies, at which candidates come forward and receive bardic degrees after satisfying the presiding bard as to their fitness. At the subsequent meetings the president gives a brief address; the bards follow with poetical addresses; adjudications are made, and prizes and medals with suitable devices are given to the successful competitors for poetical, musical and prose compositions, for the best choral and solo singing, and singing with the harp or "Pennillion singing"[1] as it is called, for the best playing on the harp or stringed or wind instruments, as well as occasionally for the best specimens of handicraft and art. In the evening of each day a concert is given, generally attended by very large numbers. The great day of the Eisteddfod is the "chair" day—usually the third or last day—the grand event of the Eisteddfod being the adjudication on the chair subject, and the chairing and investiture of the fortunate winner. This is the highest object of a Welsh bard's ambition. The ceremony is an imposing one, and is performed with sound of trumpet. (See also the articles BARD, CELT: *Celtic Literature*, and WALES.) (R. W.*)

EJECTMENT (Lat. *e*, out, and *jacere*, to throw), in English law, an action for the recovery of the possession of land, together with damages for the wrongful withholding thereof. In the old classifications of actions, as real or personal, this was known as a mixed action, because its object was twofold, viz. to recover both the realty and personal damages. It should be noted that the term "ejectment" applies in law to distinct classes of proceedings—ejectments as between rival claimants to land, and ejectments as between those who hold, or have held, the relation of landlord and tenant. Under the Rules of the Supreme Court, actions in England for the recovery of land are commenced and proceed in the same manner as ordinary actions. But the historical interest attaching to the action of ejectment is so great as to render some account of it necessary.

The form of the action as it prevailed in the English courts down to the Common Law Procedure Act 1852 was a series of fictions, among the most remarkable to be found in the entire body of English law. A, the person claiming title to land, delivered to B, the person in possession, a declaration in ejectment in which C and D, fictitious persons, were plaintiff and defendant. C stated that A had devised the land to him for a term of years, and that he had been ousted by D. A notice signed by D informed B of the proceedings, and advised him to apply to be made defendant in D's place, as he, D, having no title, did not intend to defend the suit. If B did not so apply, judgment was given against D, and possession of the lands was given to A. But if B did apply, the Court allowed him to defend the action only on condition that he admitted the three fictitious averments—the lease, the entry and the ouster—which, together with title, were the four things necessary to maintain an action of ejectment. This having been arranged the action proceeded, B being made defendant instead of D. The names used for the fictitious parties were John Doe, plaintiff, and Richard Roe, defendant, who was called "the casual ejector." The explanation of these mysterious fictions is this. The writ *de ejectione firmae* was invented about the beginning of the reign of Edward III. as a remedy to a lessee for years who had been ousted of his term. It was a writ of trespass, and carried damages, but in the time of Henry VII., if not before that date, the courts of common law added thereto a species of remedy neither warranted by the original writ nor demanded by the declaration, viz. a judgment to recover so much of the term as was still to run, and a writ of possession thereupon. The next step was to extend the remedy—limited originally to leaseholds—to cases of disputed title to freeholds. This was done indirectly by the claimant entering on the land and there making a lease for a term of years to another person; for it was only a term that could be recovered by the action, and to create a term required actual possession in the granter. The lessee remained on the land, and the next person who entered even by chance was accounted an ejector of the lessee, who then served upon him a writ of trespass and ejectment. The case then went to trial as on a common action of trespass; and the claimant's title, being the real foundation of the lessee's right, was thus indirectly determined. These proceedings might take place without the knowledge of the person really in possession; and to prevent the abuse of the action a rule was laid down that the plaintiff in ejectment must give notice to the party in possession, who might then come in and defend the action. When the action came into general use as a mode of trying the title to freeholds, the actual entry, lease and ouster which were necessary to found the action were attended with much inconvenience, and accordingly Lord Chief Justice Rolle during the Protectorate (*c.* 1657) substituted for them the fictitious averments already described. The action of ejectment is now only a curiosity of legal history. Its fictitious suitors were swept away by the Common Law Procedure Act of 1852. A form of writ was prescribed, in which the person in possession of the disputed premises by name and all persons entitled to defend the possession were informed that the plaintiff claimed to be entitled to possession, and required to appear in court to defend the possession of the property or such part of it as they should think fit. In the form of the writ and in some other respects ejectment still differed from other actions. But, as already mentioned, it has now been assimilated (under the name of action for the recovery of lands) to ordinary actions by the Rules of the Supreme Court. It is commenced by writ of summons, and—subject to the rules as to summary judgments (*v. inf.*)—proceeds along the usual course of pleadings and trial to judgment; but is subject to one special rule, viz: that except by leave of the Court or a judge the only claims which may be joined with one for recovery of land are claims in respect of arrears of rent or double value for holding over, or mesne profits (*i.e.* the value of the land during the period of illegal possession), or damages for breach of a contract under which the premises are held or for any wrong or injury to the premises claimed (R.S.C., O. xviii. r. 2). These claims were formerly recoverable by an independent action.

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[1] According to Jones's *Bardic Remains*, "To sing 'Pennillion with a Welsh harp is not so easily accomplished as may be imagined. The singer is obliged to follow the harper, who may change the tune, or perform variations *ad libitum*, whilst the vocalist must keep time, and end precisely with the strain. The singer does not commence with the harper, but takes the strain up at the second, third or fourth bar, as best suits the 'pennill' he intends to sing. . . Those are considered the best singers who can adapt stanzas of various metres to one melody, and who are acquainted with the twenty-four measures according to the bardic laws and rules of composition."

With regard to actions for the recovery of land—apart from the relationship of landlord and tenant—the only point that need be noted is the presumption of law in favour of the actual possessor of the land in dispute. Where the action is brought by a landlord against his tenant, there is of course no presumption against the landlord's title arising from the tenant's possession. By the Common Law Procedure Act 1852 (ss. 210-212) special provision was made for the prompt recovery of demised premises where half a year's rent was in arrear and the landlord was entitled to re-enter for non-payment. These provisions are still in force, but advantage is now more generally taken of the summary judgment procedure introduced by the Rules of the Supreme Court (Order 3, r. 6.). This procedure may be adopted when (*a*) the tenant's term has expired, (*b*) or has been duly determined by notice to quit, or (*c*) has become liable to forfeiture for non-payment of rent, and applies not only to the tenant but to persons claiming under him. The writ is specially endorsed with the plaintiff's claim to recover the land with or without rent or mesne profits, and summary judgment obtained if no substantial defence is disclosed. Where an action to recover land is brought against the tenant by a person claiming adversely to the landlord, the tenant is bound, under penalty of forfeiting the value of three years' improved or rack rent of the premises, to give notice to the landlord in order that he may appear and defend his title. Actions for the recovery of land, other than land belonging to spiritual corporations and to the crown, are barred in 12 years (Real Property Limitation Acts 1833 (s. 29) and 1874 (s. 1). A landlord can recover possession in the county court (i.) by an action for the recovery of possession, where neither the value of the premises nor the rent exceeds £100 a year, and the tenant is holding over (County Courts Acts of 1888, s. 138, and 1903, s. 3); (ii.) by "an action of ejectment," where (*a*) the value or rent of the premises does not exceed £100, (*b*) half a year's rent is in arrear, and (*c*) no sufficient distress (see Rent) is to be found on the premises (Act of 1888, s. 139; Act of 1903, s. 3; County Court Rules 1903, Ord. v. rule 3). Where a tenant at a rent not exceeding £20 a year of premises at will, or for a term not exceeding 7 years, refuses nor neglects, on the determination or expiration of his interest, to deliver up possession, such possession may be recovered by proceedings before justices under the Small Tenements Recovery Act 1838, an enactment which has been extended to the recovery of allotments. Under the Distress for Rent Act 1737, and the Deserted Tenements Act 1817, a landlord can have himself put by the order of two justices into premises deserted by the tenant where half a year's rent is owing and no sufficient distress can be found.

In *Ireland*, the practice with regard to the recovery of land is regulated by the Rules of the Supreme Court 1891, made under the Judicature (Ireland) Act 1877; and resembles that of England. Possession may be recovered summarily by a special indorsement of the writ, as in England; and there are analogous provisions with regard to the recovery of small tenements (see Land Act, 1860 ss. 84 and 89). The law with regard to the ejectment or eviction of tenants is consolidated by the Land Act 1860. (See ss. 52-66, 68-71, and further under Landlord and Tenant.)

In *Scotland*, the recovery of land is effected by an action of "removing" or summary ejection. In the case of a tenant "warning" is necessary unless he is bound by his lease to remove without warning. In the case of possessors without title, or a title merely precarious, no warning is needed. A summary process of removing from small holdings is provided for by Sheriff Courts (Scotland) Acts of 1838 and 1851.

In the United States, the old English action of ejectment was adopted to a very limited extent, and where it was so adopted has often been superseded, as in Connecticut, by a single action for all cases of ouster, disseisin or ejectment. In this action, known as an action of disseisin or ejectment, both possession of the land and damages may be recovered. In some of the states a tenant against whom an action of ejectment is brought by a stranger is bound under a penalty, as in England, to give notice of the claim to the landlord in order that he may appear and defend his title.

In *French law* the landlord's claim for rent is fairly secured by the hypothec, and by summary powers which exist for the seizure of the effects of defaulting tenants. Eviction or annulment of a lease can only be obtained through the judicial tribunals. The Civil Code deals with the position of a tenant in case of the sale of the property leased. If the lease is by authentic act (*acte authentique*) or has an ascertained date, the purchaser cannot evict the tenant unless a right to do so was reserved on the lease (art. 1743), and then only on payment of an indemnity (arts. 1744-1747). If the lease is not by authentic act, or has not an ascertained date, the purchaser is not liable for indemnity (art. 1750). The tenant of rural lands is bound to give the landlord notice of acts of usurpation (art. 1768). There are analogous provisions in the Civil Codes of Belgium (arts. 1743 et seq.), Holland (arts. 1613, 1614), Portugal (art. 1572); and see the German Civil Code (arts. 535 et seq.). In many of the colonies there are statutory provisions for the recovery of land or premises on the lines of English law (cf. Ontario, Rev. Stats. 1897, c. 170. ss. 19 et seq.; Manitoba, Rev. Stats. 1902, c. 1903). In others (*e.g.* New Zealand, Act. No. 55 of 1893, ss. 175-187; British Columbia, Revised Statutes, 1897, c. 182; Cyprus, Ord. 15 of 1895) there has been legislation similar to the Small Tenements Recovery Act 1838.

Authorities.—*English Law*: Cole on *Ejectment*; Digby, *History of Real Property* (3rd ed., London, 1884); Pollock and Maitland, *History of English Law* (Cambridge, 1895); Foa, *Landlord and Tenant* (4th ed., London, 1907); Fawcett, *Landlord and Tenant* (London, 1905). *Irish Law*: Nolan and Kane's *Statutes relating to the Law of Landlord and Tenant* (5th ed., Dublin, 1898); Wylie's *Judicature Acts* (Dublin, 1900). *Scots Law*: Hunter on *Landlord and Tenant* (4th ed., Edin., 1878); Erskine's *Principles* (20th ed., Edin., 1903). *American Law*: *Two Centuries' Growth of American Law* (New York and London, 1901); Bouvier's *Law Dictionary* (Boston and London, 1897); Stimson, *American Statute Law* (Boston, 1886). (A. W. R.)

EKATERINBURG, a town of Russia, in the government of Perm, 311 m. by rail S.E. of the town of Perm, on the Iset river, near the E. foot of the Ural Mountains, in 56° 49′ N. and

60° 35′ E., at an altitude of 870 ft. above sea-level. It is the most important town of the Urals. Pop. (1860) 19,830; (1897) 55,488. The streets are broad and regular, and several of the houses of palatial proportions. In 1834 Ekaterinburg was made the see of a suffragan bishop of the Orthodox Greek Church. There are two cathedrals—St Catherine's, founded in 1758, and that of the Epiphany, in 1774—and a museum of natural history, opened in 1853. Ekaterinburg is the seat of the central mining administration of the Ural region, and has a chemical laboratory for the assay of gold, a mining school, the Ural Society of Naturalists, and a magnetic and meteorological observatory. Besides the government mint for copper coinage, which dates from 1735, the government engineering works, and the imperial factory for the cutting and polishing of malachite, jasper, marble, porphyry and other ornamental stones, the industrial establishments comprise candle, paper, soap and machinery works, flour and woollen mills, and tanneries. There is a lively trade in cattle, cereals, iron, woollen and silk goods, and colonial products; and two important fairs are held annually. Nearly forty gold and platinum mines, over thirty iron-works, and numerous other factories are scattered over the district, while wheels, travelling boxes, hardware, boots and so forth are extensively made in the villages. Ekaterinburg took its origin from the mining establishments founded by Peter the Great in 1721, and received its name in honour of his wife, Catherine I. Its development was greatly promoted in 1763 by the diversion of the Siberian highway from Verkhoturye to this place.

EKATERINODAR, a town of South Russia, chief town of the province of Kubañ, on the right bank of the river Kubañ, 85 m. E.N.E. of Novo-rossiysk on the railway to Rostov-on-Don, and in 45° 3′ N. and 38° 50′ E. It is badly built, on a swampy site exposed to the inundations of the river; and its houses, with few exceptions, are slight structures of wood and plaster. Founded by Catherine II. in 1794 on the site of an old town called Tmutarakan, as a small fort and Cossack settlement, its population grew from 9620 in 1860 to 65,697 in 1897. It has various technical schools, an experimental fruit-farm, a military hospital, and a natural history museum. A considerable trade is carried on, especially in cereals.

EKATERINOSLAV, a government of south Russia, having the governments of Poltava and Kharkov on the N., the territory of the Don Cossacks on the E., the Sea of Azov and Taurida on the S., and Kherson on the W. Area, 24,478 sq. m. Its surface is undulating steppe, sloping gently south and north, with a few hills reaching 1200 ft. in the N.E., where a slight swelling (the Don Hills) compels the Don to make a great curve eastwards. Another chain of hills, to which the eastward bend of the Dnieper is due, rises in the west. These hills have a crystalline core (granites, syenites and diorites), while the surface strata belong to the Carboniferous, Permian, Cretaceous and Tertiary formations. The government is rich in minerals, especially in coal—the mines lie in the middle of the Donets coalfield—iron ores, fireclay and rock-salt, and every year the mining output increases in quantity, especially of coal and iron. Granite, limestone, grindstone, slate, with graphite, manganese and mercury are found. The government is drained by the Dnieper, the Don and their tributaries (*e.g.* the Donets and Volchya) and by several affluents (*e.g.* the Kalmius) of the Sea of Azov. The soil is the fertile black earth, but the crops occasionally suffer from drought, the average annual rainfall being only 15 in. Forests are scarce. Pop. (1860) 1,138,750; (1897) 2,118,946, chiefly Little Russians, with Great Russians, Greeks (48,740), Germans (80,979), Rumanians and a few gypsies. Jews constitute 4·7% of the population. The estimated population in 1906 was 2,708,700.

Wheat and other cereals are extensively grown; other noteworthy crops are potatoes, tobacco and grapes. Nearly 40,000 persons find occupation in factories, the most imporant being iron-works and agricultural machinery works, though there are also tobacco, glass, soap and candle factories, potteries, tanneries and breweries. In the districts of Mariupol the making of agricultural implements and machinery is carried on extensively as a domestic industry in the villages. Bees are kept in very considerable numbers. Fishing employs many persons in the Don and the Dnieper. Cereals are exported in large quantities via the Dnieper, the Sevastopol railway, and the port of Mariupol. The chief towns of the eight districts, with their populations in 1897, are Ekaterinoslav (135,552 inhabitants in 1900), Alexandrovsk (28,434), Bakhmut (30,585), Mariupol (31,772), Novomoskovsk (12,862), Pavlograd (17,188), Slavyanoserbsk (3120), and Verkhne-dnyeprovsk (11,607).

EKATERINOSLAV, a town of Russia, capital of the government of the same name, on the right bank of the Dnieper above the rapids, 673 m. by rail S.S.W. of Moscow, in 48° 21′ N. and 35° 4′ E., at an altitude of 210 ft. Pop. (1861) 18,881, without suburbs; (1900) 135,552. If the suburb of Novyikoindak be included, the town extends for upwards of 4 m. along the river. The oldest part lies very low and is much exposed to floods. Contiguous to the towns on the N.W. is the royal village of Novyimaidani or the New Factories. The bishop's palace, mining academy, archaeological museum and library are the principal public buildings. The house now occupied by the Nobles Club was formerly inhabited by the author and statesman Potemkin. Ekaterinoslav is a rapidly growing city, with a number of technical schools, and is an important depot for timber floated down the Dnieper, and also for cereals. Its iron-works, flour-mills and agricultural machinery works give occupation to over 5000 persons. In fact since 1895 the city has become the centre of numerous Franco-Belgian industrial undertakings. In addition to the branches just mentioned, there are tobacco factories and breweries. Considerable trade is carried on in cattle, cereals, horses and wool, there being three annual fairs. On the site of the city there formerly stood the Polish castle of Koindak, built in 1635, and destroyed by the Cossacks. The existing city was founded by Potemkin in 1786, and in the following year Catherine II. laid the foundation-stone of the cathedral, though it was not actually built until 1830–1835. On the south side of it is a bronze statue of the empress, put up in 1846. Paul I. changed the name of the city to Novo-rossiysk, but the original name was restored in 1802.

EKHOF, KONRAD (1720–1778), German actor, was born in Hamburg on the 12th of August 1720. In 1739 he became a member of Johann Friedrich Schönemann's (1704–1782) company in Lüneburg, and made his first appearance there on the 15th of January 1740 as Xiphares in Racine's *Mithridate*. From 1751 the Schönemann company performed mainly in Hamburg and at Schwerin, where Duke Christian Louis II. of Mecklenburg-Schwerin made them comedians to the court. During this period Ekhof founded a theatrical academy, which, though short-lived, was of great importance in helping to raise the standard of German acting and the status of German actors. In 1757 Ekhof left Schönemann to join Franz Schuch's company at Danzig; but he soon returned to Hamburg, where, in conjunction with two other actors, he succeeded Schönemann in the direction of the company. He resigned this position, however, in favour of H. G. Koch, with whom he acted until 1764, when he joined K. E. Ackermann's company. In 1767 was founded the National Theatre at Hamburg, made famous by Lessing's *Hamburgische Dramaturgie*, and Ekhof was the leading member of the company. After the failure of the enterprise Ekhof was for a time in Weimar, and ultimately became co-director of the new court theatre at Gotha. This, the first permanently established theatre in Germany, was opened on the 2nd of October 1775. Ekhof's reputation was now at its height; Goethe called him the only German tragic actor; and in 1777 he acted with Goethe and Duke Charles Augustus at a private performance at Weimar, dining afterwards with the poet at the ducal table. He died on the 16th of June 1778. His versatility may be judged from the fact that in the comedies of Goldoni and Molière he was no less successful than in the tragedies of Lessing and Shakespeare. He was regarded by his contemporaries as an unsurpassed exponent of naturalness on the stage; and in this respect he has been not unfairly compared with Garrick. His fame, however, was rapidly eclipsed by that of Friedrich U. L.

Schröder. His literary efforts were chiefly confined to translations from French authors.

See H. Uhde, biography of Ekhof in vol. iv. of *Der neue Plutarch* (1876), and J. Rüschner, *K. Ekhofs Leben und Wirken* (1872). Also H. Devrient, *J. F. Schönemann und seine Schauspielergesellschaft* (1895).

EKRON (better, as in the Septuagint and Josephus, Accaron, Ἀκκαρών), a royal city of the Philistines commonly identified with the modern Syrian village of 'Aḳir, 5 m. from Ramleh, on the southern slope of a low ridge separating the plain of Philistia from Sharon. It lay inland and off the main line of traffic. Though included by the Israelites within the limits of the tribe of Judah, and mentioned in Judges xix. as one of the cities of Dan, it was in Philistine possession in the days of Samuel, and apparently maintained its independence. According to the narrative of the Hebrew text, here differing from the Greek text and Josephus (which read Askelon), it was the last town to which the ark was transferred before its restoration to the Israelites. Its maintenance of a sanctuary of Baal Zebub is mentioned in 2 Kings i. From Assyrian inscriptions it has been gathered that Padi, king of Ekron, was for a time the vassal of Hezekiah of Judah, but regained his independence when the latter was hard pressed by Sennacherib. A notice of its history in 147 B.C. is found in 1 Macc. x. 89; after the fall of Jerusalem A.D. 70 it was settled by Jews. At the time of the crusades it was still a large village. Recently a Jewish agricultural colony has been settled there. The houses are built of mud, and in the absence of visible remains of antiquity, the identification of the site is questionable. The neighbourhood is fertile. (R. A. S. M.)

ELABUGA, a town of Russia, in the government of Vyatka, on the Kama river, 201 m. by steamboat down the Volga from Kazan and then up the Kama. It has flour-mills, and carries on a brisk trade in exporting corn. Pop. (1897) 9776.

The famous *Ananiynskiy Mogilnik* (burial-place) is on the right bank of the Kama, 3 m. above the town. It was discovered in 1858, was excavated by Alabin, Lerch and Nevostruyev, and has since supplied extremely valuable collections belonging to the Stone, Bronze and Iron Ages. It consisted of a mound, about 500 ft. in circumference, adorned with decorated stones (which have disappeared), and contained an inner wall, 65 ft. in circumference, made of uncemented stone flags. Nearly fifty skeletons were discovered, mostly lying upon charred logs, surrounded with cinerary urns filled with partially burned bones. A great variety of bronze decorations and glazed clay pearls were strewn round the skeletons. The knives, daggers and arrowpoints are of slate, bronze and iron, the last two being very rough imitations of stone implements. One of the flags bore the image of a man, without moustaches or beard, dressed in a costume and helmet recalling those of the Circassians.

ELAM, the name given in the Bible to the province of Persia called Susiana by the classical geographers, from Susa or Shushan its capital. In one passage, however (Ezra iv. 9), it is confined to Elymais, the north-western part of the province, and its inhabitants distinguished from those of Shushan, which elsewhere (Dan. viii. 2) is placed in Elam. Strabo (xv. 3. 12, &c.) makes Susiana a part of Persia proper, but a comparison of his account with those of Ptolemy (vi. 3. 1, &c.) and other writers would limit it to the mountainous district to the east of Babylonia, lying between the Oroatis and the Tigris, and stretching from India to the Persian Gulf. Along with this mountainous district went a fertile low tract of country on the western side, which also included the marshes at the mouths of the Euphrates and Tigris and the north-eastern coast land of the Gulf. This low tract, though producing large quantities of grain, was intensely hot in summer; the high regions, however, were cool and well watered.

The whole country was occupied by a variety of tribes, speaking agglutinative dialects for the most part, though the western districts were occupied by Semites. Strabo (xi. 13. 3, 6), quoting from Nearchus, seems to include the Susians under the Elymaeans, whom he associates with the Uxii, and places on the frontiers of Persia and Susa; but Pliny more correctly makes the Eulaeus the boundary between Susiana and Elymais (*N.H.* vi. 29-31). The Uxii are described as a robber tribe in the mountains adjacent to Media, and their name is apparently to be identified with the title given to the whole of Susiana in the Persian cuneiform inscriptions, *Uwaja*, *i.e.* "Aborigines." Uwaja is probably the origin of the modern Khuzistan, though Mordtmann would derive the latter from خوز "a sugar-reed." Immediately bordering on the Persians were the Amardians or Mardians, as well as the people of Khapirti (Khatamti, according to Scheil), the name given to Susiana in the Neo-Susian texts. Khapirti appears as Apir in the inscriptions of Mal-Amir, which fix the locality of the district. Passing over the Messabatae, who inhabited a valley which may perhaps be the modern Māh-Sabadan, as well as the level district of Yamutbal or Yatbur which separated Elam from Babylonia, and the smaller districts of Characene, Cabandene, Corbiana and Gabiene mentioned by classical authors, we come to the fourth principal tribe of Susiana, the Cissii (Aesch. *Pers.* 16; Strabo xv. 3. 2) or Cossaei (Strabo xi. 5. 6, xvi. 11. 17; Arr. *Ind.* 40; Polyb. v. 54, &c.), the Kassi of the cuneiform inscriptions. So important were they, that the whole of Susiana was sometimes called Cissia after them, as by Herodotus (iii. 91, v. 49, &c.). In fact Susiana was only a late name for the country, dating from the time when Susa had been made a capital of the Persian empire. In the Sumerian texts of Babylonia it was called Numma, "the Highlands," of which Elamtu or Elamu, "Elam," was the Semitic translation. Apart from Susa, the most important part of the country was Anzan (Anshan, contracted Assan), where the native population maintained itself unaffected by Semitic intrusion. The exact position of Anzan is still disputed, but it probably included originally the site of Susa and was distinguished from it only when Susa became the seat of a Semitic government. In the lexical tablets Anzan is given as the equivalent of Elamtu, and the native kings entitle themselves kings of "Anzan and Susa," as well as "princes of the Khapirti."

The principal mountains of Elam were on the north, called Charbanus and Cambalidus by Pliny (vi. 27, 31), and belonging to the Parachoathras chain. There were numerous rivers flowing into either the Tigris or the Persian Gulf. The most important were the Ulai or Eulaeus (*Kārun*) with its tributary the Pasitigris, the Choaspes (*Kerkhah*), the Coprates (river of *Diz* called Ititē in the inscriptions), the Hedyphon or Hedypnus (*Jerrāhi*), and the Croatis (*Hindyan*), besides the monumental Surappi and Ukni, perhaps to be identified with the Hedyphon and Oroatis, which fell into the sea in the marshy region at the mouth of the Tigris. Shushan or Susa, the capital now marked by the mounds of *Shush*, stood near the junction of the Choaspes and Eulaeus (see Susa); and Badaca, Madaktu in the inscriptions, lay between the *Shapur* and the river of *Diz*. Among the other chief cities mentioned in the inscriptions may be named Naditu, Khaltemas, Din-sar, Bubilu, Bit-imbi, Khidalu and Nagitu on the sea-coast. Here, in fact, lay some of the oldest and wealthiest towns, the sites of which have, however, been removed inland by the silting up of the shore. J. de Morgan's excavations at Susa have thrown a flood of light on the early history of Elam and its relations to Babylon. The earliest settlement there goes back to neolithic times, but it was already a fortified city when Elam was conquered by Sargon of Akkad (3800 B.C.) and Susa became the seat of a Babylonian viceroy. From this time onward for many centuries it continued under Semitic suzerainty, its high-priests, also called "Chief Envoys of Elam, Sippara and Susa," bearing sometimes Semitic, sometimes native "Anzanite" names. One of the kings of the dynasty of Ur built at Susa. Before the rise of the First Dynasty of Babylon, however, Elam had recovered its independence, and in 2280 B.C. the Elamite king Kutur-Nakhkhunte made a raid in Babylonia and carried away from Erech the image of the goddess Nanā. The monuments of many of his successors have been discovered by de Morgan and their inscriptions deciphered by v. Scheil. One of them was defeated by Ammi-zadoq of Babylonia (*c.* 2100 B.C.), another would have been the Chedor-laomer (Kutur-Lagamar) of Genesis xiv. One of the greatest builders among them was Untas-GAL (the pronunciation of the second element in the name is uncertain). About 1330 B.C. Khurba-tila was captured by Kuri-galzu III., the Kassite king of Babylonia, but a later prince Kidin-Khutrutas avenged his defeat, and Sutruk-Nakhkhunte (1220 B.C.) carried fire and sword through Babylonia, slew its king Zamama-sum-iddin and carried away a stela of Naram-Sin and the famous code of laws of Khammurabi from Sippara, as well as a stela of Manistusu from Akkuttum or Akkad. He also conquered the land of Asnunnak and carried off from Padan a stela belonging to a refugee from Malatia. He was succeeded by his son who was followed on the throne by his brother, one of the great builders of Elam. In 750 B.C. Umbadara was king of Elam; Khumban-igas was his successor in 742 B.C. In 720 B.C. the latter prince met the Assyrians under Sargon at Dur-ili in Yamutbal, and though Sargon claims a victory the result was that Babylonia recovered its independence under Merodach-baladan and the Assyrian forces were driven north. From this time forward it was against Assyria instead of Babylonia that Elam found itself compelled to exert its strength, and Elamite policy was directed towards fomenting revolt in Babylonia and assisting the Babylonians in their struggle with Assyria. In 716 B.C. Khumban-igas died and was followed by his nephew, Sutruk-Nakhkhunte. He failed to make head against the Assyrians; the frontier cities were taken by Sargon and Merodach-baladan was left to his fate. A few years later (704 B.C.) the combined forces of Elam and Babylonia were overthrown at Kis, and in the following year the Kassites were reduced to subjection. The Elamite king was dethroned and imprisoned in 700 B.C. by his brother Khallusu, who six years later marched into Babylonia, captured the son of Sennacherib, whom his father had placed there as king, and raised a nominee of his own, Nergal-yusezib, to the throne. Khallusu was murdered in 694 B.C., after seeing the maritime part of his dominions invaded by the Assyrians. His successor Kudur-Nakhkhunte invaded Babylonia; he was repulsed, however, by Sennacherib, 34 of his cities were destroyed, and he himself fled from Madaktu to Khidalu. The result was a revolt in which he was killed after a reign of ten months. His brother Umman-menan at once collected allies and prepared for resistance to the Assyrians. But the terrible defeat at Khalulē broke his power; he was attacked by paralysis shortly afterwards, and Khumba-Khaldas II. followed him on the throne (689 B.C.). The new king endeavoured to gain Assyrian favour by putting to death the son of Merodach-baladan, but was himself murdered by his brothers Urtaki and Teumman (681 B.C.), the first of whom seized the crown. On his death Teumman succeeded and almost immediately provoked a quarrel with Assur-bani-pal by demanding the surrender of his nephews who had taken refuge at the Assyrian court. The Assyrians pursued the Elamite army to Susa, where a battle was fought on the banks of the Eulaeus, in which the Elamites were defeated, Teumman captured and slain, and Umman-igas, the son of Urtaki, made king, his younger brother Tammaritu being given the district of Khidalu. Umman-igas afterwards assisted in the revolt of Babylonia under Samas-sum-yukin, but his nephew, a second Tammaritu, raised a rebellion against him, defeated him in battle, cut off his head and seized the crown. Tammaritu marched to Babylonia; while there, his officer Inda-bigas made himself master of Susa and drove Tammaritu to the coast whence he fled to Assur-bani-pal. Inda-bigas was himself overthrown and slain by a new pretender, Khumba-Khaldas III., who was opposed, however, by three other rivals, two of whom maintained themselves in the mountains until the Assyrian conquest of the country, when Tammaritu was first restored and then imprisoned, Elam being utterly devastated. The return of Khumba-Khaldas led to a fresh Assyrian invasion; the Elamite king fled from Madaktu to Dur-undasi; Susa and other cities were taken, and the Elamite army almost exterminated on the banks of the Ititē. The whole country was reduced to a desert, Susa was plundered and razed to the ground, the royal sepulchres were desecrated, and the images of the gods and of 32 kings "in silver, gold, bronze and alabaster," were carried away. All this must have happened about 640 B.C. After the fall of the Assyrian empire Elam was occupied by the Persian Teispes, the forefather of Cyrus, who, accordingly, like his immediate successors, is called in the inscriptions "king of Anzan." Susa once more became a capital, and on the establishment of the Persian empire remained one of the three seats of government, its language, the Neo-Susian, ranking with the Persian of Persepolis and the Semitic of Babylon as an official tongue. In the reign of Darius, however, the Susianians attempted to revolt, first under Assina or Atrina, the son of Umbadara, and later under Martiya, the son of Issainsakria, who called himself Immanes; but they gradually became completely Aryanized, and their agglutinative dialects were supplanted by the Aryan Persian from the south-east.

Elam, "the land of the cedar-forest," with its enchanted trees, figured largely in Babylonian mythology, and one of the adventures of the hero Gilgamesh was the destruction of the tyrant Khumbaba who dwelt in the midst of it. A list of the Elamite deities is given by Assur-bani-pal; at the head of them was In-Susinak, "the lord of the Susians,"—a title which went back to the age of Babylonian suzerainty,—whose image and oracle were hidden from the eyes of the profane. Nakhkhunte, according to Scheil, was the Sun-goddess, and Lagamar, whose name enters into that of Chedorlaomer, was borrowed from Semitic Babylonia.

See W. K. Loftus, *Chaldaea and Susiana* (1857); A. Billerbeck, *Susa* (1893); J de Morgan, *Mémoires de la Délégation en Perse* (9 vols., 1899–1906). (A. H. S.)

ELAND (=elk), the Dutch name for the largest of the South African antelopes (*Taurotragus oryx*), a species near akin to the kudu, but with horns present in both sexes, and their spiral much closer, being in fact screw-like instead of corkscrew-like. There is also a large dewlap, while old bulls have a thick forelock. In the typical southern form the body-colour is wholly pale fawn, but north of the Orange river the body is marked by narrow vertical white lines, this race being known as *T. oryx livingstonei*. In Senegambia the genus is represented by *T. derbianus*, a much larger animal, with a dark neck; while in the Bahr-el-Ghazal district there is a gigantic local race of this species (*T. derbianus giganteus*). (R. L.*)

ELASTICITY. 1. Elasticity is the property of recovery of an original size or shape. A body of which the size, or shape, or both size and shape, have been altered by the application of forces may, and generally does, tend to return to its previous size and shape when the forces cease to act. Bodies which exhibit this tendency are said to be *elastic* (from Greek, ἐλαύνειν, to drive). All bodies are more or less elastic as regards size; and all solid bodies are more or less elastic as regards shape. For example: gas contained in a vessel, which is closed by a piston, can be compressed by additional pressure applied to the piston; but, when the additional pressure is removed, the gas expands and drives the piston outwards. For a second example: a steel bar hanging vertically, and loaded with one ton for each square inch of its sectional area, will have its length increased by about seven one-hundred-thousandths of itself, and its sectional area diminished by about half as much; and it will spring back to its original length and sectional area when the load is gradually removed. Such changes of size and shape in bodies subjected to forces, and the recovery of the original size and shape when the forces cease to act, become conspicuous when the bodies have the forms of thin wires or planks; and these properties of bodies in such forms are utilized in the construction of spring balances, carriage springs, buffers and so on.

It is a familiar fact that the hair-spring of a watch can be coiled and uncoiled millions of times a year for several years without losing its elasticity; yet the same spring can have its shape permanently altered by forces which are much greater than those to which it is subjected in the motion of the watch. The incompleteness of the recovery from the effects of great forces is as important a fact as the practical completeness of the recovery from the effects of comparatively small forces.

The fact is referred to in the distinction between "perfect" and "imperfect" elasticity; and the limitation which must be imposed upon the forces in order that the elasticity may be perfect leads to the investigation of "limits of elasticity" (see §§ 31, 32 below). Steel pianoforte wire is perfectly elastic within rather wide limits, glass within rather narrow limits; building stone, cement and cast iron appear not to be perfectly elastic within any limits, however narrow. When the limits of elasticity are not exceeded no injury is done to a material or structure by the action of the forces. The strength or weakness of a material, and the safety or insecurity of a structure, are thus closely related to the elasticity of the material and to the change of size or shape of the structure when subjected to forces. The "science of elasticity" is occupied with the more abstract side of this relation, viz. with the effects that are produced in a body of definite size, shape and constitution by definite forces; the "science of the strength of materials" is occupied with the more concrete side, viz. with the application of the results obtained in the science of elasticity to practical questions of strength and safety (see STRENGTH OF MATERIALS).

2. *Stress.*—Every body that we know anything about is always under the action of forces. Every body upon which we can experiment is subject to the force of gravity, and must, for the purpose of experiment, be supported by other forces. Such forces are usually applied by way of pressure upon a portion of the surface of the body; and such pressure is exerted by another body in contact with the first. The supported body exerts an equal and opposite pressure upon the supporting body across the portion of surface which is common to the two. The same thing is true of two portions of the same body. If, for example, we consider the two portions into which a body is divided by a (geometrical) horizontal plane, we conclude that the lower portion supports the upper portion by pressure across the plane, and the upper portion presses downwards upon the lower portion with an equal pressure. The pressure is still exerted when the plane is not horizontal, and its direction may be obliquely inclined to, or tangential to, the plane. A more precise meaning is given to "pressure" below. It is important to distinguish between the two classes of forces: forces such as the force of gravity, which act all through a body, and forces such as pressure applied over a surface. The former are named "body forces" or "volume forces," and the latter "surface tractions." The action between two portions of a body separated by a geometrical surface is of the nature of surface traction. Body forces are ultimately, when the volumes upon which they act are small enough, proportional to the volumes; surface tractions, on the other hand, are ultimately, when the surfaces across which they act are small enough, proportional to these surfaces. Surface tractions are always exerted by one body upon another, or by one part of a body upon another part, across a surface of contact; and a surface traction is always to be regarded as one aspect of a "stress," that is to say of a pair of equal and opposite forces; for an equal traction is always exerted by the second body, or part, upon the first across the surface.

3. The proper method of estimating and specifying stress is a matter of importance, and its character is necessarily mathematical. The magnitudes of the surface tractions which compose a stress are estimated as so much force (in dynes or tons) per unit of area (per sq. cm. or per sq. in.). The traction across an assigned plane at an assigned point is measured by the mathematical limit of the fraction F/S, where F denotes the numerical measure of the force exerted across a small portion of the plane containing the point, and S denotes the numerical measure of the area of this portion, and the limit is taken by diminishing S indefinitely. The traction may act as "tension," as it does in the case of a horizontal section of a bar supported at its upper end and hanging vertically, or as "pressure," as it does in the case of a horizontal section of a block resting on a horizontal plane, or again it may act obliquely or even tangentially to the separating plane. Normal tractions are reckoned as positive when they are tensions, negative when they are pressures. Tangential tractions are often called "shears" (see § 7 below). Oblique tractions can always be resolved, by the vector law, into normal and tangential tractions. In a fluid at rest the traction across any plane at any point is normal to the plane, and acts as pressure. For the complete specification of the "state of stress" at any point of a body, we should require to know the normal and tangential components of the traction across every plane drawn through the point. Fortunately this requirement can be very much simplified (see §§ 6, 7 below).

4. In general let ν denote the direction of the normal drawn in a specified sense to a plane drawn through a point O of a body; and let T_ν denote the traction exerted across the plane, at the point O, by the portion of the body towards which ν is drawn upon the remaining portion. Then T_ν is a vector quantity, which has a definite magnitude (estimated as above by the limit of a fraction of the form F/S) and a definite direction. It can be specified completely by its components X_ν, Y_ν, Z_ν, referred to fixed rectangular axes of x, y, z. When the direction of ν is that of the axis of x, in the positive sense, the components are denoted by X_x, Y_x, Z_x; and a similar notation is used when the direction of ν is that of y or z, the suffix x being replaced by y or z.

5. Every body about which we know anything is always in a state of stress, that is to say there are always internal forces acting between the parts of the body, and these forces are exerted as surface tractions across geometrical surfaces drawn in the body. The body, and each part of the body, moves under the action of all the forces (body forces and surface tractions) which are exerted upon it; or remains at rest if these forces are in equilibrium. This result is expressed analytically by means of certain equations—the "equations of motion" or "equations of equilibrium" of the body.

Let ρ denote the density of the body at any point, X, Y, Z, the components parallel to the axes of x, y, z of the body forces, estimated as so much force per unit of mass; further let f_x, f_y, f_z denote the components, parallel to the same axes, of the acceleration of the particle which is momentarily at the point (x, y, z). The equations of motion express the result that the rates of change of the momentum, and of the moment of momentum, of any portion of the body are those due to the action of all the forces exerted upon the portion by other bodies, or by other portions of the same body. For the changes of momentum, we have three equations of the type

$$\iiint \rho X\,dx\,dy\,dz + \iint X_\nu\,dS = \iiint \rho f_x\,dx\,dy\,dz, \qquad (1)$$

in which the volume integrations are taken through the volume of the portion of the body, the surface integration is taken over its surface, and the notation X_ν is that of § 4, the direction of ν being that of the normal to this surface drawn outwards. For the changes of moment of momentum, we have three equations of the type

$$\iiint \rho(yZ - zY)\,dx\,dy\,dz + \iint (yZ_\nu - zY_\nu)\,dS = \iiint \rho(yf_z - zf_y)\,dx\,dy\,dz. \quad (2)$$

The equations (1) and (2) are the equations of motion of any kind of body. The equations of equilibrium are obtained by replacing the right-hand members of these equations by zero.

6. These equations can be used to obtain relations between the values of X_ν, Y_ν, . . . for different directions ν. When the equations are applied to a very small volume, it appears that the terms expressed by surface integrals would, unless they tend to zero limits in a higher order than the areas of the surfaces, be very great compared with the terms expressed by volume integrals. We conclude that the surface tractions on the portion of the body which is bounded by any very small closed surface, are ultimately in equilibrium. When this result is interpreted for a small portion in the shape of a tetrahedron, having three of its faces at right angles to the co-ordinate axes, it leads to three equations of the type

$$X_\nu = X_x \cos(x,\nu) + X_y \cos(y,\nu) + X_z \cos(z,\nu), \quad . \quad (1)$$

where ν is the direction of the normal (drawn outwards) to the remaining face of the tetrahedron, and (x, ν) . . . denote the angles which this normal makes with the axes. Hence X_ν, . . . for any direction ν are expressed in terms of X_x, ... When the above result is interpreted for a very small portion in the shape of a cube, having its edges parallel to the co-ordinate axes, it leads to the equations

$$Y_z = Z_y, \quad Z_x = X_z, \quad X_y = Y_x. \quad . \quad . \quad (2)$$

When we substitute in the general equations the particular results which are thus obtained, we find that the equations of motion take such forms as

$$\rho X + \frac{\partial X_x}{\partial x} + \frac{\partial X_y}{\partial y} + \frac{\partial Z_x}{\partial z} = \rho f_x, \quad . \quad . \quad . \quad (3)$$

and the equations of moments are satisfied identically. The equations of equilibrium are obtained by replacing the right-hand members by zero.

7. A state of stress in which the traction across any plane of a set of parallel planes is normal to the plane, and that across any perpendicular plane vanishes, is described as a state of "simple tension" ("simple pressure" if the traction is negative). A state of stress in which the traction across any plane is normal to the plane, and the traction is the same for all planes passing through any point, is described as a state of "uniform tension" ("uniform pressure" if the traction is negative). Sometimes the phrases "isotropic tension" and "hydrostatic pressure" are used instead of "uniform" tension or pressure. The distinction between the two states, simple tension and uniform tension, is illustrated in fig. 1.

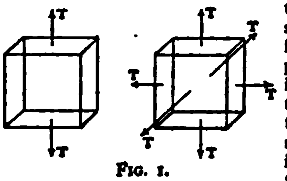

FIG. 1.

A state of stress in which there is purely tangential traction on a plane, and no normal traction on any perpendicular plane, is described as a state of "shearing stress." The result (2) of § 6 shows that tangential tractions occur in pairs. If, at any point, there is tangential traction, in any direction, on a plane parallel to this direction, and if we draw through the point a plane at right angles to the direction of this traction, and therefore containing the normal to the first plane, then there is equal tangential traction on this second plane in the direction of the normal to the first plane. The result is illustrated in fig. 2, where a rectangular block is subjected on two opposite faces to opposing tangential tractions, and is held in equilibrium by equal tangential tractions applied to two other faces.

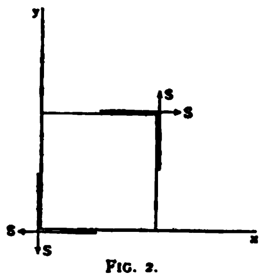

FIG. 2.

Through any point there always pass three planes, at right angles to each other, across which there is no tangential traction. These planes are called the "principal planes of stress," and the (normal) tractions across them the "principal stresses." Lines, usually curved, which have at every point the direction of a principal stress at the point, are called "lines of stress."

8. It appears that the stress at any point of a body is completely specified by six quantities, which can be taken to be the X_x, Y_y, Z_z and Y_z, Z_x, X_y of § 6. The first three are tensions (pressures if they are negative) across three planes parallel to fixed rectangular directions, and the remaining three are tangential tractions across the same three planes. These six quantities are called the "components of stress." It appears also that the components of stress are connected with each other, and with the body forces and accelerations, by the three partial differential equations of the type (3) of § 6. These equations are available for the purpose of determining the state of stress which exists in a body of definite form subjected to definite forces, but they are not sufficient for the purpose (see § 38 below). In order to effect the determination it is necessary to have information concerning the constitution of the body, and to introduce subsidiary relations founded upon this information.

9. The definite mathematical relations which have been found to connect the components of stress with each other, and with other quantities, result necessarily from the formation of a clear conception of the nature of stress. They do not admit of experimental verification, because the stress within a body does not admit of direct measurement. Results which are deduced by the aid of these relations can be compared with experimental results. If any discrepancy were observed it would not be interpreted as requiring a modification of the concept of stress, but as affecting some one or other of the subsidiary relations which must be introduced for the purpose of obtaining the theoretical result.

10. *Strain.*—For the specification of the changes of size and shape which are produced in a body by any forces, we begin by defining the "average extension" of any linear element or "filament" of the body. Let l_0 be the length of the filament before the forces are applied, l its length when the body is subjected to the forces. The average extension of the filament is measured by the fraction $(l-l_0)/l_0$. If this fraction is negative there is "contraction." The "extension at a point" of a body in any assigned direction is the mathematical limit of this fraction when one end of the filament is at the point, the filament has the assigned direction, and its length is diminished indefinitely. It is clear that all the changes of size and shape of the body are known when the extension at every point in every direction is known.

The relations between the extensions in different directions around the same point are most simply expressed by introducing the extensions in the directions of the co-ordinate axes and the angles between filaments of the body which are initially parallel to these axes. Let e_{xx}, e_{yy}, e_{zz} denote the extensions parallel to the axes of x, y, z, and let e_{yz}, e_{zx}, e_{xy} denote the cosines of the angles between the pairs of filaments which are initially parallel to the axes of y and z, z and x, x and y. Also let e denote the extension in the direction of a line the direction cosines of which are l, m, n. Then, if the changes of size and shape are slight, we have the relation

$$e=e_{xx}l^2+e_{yy}m^2+e_{zz}n^2+e_{yz}mn+e_{zx}nl+e_{xy}lm.$$

The body which undergoes the change of size or shape is said to be "strained," and the "strain" is determined when the quantities e_{xx}, e_{yy}, e_{zz} and e_{yz}, e_{zx}, e_{xy} defined above are known at every point of it. These quantities are called "components of strain." The three of the type e_{xx} are extensions, and the three of the type e_{yz} are called "shearing strains" (see § 12 below).

11. All the changes of relative position of particles of the body are known when the strain is known, and conversely the strain can be determined when the changes of relative position are given. These changes can be expressed most simply by the introduction of a vector quantity to represent the *displacement* of any particle.

When the body is deformed by the action of any forces its particles pass from the positions which they occupied before the action of the forces into new positions. If x, y, z are the co-ordinates of the position of a particle in the first state, its co-ordinates in the second state may be denoted by $x+u$, $y+v$, $z+w$. The quantities, u, v, w are the "components of displacement." When these quantities are small, the strain is connected with them by the equations

$$\left.\begin{array}{lll} e_{xx}=\partial u/\partial x, & e_{yy}=\partial v/\partial y, & e_{zz}=\partial w/\partial z, \\ e_{yz}=\dfrac{\partial w}{\partial y}+\dfrac{\partial v}{\partial z}, & e_{zx}=\dfrac{\partial u}{\partial z}+\dfrac{\partial w}{\partial x}, & e_{xy}=\dfrac{\partial v}{\partial x}+\dfrac{\partial u}{\partial y}. \end{array}\right\} \quad . \quad (1)$$

12. These equations enable us to determine more exactly the nature of the "shearing strains" such as e_{xy}. Let u, for example, be of the form sy, where s is constant, and let v and w vanish. Then $e_{xy}=s$, and the remaining components of strain vanish. The nature of the strain (called "simple shear") is simply appreciated by imagining the body to consist of a series of thin sheets, like the leaves of a book, which lie one over another and are all parallel to a plane (that of x, z); and the displacement is seen to consist in the shifting of each sheet relative to the sheet below in a direction (that of x) which is the same for all the sheets. The displacement of any sheet is proportional to its distance y from a particular sheet, which remains undisplaced. The shearing strain has the effect of distorting the shape of any portion of the body without altering its volume. This is shown in fig. 3, where a square ABCD is distorted by simple shear (each point moving parallel to the line marked xx) into a rhombus A′B′C′D′, as if by an extension of the diagonal BD and a contraction of the diagonal AC, which extension and contraction are adjusted so as to leave the area unaltered. In the general case, where u is not of the form sy and v and w do not vanish, the shearing strains such as e_{xy} result from the composition of pairs of simple shears of the type which has just been explained.

13. Besides enabling us to express the extension in any direction and the changes of relative direction of any filaments of the body, the components of strain also express the changes of size of volumes and areas. In particular, the "cubical dilatation," that is to say, the increase of volume per unit of volume, is expressed by the quantity $e_{xx}+e_{yy}+e_{zz}$ or $\frac{\partial u}{\partial x}+\frac{\partial v}{\partial y}+\frac{\partial w}{\partial z}$. When this quantity is negative there is "compression."

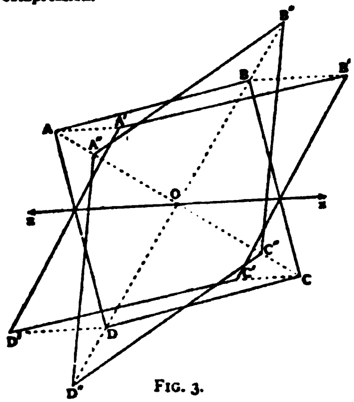

FIG. 3.

14. It is important to distinguish between two types of strain: the "rotational" type and the "irrotational" type. The distinction is illustrated in fig. 3, where the figure A"B"C"D" is obtained from the figure ABCD by contraction parallel to AC and extension parallel to BD, and the figure A'B'C'D' can be obtained from ABCD by the same contraction and extension followed by a rotation through the angle A"OA'. In strains of the irrotational type there are at any point three filaments at right angles to each other, which are such that the particles which lie in them before strain continue to lie in them after strain. A small spherical element of the body with its centre at the point becomes a small ellipsoid with its axes in the directions of these three filaments. In the case illustrated in the figure, the lines of the filaments in question, when the figure ABCD is strained into the figure A"B"C"D", are OA, OB and a line through O at right angles to their plane. In strains of the rotational type, on the other hand, the single existing set of three filaments (issuing from a point) which cut each other at right angles both before and after strain do not retain their directions after strain, though one of them may do so in certain cases. In the figure, the lines of the filaments in question, when the figure ABCD is strained into A'B'C'D', are OA, OB and a line at right angles to their plane before strain, and after strain they are OA', OB', and the same third line. A rotational strain can always be analysed into an irrotational strain (or "pure" strain) followed by a rotation.

Analytically, a strain is irrotational if the three quantities

$$\frac{\partial w}{\partial y}-\frac{\partial v}{\partial z},\quad \frac{\partial u}{\partial z}-\frac{\partial w}{\partial x},\quad \frac{\partial v}{\partial x}-\frac{\partial u}{\partial y}$$

vanish, rotational if any one of them is different from zero. The halves of these three quantities are the components of a vector quantity called the "rotation."

15. Whether the strain is rotational or not, there is always one set of three linear elements issuing from any point which cut each other at right angles both before and after strain. If these directions are chosen as axes of x, y, z, the shearing strains e_{yz}, e_{zx}, e_{xy} vanish at this point. These directions are called the "principal axes of strain," and the extensions in the directions of these axes the "principal extensions."

16. It is very important to observe that the relations between components of strain and components of displacement imply relations between the components of strain themselves. If by any process of reasoning we arrive at the conclusion that the state of strain in a body is such and such a state, we have a test of the possibility or impossibility of our conclusion. The test is that if the state of strain is a possible one, then there must be a displacement which can be associated with it in accordance with the equations (1) of § 11.

We may eliminate u, v, w from these equations. When this is done we find that the quantities $e_{xx}, \dots e_{yz}$ are connected by the two sets of equations

$$\left.\begin{aligned}\frac{\partial^2 e_{yy}}{\partial z^2}+\frac{\partial^2 e_{zz}}{\partial y^2}&=\frac{\partial^2 e_{yz}}{\partial y\partial z}\\ \frac{\partial^2 e_{zz}}{\partial x^2}+\frac{\partial^2 e_{xx}}{\partial z^2}&=\frac{\partial^2 e_{zx}}{\partial z\partial x}\\ \frac{\partial^2 e_{xx}}{\partial y^2}+\frac{\partial^2 e_{yy}}{\partial x^2}&=\frac{\partial^2 e_{xy}}{\partial x\partial y}\end{aligned}\right\}\quad .\quad .\quad .\quad (1)$$

and

$$\left.\begin{aligned}2\frac{\partial^2 e_{xx}}{\partial y\partial z}&=\frac{\partial}{\partial x}\left(-\frac{\partial e_{yz}}{\partial x}+\frac{\partial e_{zx}}{\partial y}+\frac{\partial e_{xy}}{\partial z}\right)\\ 2\frac{\partial^2 e_{yy}}{\partial z\partial x}&=\frac{\partial}{\partial y}\left(\frac{\partial e_{yz}}{\partial x}-\frac{\partial e_{zx}}{\partial y}+\frac{\partial e_{xy}}{\partial z}\right)\\ 2\frac{\partial^2 e_{zz}}{\partial x\partial y}&=\frac{\partial}{\partial z}\left(\frac{\partial e_{yz}}{\partial x}+\frac{\partial e_{zx}}{\partial y}-\frac{\partial e_{xy}}{\partial z}\right)\end{aligned}\right\}\quad .\quad .\quad (2)$$

These equations are known as the *conditions of compatibility of strain-components*. The components of strain which specify any possible strain satisfy them. Quantities arrived at in any way, and intended to be components of strain, if they fail to satisfy these equations, are not the components of any possible strain; and the theory or speculation by which they are reached must be modified or abandoned.

When the components of strain have been found in accordance with these and other necessary equations, the displacement is to be found by solving the equations (1) of § 11, considered as differential equations to determine u, v, w. The most general possible solution will differ from any other solution by terms which contain arbitrary constants, and these terms represent a possible displacement. This "complementary displacement" involves no strain, and would be a possible displacement of an ideal perfectly rigid body.

17. The relations which connect the strains with each other and with the displacement are geometrical relations resulting from the definitions of the quantities and not requiring any experimental verification. They do not admit of such verification, because the strain within a body cannot be measured. The quantities (belonging to the same category) which can be measured are displacements of points on the surface of a body. For example, on the surface of a bar subjected to tension we may make two fine transverse scratches, and measure the distance between them before and after the bar is stretched. For such measurements very refined instruments are required. Instruments for this purpose are called barbarously "extensometers," and many different kinds have been devised. From measurements of displacement by an extensometer we may deduce the average extension of a filament of the bar terminated by the two scratches. In general, when we attempt to measure a strain, we really measure some displacements, and deduce the values, not of the strain at a point, but of the average extensions of some particular linear filaments of a body containing the point; and these filaments are, from the nature of the case, nearly always superficial filaments.

18. In the case of transparent materials such as glass there is available a method of studying experimentally the state of strain within a body. This method is founded upon the result that a piece of glass when strained becomes doubly refracting, with its optical principal axes at any point in the directions of the principal axes of strain (§ 15) at the point. When the piece has two parallel plane faces, and two of the principal axes of strain at any point are parallel to these faces, polarized light transmitted through the piece in a direction normal to the faces can be used to determine the directions of the principal axes of the strain at any point. If the directions of these axes are known theoretically the comparison of the experimental and theoretical results yields a test of the theory.

19. *Relations between Stresses and Strains.*—The problem of the extension of a bar subjected to tension is the one which has been most studied experimentally, and as a result of this study it is found that for most materials, including all metals except cast metals, the measurable extension is proportional

to the applied tension, provided that this tension is not too great. In interpreting this result it is assumed that the tension is uniform over the cross-section of the bar, and that the extension of longitudinal filaments is uniform throughout the bar; and then the result takes the form of a law of proportionality connecting stress and strain: The tension is proportional to the extension. Similar results are found for the same materials when other methods of experimenting are adopted, for example, when a bar is supported at the ends and bent by an attached load and the deflexion is measured, or when a bar is twisted by an axial couple and the relative angular displacement of two sections is measured. We have thus very numerous experimental verifications of the famous law first enunciated by Robert Hooke in 1678 in the words "*Ut Tensio sic vis*"; that is, "the Power of any spring is in the same proportion as the Tension (= stretching) thereof." The most general statement of Hooke's Law in modern language would be:—*Each of the six components of stress at any point of a body is a linear function of the six components of strain at the point.* It is evident from what has been said above as to the nature of the measurement of stresses and strains that this law in all its generality does not admit of complete experimental verification, and that the evidence for it consists largely in the agreement of the results which are deduced from it in a theoretical fashion with the results of experiments. Of such results one of a general character may be noted here. If the law is assumed to be true, and the equations of motion of the body (§ 5) are transformed by means of it into differential equations for determining the components of displacement, these differential equations admit of solutions which represent periodic vibratory displacements (see § 85 below). The fact that solid bodies can be thrown into states of isochronous vibration has been emphasized by G. G. Stokes as a peremptory proof of the truth of Hooke's Law.

20. According to the statement of the generalised Hooke's Law the stress-components vanish when the strain-components vanish. The strain-components contemplated in experiments upon which the law is founded are measured from a zero of reckoning which corresponds to the state of the body subjected to experiment before the experiment is made, and the stress-components referred to in the statement of the law are those which are called into action by the forces applied to the body in the course of the experiment. No account is taken of the stress which must already exist in the body owing to the force of gravity and the forces by which the body is supported. When it is desired to take account of this stress it is usual to suppose that the strains which would be produced in the body if it could be freed from the action of gravity and from the pressures of supports are so small that the strains produced by the forces which are applied in the course of the experiment can be compounded with them by simple superposition. This supposition comes to the same thing as measuring the strain in the body, not from the state in which it was before the experiment, but from an ideal state (the "unstressed" state) in which it would be entirely free from internal stress, and allowing for the strain which would be produced by gravity and the supporting forces if these forces were applied to the body when free from stress. In most practical cases the initial strain to be allowed for is unimportant (see §§ 91-93 below).

21. Hooke's law of proportionality of stress and strain leads to the introduction of important physical constants: the *moduluses of elasticity* of a body. Let a bar of uniform section (of area ω) be stretched with tension T, which is distributed uniformly over the section, so that the stretching force is $T\omega$, and let the bar be unsupported at the sides. The bar will undergo a longitudinal extension of magnitude T/E, where E is a constant quantity depending upon the material. This constant is called *Young's modulus* after Thomas Young, who introduced it into the science in 1807. The quantity E is of the same nature as a traction, that is to say, it is measured as a force estimated per unit of area. For steel it is about $2{\cdot}04\times10^{12}$ dynes per square centimetre, or about 13,000 tons per sq. in.

22. The longitudinal extension of the bar under tension is not the only strain in the bar. It is accompanied by a lateral contraction by which all the transverse filaments of the bar are shortened. The amount of this contraction is σT/E, where σ is a certain number called *Poisson's ratio*, because its importance was at first noted by S. D. Poisson in 1828. Poisson arrived at the existence of this contraction, and the corresponding number σ, from theoretical considerations, and his theory led him to assign to σ the value $\frac{1}{4}$. Many experiments have been made with the view of determining σ, with the result that it has been found to be different for different materials, although for very many it does not differ much from $\frac{1}{4}$. For steel the best value (Amagat's) is 0·268. Poisson's theory admits of being modified so as to agree with the results of experiment.

23. The behaviour of an elastic solid body, strained within the limits of its elasticity, is entirely determined by the constants E and σ if the body is *isotropic*, that is to say, if it has the same quality in all directions around any point. Nevertheless it is convenient to introduce other constants which are related to the action of particular sorts of forces. The most important of these are the "modulus of compression" (or "bulk modulus") and the "rigidity" (or "modulus of shear"). To define the *modulus of compression*, we suppose that a solid body of any form is subjected to uniform hydrostatic pressure of amount p. The state of stress within it will be one of uniform pressure, the same at all points, and the same in all directions round any point. There will be compression, the same at all points, and proportional to the pressure; and the amount of the compression can be expressed as p/k. The quantity k is the modulus of compression. In this case the linear contraction in any direction is $p/3k$; but in general the linear extension (or contraction) is not one-third of the cubical dilatation (or compression).

24. To define the *rigidity*, we suppose that a solid body is subjected to forces in such a way that there is shearing stress within it. For example, a cubical block may be subjected to opposing tractions on opposite faces acting in directions which are parallel to an edge of the cube and to both the faces. Let S be the amount of the traction, and let it be uniformly distributed over the faces. As we have seen (§ 7), equal tractions must act upon two other faces in suitable directions in order to maintain equilibrium (see fig. 2 of § 7). The two directions involved may be chosen as axes of x, y as in that figure. Then the state of stress will be one in which the stress-component denoted by X_y is equal to S, and the remaining stress-components vanish; and the strain produced in the body is shearing strain of the type denoted by e_{xy}. The amount of the shearing strain is S/μ, and the quantity μ is the "rigidity."

25. The modulus of compression and the rigidity are quantities of the same kind as Young's modulus. The modulus of compression of steel is about $1{\cdot}43\times10^{12}$ dynes per square centimetre, the rigidity is about $8{\cdot}19\times10^{11}$ dynes per square centimetre. It must be understood that the values for different specimens of nominally the same material may differ considerably.

The modulus of compression k and the rigidity μ of an isotropic material are connected with the Young's modulus E and Poisson's ratio σ of the material by the equations

$$k=E/3(1-2\sigma),\quad \mu=E/2(1+\sigma).$$

26. Whatever the forces acting upon an isotropic solid body may be, provided that the body is strained within its limits of elasticity, the strain-components are expressed in terms of the stress-components by the equations

$$\left.\begin{aligned} e_{xx}&=(X_x-\sigma Y_y-\sigma Z_z)/E, & e_{yz}&=Y_z/\mu,\\ e_{yy}&=(Y_y-\sigma Z_z-\sigma X_x)/E, & e_{zx}&=Z_x/\mu,\\ e_{zz}&=(Z_z-\sigma X_x-\sigma Y_y)/E, & e_{xy}&=X_y/\mu. \end{aligned}\right\} \quad . \quad . \quad (1)$$

If we introduce a quantity λ, of the same nature as E or μ, by the equation

$$\lambda=E\sigma/(1+\sigma)(1-2\sigma),\quad . \quad . \quad . \quad . \quad (2)$$

we may express the stress-components in terms of the strain-components by the equations

$$\left.\begin{aligned} X_x&=\lambda(e_{xx}+e_{yy}+e_{zz})+2\mu e_{xx}, & Y_z&=\mu e_{yz},\\ Y_y&=\lambda(e_{xx}+e_{yy}+e_{zz})+2\mu e_{yy}, & Z_x&=\mu e_{zx},\\ Z_z&=\lambda(e_{xx}+e_{yy}+e_{zz})+2\mu e_{zz}, & X_y&=\mu e_{xy}; \end{aligned}\right\} \quad . \quad (3)$$

and then the behaviour of the body under the action of any forces depends upon the two constants λ and μ. These two constants were introduced by G. Lamé in his treatise of 1852. The importance of the quantity μ had been previously emphasized by L. J. Vicat and G. G. Stokes.

27. The potential energy per unit of volume (often called the "resilience") stored up in the body by the strain is equal to

$$\tfrac{1}{2}(\lambda+2\mu)(e_{xx}+e_{yy}+e_{zz})^2+\tfrac{1}{2}\mu(e_{yz}^2+e_{zx}^2+e_{xy}^2-4e_{yy}e_{zz}-4e_{zz}e_{xx}-4e_{xx}e_{yy}),$$

or the equivalent expression

$$\tfrac{1}{2}[(X_x^2+Y_y^2+Z_z^2)-2\sigma(Y_yZ_z+Z_zX_x+X_xY_y)+2(1+\sigma)(Y_z^2+Z_x^2+X_y^2)]/E.$$

The former of these expressions is called the "strain-energy-function"

28. The Young's modulus E of a material is often determined experimentally by the direct method of the extensometer (§ 17), but more frequently it is determined indirectly by means of a result obtained in the theory of the flexure of a bar (see §§ 47, 53 below). The rigidity μ is usually determined indirectly by means of results obtained in the theory of the torsion of a bar (see §§ 41, 42 below). The modulus of compression *k* may be determined directly by means of the piezometer, as was done by E. H. Amagat, or it may be determined indirectly by means of a result obtained in the theory of a tube under pressure, as was done by A. Mallock (see § 78 below). The value of Poisson's ratio σ is generally inferred from the relation connecting it with E and μ or with E and *k*, but it may also be determined indirectly by means of a result obtained in the theory of the flexure of a bar (§ 47 below), as was done by M. A. Cornu and A. Mallock, or directly by a modification of the extensometer method, as has been done recently by J. Morrow.

29. The *elasticity of a fluid* is always expressed by means of a single quantity of the same kind as the *modulus of compression* of a solid body. To any increment of pressure, which is not too great, there corresponds a proportional cubical compression, and the amount of this compression for an increment δp of pressure can be expressed as $\delta p/k$. The quantity that is usually tabulated is the reciprocal of *k*, and it is called the *coefficient of compressibility*. It is the amount of compression per unit increase of pressure. As a physical quantity it is of the same dimensions as the reciprocal of a pressure (or of a force per unit of area). The pressures concerned are usually measured in atmospheres (1 atmosphere = $1{\cdot}014 \times 10^6$ dynes per sq. cm.). For water the coefficient of compressibility, or the compression per atmosphere, is about $4{\cdot}5 \times 10^{-5}$. This gives for *k* the value $2{\cdot}22 \times 10^{10}$ dynes per sq. cm. The Young's modulus and the rigidity of a fluid are always zero.

30. The relations between stress and strain in a material which is not isotropic are much more complicated. In such a material the Young's modulus depends upon the direction of the tension, and its variations about a point are expressed by means of a surface of the fourth degree. The Poisson's ratio depends upon the direction of the contracted lateral filaments as well as upon that of the longitudinal extended ones. The rigidity depends upon both the directions involved in the specification of the shearing stress. In general there is no simple relation between the Young's moduluses and Poisson's ratios and rigidities for assigned directions and the modulus of compression. Many materials in common use, all fibrous woods for example, are actually *aeolotropic* (that is to say, are not isotropic), but the materials which are aeolotropic in the most regular fashion are natural crystals. The elastic behaviour of crystals has been studied exhaustively by many physicists, and in particular by W. Voigt. The strain-energy-function is a homogeneous quadratic function of the six strain-components, and this function may have as many as 21 independent coefficients, taking the place in the general case of the 2 coefficients λ, μ which occur when the material is isotropic—a result first obtained by George Green in 1837. The best experimental determinations of the coefficients have been made indirectly by Voigt by means of results obtained in the theories of the torsion and flexure of aeolotropic bars.

31. *Limits of Elasticity.*—A solid body which has been strained by considerable forces does not in general recover its original size and shape completely after the forces cease to act. The strain that is left is called *set*. If set occurs the elasticity is said to be "imperfect," and the greatest strain (or the greatest load) of any specified type, for which no set occurs, defines the "limit of perfect elasticity" corresponding to the specified type of strain, or of stress. All fluids and many solid bodies, such as glasses and crystals, as well as some metals (copper, lead, silver) appear to be perfectly elastic as regards change of volume within wide limits; but malleable metals and alloys can have their densities permanently increased by considerable pressures. The limits of perfect elasticity as regards change of shape, on the other hand, are very low, if they exist at all, for glasses and other hard, brittle solids; but a class of metals including copper, brass, steel, platinum are very perfectly elastic as regards distortion, provided that the distortion is not too great. The question can be tested by observation of the torsional elasticity of thin fibres or wires. The limits of perfect elasticity are somewhat ill-defined, because an experiment cannot warrant us in asserting that there is no set, but only that, if there is any set, it is too small to be observed.

32. A different meaning may be, and often is, attached to the phrase "limits of elasticity" in consequence of the following experimental result:—Let a bar be held stretched under a moderate tension, and let the extension be measured; let the tension be slightly increased and the extension again measured; let this process be continued, the tension being increased by equal increments. It is found that when the tension is not too great the extension increases by equal increments (as nearly as experiment can decide), but that, as the tension increases, a stage is reached in which the extension increases faster than it would do if it continued to be proportional to the tension. The beginning of this stage is tolerably well marked. Some time before this stage is reached the limit of perfect elasticity is passed; that is to say, if the load is removed it is found that there is some permanent set. The limiting tension beyond which the above law of proportionality fails is often called the "limit of *linear* elasticity." It is higher than the limit of perfect elasticity. For steel bars of various qualities J. Bauschinger found for this limit values varying from 10 to 17 tons per square inch. The result indicates that, when forces which produce any kind of strain are applied to a solid body and are gradually increased, the strain at any instant increases proportionally to the forces up to a stage beyond that at which, if the forces were removed, the body would completely recover its original size and shape, but that the increase of strain ceases to be proportional to the increase of load when the load surpasses a certain limit. There would thus be, for any type of strain, a *limit of linear elasticity*, which exceeds the limit of perfect elasticity.

33. A body which has been strained beyond the limit of linear elasticity is often said to have suffered an "over-strain." When the load is removed, the *set* which can be observed is not entirely permanent; but it gradually diminishes with lapse of time. This phenomenon is named "elastic after-working." If, on the other hand, the load is maintained constant, the strain is gradually increased. This effect indicates a gradual flowing of solid bodies under great stress; and a similar effect was observed in the experiments of H. Tresca on the punching and crushing of metals. It appears that all solid bodies under sufficiently great loads become "plastic," that is to say, they take a set which gradually increases with the lapse of time. No plasticity is observed when the limit of linear elasticity is not exceeded.

34. The values of the elastic limits are affected by overstrain. If the load is maintained for some time, and then removed, the limit of linear elasticity is found to be higher than before. If the load is not maintained, but is removed and then reapplied, the limit is found to be lower than before. During a period of rest a test piece recovers its elasticity after overstrain.

35. The effects of repeated loading have been studied by A. Wöhler, J. Bauschinger, O. Reynolds and others. It has been found that, after many repetitions of rather rapidly alternating stress, pieces are fractured by loads which they have many times withstood. It is not certain whether the fracture

is in every case caused by the gradual growth of minute flaws from the beginning of the series of tests, or whether the elastic quality of the material suffers deterioration apart from such flaws. It appears, however, to be an ascertained result that, so long as the limit of linear elasticity is not exceeded, repeated loads and rapidly alternating loads do not produce failure of the material.

36. The question of the conditions of safety, or of the conditions in which rupture is produced, is one upon which there has been much speculation, but no completely satisfactory result has been obtained. It has been variously held that rupture occurs when the numerically greatest principal stress exceeds a certain limit, or when this stress is tension and exceeds a certain limit, or when the greatest difference of two principal stresses (called the "stress-difference") exceeds a certain limit, or when the greatest extension or the greatest shearing strain or the greatest strain of any type exceeds a certain limit. Some of these hypotheses appear to have been disproved. It was held by G. F. Fitzgerald (*Nature*, Nov. 5, 1896) that rupture is not produced by pressure symmetrically applied all round a body, and this opinion has been confirmed by the recent experiments of A. Föppl. This result disposes of the greatest stress hypothesis and also of the greatest strain hypothesis. The fact that short pillars can be crushed by longitudinal pressure disposes of the greatest tension hypothesis, for there is no tension in the pillar. The greatest extension hypothesis failed to satisfy some tests imposed by H. Wehage, who experimented with blocks of wrought iron subjected to equal pressures in two directions at right angles to each other. The greatest stress-difference hypothesis and the greatest shearing strain hypothesis would lead to practically identical results, and these results have been held by J. J. Guest to accord well with his experiments on metal tubes subjected to various systems of combined stress; but these experiments and Guest's conclusion have been criticized adversely by O. Mohr, and the question cannot be regarded as settled. The fact seems to be that the conditions of rupture depend largely upon the nature of the test (tensional, torsional, flexural, or whatever it may be) that is applied to a specimen, and that no general formula holds for all kinds of tests. The best modern technical writings emphasize the importance of the limits of linear elasticity and of tests of dynamical resistance (§ 87 below) as well as of statical resistance.

37. The question of the conditions of rupture belongs rather to the science of the strength of materials than to the science of elasticity (§ 1); but it has been necessary to refer to it briefly here, because there is no method except the methods of the theory of elasticity for determining the state of stress or strain in a body subjected to forces. Whatever view may ultimately be adopted as to the relation between the conditions of safety of a structure and the state of stress or strain in it, the calculation of this state by means of the theory or by experimental means (as in § 18) cannot be dispensed with.

38. *Methods of determining the Stress in a Body subjected to given Forces.*—To determine the state of stress, or the state of strain, in an isotropic solid body strained within its limits of elasticity by given forces, we have to use (i.) the equations of equilibrium, (ii.) the conditions which hold at the bounding surface, (iii.) the relations between stress-components and strain-components, (iv.) the relations between strain-components and displacement. The equations of equilibrium are (with notation already used) three partial differential equations of the type

$$\frac{\partial X_x}{\partial x}+\frac{\partial X_y}{\partial y}+\frac{\partial Z_x}{\partial z}+\rho X=0. \qquad . \quad . \qquad (1)$$

The conditions which hold at the bounding surface are three equations of the type

$$X_x \cos(x, \nu)+X_y \cos(y, \nu)+Z_x \cos(z, \nu)=\bar{X}_\nu, \qquad (2)$$

where ν denotes the direction of the outward-drawn normal to the bounding surface, and $\bar{X}_\nu$ denotes the x-component of the applied surface traction. The relations between stress-components and strain-components are expressed by either of the sets of equations (1) or (3) of § 26. The relations between strain-components and displacement are the equations (1) of § 11, or the equivalent conditions of compatibility expressed in equations (1) and (2) of § 16.

39 We may proceed by either of two methods In one method we eliminate the stress-components and the strain-components and retain only the components of displacement. This method leads (with notation already used) to three partial differential equations of the type

$$(\lambda+\mu)\frac{\partial}{\partial x}\left(\frac{\partial u}{\partial x}+\frac{\partial v}{\partial y}+\frac{\partial w}{\partial z}\right)+\mu\left(\frac{\partial^2 u}{\partial x^2}+\frac{\partial^2 u}{\partial y^2}+\frac{\partial^2 u}{\partial z^2}\right)+\rho X=0, \qquad (3)$$

and three boundary conditions of the type

$$\lambda\cos(x,\nu)\left(\frac{\partial u}{\partial x}+\frac{\partial v}{\partial y}+\frac{\partial w}{\partial z}\right)+\mu\left\{2\cos(x,\nu)\frac{\partial u}{\partial x}+\cos(y,\nu)\left(\frac{\partial v}{\partial x}+\frac{\partial u}{\partial y}\right)\right.$$
$$\left.+\cos(z,\nu)\left(\frac{\partial u}{\partial z}+\frac{\partial w}{\partial x}\right)\right\}=X_\nu. \qquad (4)$$

In the alternative method we eliminate the strain-components and the displacements. This method leads to a system of partial differential equations to be satisfied by the stress-components. In this system there are three equations of the type

$$\frac{\partial X_x}{\partial x}+\frac{\partial X_y}{\partial y}+\frac{\partial Z_x}{\partial z}+\rho X=0, \qquad . \quad . \qquad (1\ bis)$$

three of the type

$$\frac{\partial^2 X_x}{\partial x^2}+\frac{\partial^2 X_x}{\partial y^2}+\frac{\partial^2 X_x}{\partial z^2}+\frac{1}{1+\sigma}\frac{\partial^2}{\partial x^2}(X_x+Y_y+Z_z)=$$
$$-\frac{\sigma}{1-\sigma}\rho\left(\frac{\partial X}{\partial x}+\frac{\partial Y}{\partial y}+\frac{\partial Z}{\partial z}\right)-2\rho\frac{\partial X}{\partial x}, \qquad (5)$$

and three of the type

$$\frac{\partial^2 Y_z}{\partial x^2}+\frac{\partial^2 Y_z}{\partial y^2}+\frac{\partial^2 Y_z}{\partial z^2}+\frac{1}{1+\sigma}\frac{\partial^2}{\partial y\partial z}(X_x+Y_y+Z_z)=-\rho\left(\frac{\partial Z}{\partial y}+\frac{\partial Y}{\partial z}\right), \qquad (6)$$

the equations of the two latter types being necessitated by the conditions of compatibility of strain-components. The solutions of these equations have to be adjusted so that the boundary conditions of the type (2) may be satisfied.

40. It is evident that whichever method is adopted the mathematical problem is in general very complicated. It is also evident that, if we attempt to proceed by help of some intuition as to the nature of the stress or strain, our intuition ought to satisfy the tests provided by the above systems of equations. Neglect of this precaution has led to many errors. Another source of frequent error lies in the neglect of the conditions in which the above systems of equations are correct. They are obtained by help of the supposition that the relative displacements of the parts of the strained body are small. The solutions of them must therefore satisfy the test of smallness of the relative displacements.

41. *Torsion.*—As a first example of the application of the theory we take the problem of the torsion of prisms. This problem, considered first by C. A. Coulomb in 1784, was finally solved by B. de Saint-Venant in 1855. The problem is this:—A cylindrical or prismatic bar is held twisted by terminal couples; it is required to determine the state of stress and strain in the interior. When the bar is a circular cylinder the problem is easy. Any section is displaced by rotation about the central-line through a small angle, which is proportional to the distance z of the section from a fixed plane at right angles to this line. This plane is a terminal section if one of the two terminal sections is not displaced. The angle through which the section z rotates is τz, where τ is a constant, called the amount of the *twist*; and this constant τ is equal to $G/\mu I$, where G is the twisting couple, and I is the moment of inertia of the cross-section about the central-line. This result is often called "Coulomb's law." The stress within the bar is shearing stress, consisting, as it must, of two sets of equal tangential tractions on two sets of planes which are at right angles to each other. These planes are the cross-sections and the axial planes of the bar. The tangential traction at any point of the cross-section is directed at right angles to the axial plane through the point, and the tangential traction on the axial plane is directed parallel to the length of the bar. The amount of either at a distance r from the axis is $\mu\tau r$ or Gr/I. The result that $G = \mu\tau I$ can be used to determine μ experimentally, for τ may be measured and G and I are known.

42. When the cross-section of the bar is not circular it is clear that this solution fails; for the existence of tangential traction, near the prismatic bounding surface, on any plane which does not cut this surface at right angles, implies the existence of traction applied to this surface. We may attempt to modify the theory by retaining the supposition that the stress consists of shearing stress, involving tangential traction distributed in some way over the cross-sections. Such traction is obviously a necessary constituent of any stress-system which could be produced by terminal couples around the axis.

We should then know that there must be equal tangential traction directed along the length of the bar, and exerted across some planes or other which are parallel to this direction. We should also know that, at the bounding surface, these planes must cut this surface at right angles. The corresponding strain would be shearing strain which could involve (i.) a sliding of elements of one cross-section relative to another, (ii.) a relative sliding of elements of the above mentioned planes in the direction of the length of the bar. We could conclude that there may be a longitudinal displacement of the elements of the cross-sections. We should then attempt to satisfy the conditions of the problem by supposing that this is the character of the strain, and that the corresponding displacement consists of (i.) a rotation of the cross-sections in their planes such as we found in the case of the circle, (ii.) a distortion of the cross-sections into curved surfaces by a displacement (w) which is directed normally to their planes and varies in some manner from point to point of these planes. We could show that all the conditions of the problem are satisfied by this assumption, provided that the longitudinal displacement (w), considered as a function of the position of a point (x,y) in the cross-section, satisfies the equation

$$\frac{\partial^2 w}{\partial x^2}+\frac{\partial^2 w}{\partial y^2}=0, \quad . \quad . \quad . \quad . \quad (1)$$

and the boundary condition

$$\left(\frac{\partial w}{\partial x}-\tau y\right)\cos(x,\nu)+\left(\frac{\partial w}{\partial y}+\tau x\right)\cos(y,\nu)=0, \quad . \quad (2)$$

where τ denotes the amount of the twist, and ν the direction of the normal to the boundary. The solution is known for a great many forms of section. (In the particular case of a circular section w vanishes.) The tangential traction at any point of the cross-section is directed along the tangent to that curve of the family $\psi=$const. which passes through the point, ψ being the function determined by the equations

$$\frac{\partial w}{\partial x}=\tau\left(\frac{\partial \psi}{\partial y}+y\right), \quad \frac{\partial w}{\partial y}=-\tau\left(\frac{\partial \psi}{\partial x}+x\right).$$

The amount of the twist τ produced by terminal couples of magnitude G is G/C, where C is a constant, called the "torsional rigidity" of the prism, and expressed by the formula

$$C=\mu\iint\left\{\left(\frac{\partial\psi}{\partial x}\right)^2+\left(\frac{\partial\psi}{\partial y}\right)^2\right\}dxdy,$$

the integration being taken over the cross-section. When the coefficient of μ in the expression for C is known for any section, μ can be determined by experiment with a bar of that form of section.

43. The distortion of the cross-sections into curved surfaces is shown graphically by drawing the contour lines (w =const.). In general the section is divided into a number of compartments, and the portions that lie within two adjacent compartments are respectively concave and convex. This result is illustrated in the accompanying figures (fig. 4 for the *ellipse*, given by $x^2/b^2+y^2/c^2=1$; fig. 5 for the *equilateral triangle*, given by $(x+\frac{1}{3}a)(x^2-3y^2-\frac{4}{3}ax+\frac{4}{9}a^2)=0$; fig. 6 for the square).

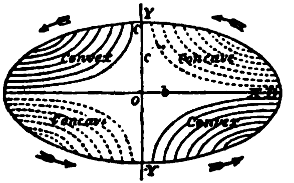

FIG. 4.

44. The distribution of the shearing stress over the cross-section is determined by the function ψ already introduced. If we draw the curves $\psi=$const., corresponding to any form of section, for equidifferent values of the constant, the tangential traction at any point on the cross-section is directed along the tangent to that curve of the family which passes through the point, and the magnitude of it is inversely proportional to the distance between consecutive curves of the family. Fig. 7 illustrates the result in the case of the *equilateral* triangle. The boundary is, of course, one of the lines. The "lines of shearing stress" which can thus be drawn are in every case identical with the lines of flow of frictionless liquid filling a cylindrical vessel of the same cross-section as the bar, when the liquid circulates in the plane of the section with uniform spin. They are also the same as the contour lines of a flexible and slightly extensible membrane, of which the edge has the same form as the bounding curve of the cross-section of the bar, when the membrane is fixed at the edge and slightly deformed by uniform pressure.

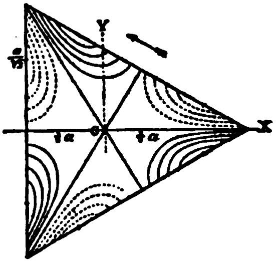

FIG. 5.

45. Saint-Venant's theory shows that the true torsional rigidity is in general less than that which would be obtained by extending Coulomb's law ($G=\mu\tau I$) to sections which are not circular. For an elliptic cylinder of sectional area ω and moment of inertia I about its central-line the torsional rigidity is $\mu\omega^4/4\pi^2 I$, and this formula is not far from being correct for a very large number of sections. For a bar of square section of side a centimetres, the torsional rigidity in C.G.S. units is $(0{\cdot}1406)\mu a^4$ approximately, μ being expressed in dynes per square centimetre. How great the defect of the true value from that given by extending Coulomb's law may be in the case of sections with projecting corners is shown by the diagrams (fig. 8 especially no. 4). In these diagrams the upper of the two numbers under each figure indicates the fraction which the true torsional rigidity corresponding to the section is of that value which would be obtained by extending Coulomb's law; and the lower of the two numbers indicates the ratio which the torsional rigidity for a bar of the corresponding section bears to that of a bar of circular section of the same material and of equal sectional area. These results have an important practical application, inasmuch as they show that strengthening ribs and projections, such as are introduced in engineering to give stiffness to beams, have the reverse of a good effect when torsional stiffness is an object, although they are of great value in increasing the resistance to bending. The theory shows further that the resistance to torsion is very seriously diminished when there is in the surface any dent approaching to a re-entrant angle. At such a place the shearing strain tends to become infinite, and some

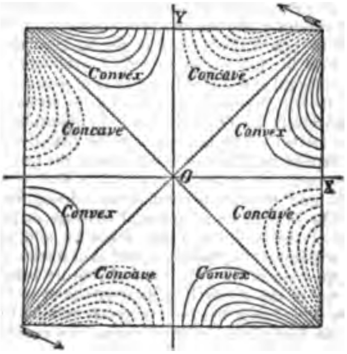

FIG. 6.

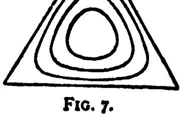

FIG. 7.

permanent set is produced by torsion. In the case of a section of any form, the strain and stress are greatest at points on the contour, and these points are in many cases the points of the contour which are nearest to the centroid of the section. The theory has also been applied to show that a longitudinal flaw near the axis of a shaft transmitting a torsional couple has little influence on the strength of the shaft, but that in the neighbourhood of a similar flaw which is much nearer to the surface than to the axis the shearing strain may be nearly doubled, and thus the possibility of such flaws is a source of weakness against which special provision ought to be made.

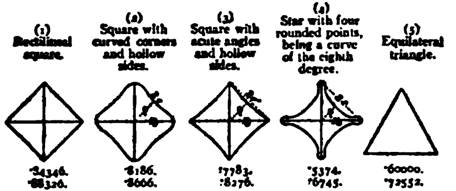
(1) Rectilineal square.
(2) Square with curved corners and hollow sides.
(3) Square with acute angles and hollow sides.
(4) Star with four rounded points, being a curve of the eighth degree.
(5) Equilateral triangle.
·84346.
·88326.
·8186.
·8666.
·7783.
·8276.
·5374.
·6745.
·60000.
·72552.

FIG. 8.—Diagrams showing Torsional Rigidities.

46. *Bending of Beams.*—As a second example of the application of the general theory we take the problem of the flexure of a beam. In this case also we begin by forming a simple intuition as to the nature of the strain and the stress. On the side of the beam towards the centre of curvature the longitudinal filaments must be contracted, and on the other side they must be extended. If we assume that the cross-sections remain plane, and that the central-line is unaltered in length, we see (at once from fig. 9) that the extensions (or contractions) are given by the formula y/R, where y denotes the distance of a longitudinal filament from the plane drawn through the unstrained central-line at right-angles to the plane of bending, and R is the radius of curvature of the curve into which this line is bent (shown by the dotted line in the figure). Corresponding to this strain there must be traction acting across the cross-sections. If we assume that there is no other stress, then the magnitude of the traction in question is Ey/R, where E is Young's modulus, and it is tension on the side where the filaments are extended and pressure on the side where they are contracted. If the plane of bending contains a set of principal axes of the cross-sections at their centroids, these tractions for the whole cross-section are equivalent to a couple of moment EI/R, where I now denotes the moment of inertia of the cross-section about an axis through its centroid at right angles to the plane of bending, and the plane of the couple is the plane of bending. Thus a beam of any form of section can be held bent in a "principal plane" by terminal couples of moment M, that is to say by a "bending moment" M; the central-line will take a curvature M/EI, so that it becomes an arc of a circle of radius EI/M; and the stress at any point will be tension of amount My/I, where y denotes distance (reckoned positive towards the side remote from the centre of curvature) from that plane which initially contains the central-line and is at right angles to the plane of the couple. This plane is called the "neutral plane." The restriction that the beam is bent in a principal plane means that the plane of bending contains one set of principal axes of the cross-sections at their centroids; in the case of a beam of rectangular section the plane would bisect two opposite edges at right angles. In order that the theory may hold good the radius of curvature must be very large.

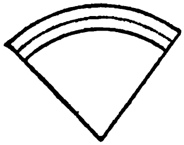

FIG. 9.

47. In this problem of the bending of a beam by terminal couples the stress is tension, determined as above, and the corresponding strain consists therefore of longitudinal extension of amount My/EI or y/R (contraction if y is negative), accompanied by lateral contraction of amount $\sigma My/EI$ or $\sigma y/R$ (extension if y is negative), σ being Poisson's ratio for the material. Our intuition of the nature of the strain was imperfect, inasmuch as it took no account of these lateral strains. The necessity for introducing them was pointed out by Saint-Venant. The effect of them is a change of shape of the cross-sections in their own planes. This is shown in an exaggerated way in fig. 10, where the rectangle ABCD represents the cross-section of the unstrained beam, or a rectangular portion of this cross-section, and the curvilinear figure A′B′C′D′ represents in an exaggerated fashion the cross-section (or the corresponding portion of the cross-section) of the same beam, when bent so that the centre of curvature of the central-line (which is at right angles to the plane of the figure) is on the line EF produced beyond F. The lines A′B′ and C′D′ are approximately circles of radii R/σ, when the central-line is a circle of radius R, and their centres are on the line FE produced beyond E. Thus the neutral plane, and each of the faces that is parallel to it, becomes strained into an *anticlastic surface*, whose principal curvatures are in the ratio $\sigma : 1$. The general appearance of the bent beam is shown in an exaggerated fashion in fig. 11, where the traces of the surface into which the neutral plane is bent are dotted. The result that the ratio of the principal curvatures of the anticlastic surfaces, into which the top and bottom planes of the beam (of rectangular section) are bent, is Poisson's ratio σ, has been used for the experimental determination of σ. The result that the radius of curvature of the bent central-line is EI/M is used in the experimental determination of E. The quantity EI is often called the "flexural rigidity" of the beam. There are two principal flexural rigidities corresponding to bending in the two principal planes (cf. § 62 below).

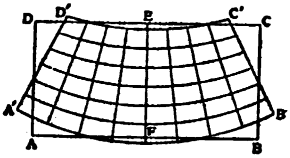

FIG. 10.

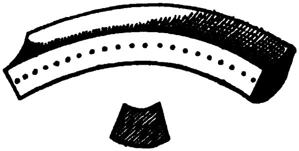

FIG. 11.

48. That this theory requires modification, when the load does not consist simply of terminal couples, can be seen most easily by considering the problem of a beam loaded at one end with a weight W, and supported in a horizontal position at its other end. The forces that are exerted at any section p, to balance the weight W, must reduce statically to a vertical force W and a couple, and these forces arise from the action of the part Ap on the part Bp (see fig. 12), *i.e.* from the stresses across the section at p. The couple is equal to the moment of the applied load W about an axis drawn through the centroid of the section p at right angles to the plane of bending. This moment is called the "bending moment" at the section, it is the product of the load W and the distance of the section from the loaded end, so that it varies uniformly along the length of the beam. The stress that suffices in the simpler problem gives rise to no vertical force, and it is clear that in addition to longitudinal tensions and pressures there must be tangential tractions on the cross-sections. The resultant of these tangential tractions must be a force equal to W, and directed vertically;

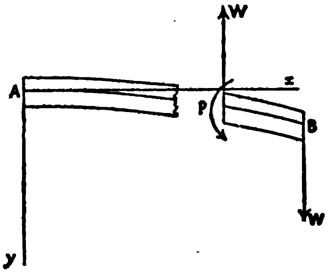

FIG. 12.

but the direction of the traction at a point of the cross-section need not in general be vertical. The existence of tangential traction on the cross-sections implies the existence of equal tangential traction, directed parallel to the central-line, on some planes or other which are parallel to this line, the two sets of tractions forming a shearing stress. We conclude that such shearing stress is a necessary constituent of the stress-system in the beam bent by terminal transverse load. We can develop a theory of this stress-system from the assumptions (i.) that the tension at any point of the cross-section is related to the bending moment at the section by the same law as in the case of uniform bending by terminal couples; (ii.) that, in addition to this tension, there is at any point shearing stress, involving tangential tractions acting in appropriate directions upon the elements of the cross-sections. When these assumptions are made it appears that there is one and only one distribution of shearing stress by which the conditions of the problem can be satisfied. The determination of the amount and direction of this shearing stress, and of the corresponding strains and displacements, was effected by Saint-Venant and R. F. A. Clebsch for a number of forms of section by means of an analysis of the same kind as that employed in the solution of the torsion problem.

49. Let l be the length of the beam, x the distance of the section p from the fixed end A, y the distance of any point below the horizontal plane through the centroid of the section at A, then the bending moment at p is $W(l-x)$, and the longitudinal tension P or X_x at any point on the cross-section is $-W(l-x)y/I$, and this is related to the bending moment exactly as in the simpler problem.

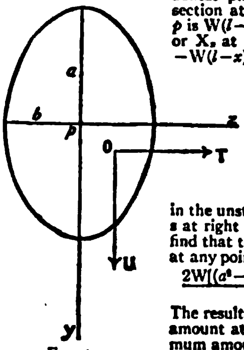

FIG. 13.

50. The expressions for the shearing stresses depend on the shape of the cross-section. Taking the beam to be of isotropic material and the cross-section to be an ellipse of semiaxes a and b (fig. 13), the a axis being vertical in the unstrained state, and drawing the axis z at right angles to the plane of flexure, we find that the vertical shearing stress U or X_y at any point (y, z) on any cross-section is

$$\frac{2W[(a^2-y^2)\{2a^2(1+\sigma)+b^2\}-z^2a^2(1-2\sigma)]}{\pi a^3b(1+\sigma)(3a^2+b^2)}.$$

The resultant of these stresses is W, but the amount at the centroid, which is the maximum amount, exceeds the average amount, $W/\pi ab$, in the ratio

$$\{4a^2(1+\sigma)+2b^2\}/(3a^2+b^2)(1+\sigma).$$

If $\sigma=\frac{1}{4}$, this ratio is $\frac{7}{5}$ for a circle, nearly $\frac{4}{3}$ for a flat elliptic bar with the longest diameter vertical, nearly $\frac{8}{5}$ for a flat elliptic bar with the longest diameter horizontal.

In the same problem the horizontal shearing stress T or Z_x at any point on any cross-section is of amount

$$-\frac{4Wyz\{a^2(1+\sigma)+b^2\sigma\}}{\pi a^3b(1+\sigma)(3a^2+b^2)}.$$

The resultant of these stresses vanishes; but, taking as before $\sigma=\frac{1}{4}$, and putting for the three cases above $a=b$, $a=10b$, $b=10a$, we find that the ratio of the maximum of this stress to the average vertical shearing stress has the values $\frac{3}{5}$, nearly $\frac{1}{15}$, and nearly 4. Thus the stress T is of considerable importance when the beam is a plank.

As another example we may consider a circular tube of external radius r_0 and internal radius r_1. Writing P, U, T for X_x, X_y, Z_x, we find

$$\left.\begin{aligned}
P&=-\frac{4W}{\pi(r_0^4-r_1^4)}(l-x)y,\\
U&=\frac{W}{2(1+\sigma)\pi(r_0^4-r_1^4)}\Big[(3+2\sigma)\Big\{r_0^2+r_1^2-y^2\\
&\qquad\qquad-\frac{r_0^2r_1^2}{(y^2+z^2)^2}(y^2-z^2)\Big\}-(1-2\sigma)z^2\Big]\\
T&=-\frac{W}{(1+\sigma)\pi(r_0^4-r_1^4)}\Big\{1+2\sigma+(3+2\sigma)\frac{r_0^2r_1^2}{(y^2+z^2)^2}\Big\}yz;
\end{aligned}\right\}$$

and for a tube of radius r and small thickness t the value of P and the maximum values of U and T reduce approximately to

$$P=-W(l-x)y/\pi r^3t$$
$$U_{\text{max.}}=W/\pi rt,\quad T_{\text{max.}}=W/2\pi rt.$$

The greatest value of U is in this case approximately twice its average value, but it is possible that these results for the bending of very thin tubes may be seriously at fault if the tube is not plugged, and if the load is not applied in the manner contemplated in the theory (cf. § 55). In such cases the extensions and contractions of the longitudinal filaments may be practically confined to a small part of the material near the ends of the tube, while the rest of the tube is deformed without stretching.

51. The tangential tractions U, T on the cross-sections are necessarily accompanied by tangential tractions on the longitudinal sections, and on each such section the tangential traction is parallel to the central line; on a vertical section $z=$const. its amount at any point is T, and on a horizontal section $y=$const. its amount at any point is U.

The internal stress at any point is completely determined by the components P, U, T, but these are not *principal stresses* (§ 7). Clebsch has given an elegant geometrical construction for determining the principal stresses at any point when the values of P, U, T are known.

From the point O (fig. 14) draw lines OP, OU, OT, to represent the stresses P, U, T at O, on the cross-section through O, in magnitude, direction and sense, and compound U and T into a resultant represented by OE; the plane EOP is a principal plane of stress at O, and the principal stress at right angles to this plane vanishes. Take M the middle point of OP, and with centre M and radius ME describe a circle cutting the line OP in A and B; then OA and OB represent the magnitudes of the two remaining principal stresses. On AB describe a rectangle ABDC so that DC passes through E; then OC is the direction of the principal stress represented in magnitude by OA, and OD is the direction of the principal stress represented in magnitude by OB.

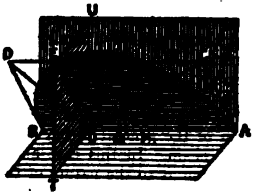

FIG. 14.

52. As regards the strain in the beam, the longitudinal and lateral extensions and contractions depend on the bending moment in the same way as in the simpler problem; but, the bending moment being variable, the anticlastic curvature produced is also variable. In addition to these extensions and contractions there are shearing strains corresponding to the shearing stresses T, U. The shearing strain corresponding to T consists of a relative sliding parallel to the central-line of different longitudinal linear elements combined with a relative sliding in a transverse horizontal direction of elements of different cross-sections; the latter of these is concerned in the production of these displacements by which the variable anticlastic curvature is brought about; to see the effect of the former we may most suitably consider, for the case of an elliptic cross-section, the distortion of the shape of a rectangular portion of a plane of the material which in the natural state was horizontal; all the boundaries of such a portion become parabolas of small curvature, which is variable along the length of the beam, and the particular effect under consideration is the change of the transverse horizontal linear elements from straight lines such as HK to parabolas such as H′K′ (fig. 15); the lines HL and KM are parallel to the central-line, and the figure is drawn for a plane above the neutral plane. When the cross-section is not an ellipse the character of the strain is the same, but the curves are only approximately parabolic.

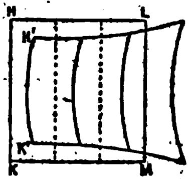

FIG. 15.

The shearing strain corresponding to U is a distortion which has the effect that the straight vertical filaments become curved lines which cut the longitudinal filaments obliquely, and thus the cross-sections do not remain plane, but become curved surfaces, and the tangent plane to any one of these surfaces at the centroid cuts the central line obliquely (fig. 16). The angle between these tangent planes and the central-line is the same at all points of the line; and, if it is denoted by $\frac{1}{2}\pi+s_0$, the value of s_0 is expressible as

$$\frac{\text{shearing stress at centroid}}{\text{rigidity of material}},$$

and it thus depends on the shape of the cross-section; for the elliptic section of § 50 its value is

$$\frac{4W}{E\pi ab}\,\frac{2a^2(1+\sigma)+b^2}{3a^2+b^2};$$

for a circle (with $\sigma=\frac{1}{4}$) this becomes $7W/2E\pi a^2$. The vertical filament through the centroid of any cross-section becomes a cubical parabola, as shown in fig. 16, and the contour lines of the curved surface into which any cross-section is distorted are shown in fig. 17 for a circular section.

53. The deflection of the beam is determined from the equation

curvature of central line = bending moment ÷ flexural rigidity,

and the special conditions at the supported end; there is no alteration of this statement on account of the shears. As regards the special condition at an end which is *encastrée*, or built in, Saint-Venant proposed to assume that the central tangent plane of the cross-section at the end is vertical; with this assumption the tangent to the central line at the end is inclined downwards and makes an angle s_0 with the horizontal (see fig. 18); it is, however, improbable that this condition is exactly realized in practice. In the application of the theory to the experimental determination of Young's modulus, the small angle which the central-line at the support makes with the horizontal is an unknown quantity, to be eliminated by observation of the deflection at two or more points.

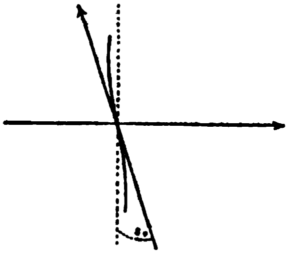

Fig. 16.

54. We may suppose the displacement in a bent beam to be produced by the following operations: (1) the central-line is deflected into its curved form, (2) the cross-sections are rotated about axes through their centroids at right angles to the plane of flexure so as to make angles equal to $\frac{1}{2}\pi+s_0$ with the central-line, (3) each cross-section is distorted in its own plane in such a way that the appropriate variable anticlastic curvature is produced, (4) the cross-sections are further distorted into curved surfaces. The contour lines of fig. 17 show the disturbance from the central tangent plane, not from the original vertical plane.

55. *Practical Application of Saint-Venant's Theory.*—The theory above described is exact provided the forces applied to the loaded end, which have W for resultant, are distributed over the terminal section in a particular way, not likely to be realized in practice; and the application to practical problems depends on a principle due to Saint-Venant, to the effect that, except for comparatively small portions of the beam near to the loaded and fixed ends, the resultant only is effective, and its mode of distribution does not seriously affect the internal strain and stress. In fact, the actual stress is that due to forces with the required resultant distributed in the manner contemplated in the theory, superposed upon that due to a certain distribution of forces on each terminal section which, if applied to a rigid body, would keep it in equilibrium; according to Saint-Venant's principle, the stresses and strains due to such distributions of force are unimportant except near the ends. For this principle to be exactly applicable it is necessary that the length of the beam should be very great compared with any linear dimension of its cross-section; for the practical application it is sufficient that the length should be about ten times the greatest diameter.

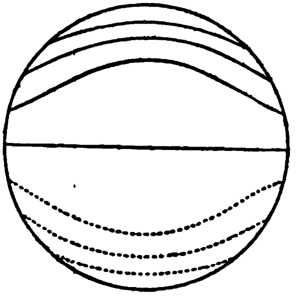

Fig. 17.

56. In recent years the problem of the bending of a beam by loads distributed along its length has been much advanced. It is now practically solved for the case of a load distributed uniformly, or according to any rational algebraic law, and it is also solved for the case where the thickness is small compared with the length and depth, as in a plate girder, and the load is distributed in any way. These solutions are rather complicated and difficult to interpret. The case which has been worked out most fully is that of a transverse load distributed uniformly along the length of the beam. In this case two noteworthy results have been obtained. The first of these is that the central-line in general suffers extension. This result had been found experimentally many years before. In the case of the plate girder loaded uniformly along the top, this extension is just half as great as the extension of the central-line of the same girder when free at the ends, supported along the base, and carrying the same load along the top. The second noteworthy result is that the curvature of the strained central-line is not proportional to the bending moment. Over and above the curvature which would be found from the ordinary relation—

curvature of central-line = bending moment ÷ flexural rigidity,

there is an additional curvature which is the same at all the cross-sections. In ordinary cases, provided the length is large compared with any linear dimension of the cross-section, this additional curvature is small compared with that calculated from the ordinary formula, but it may become important in cases like that of suspension bridges, where a load carried along the middle of the roadway is supported by tensions in rods attached at the sides.

57. When the ordinary relation between the curvature and the bending moment is applied to the calculation of the deflection of *continuous beams* it must not be forgotten that a correction of the kind just mentioned may possibly be requisite. In the usual method of treating the problem such corrections are not considered, and the ordinary relation is made the basis of the theory. In order to apply this relation to the calculation of the deflection, it is necessary to know the bending moment at every point; and, since the pressures of the supports are not among the data of the problem, we require a method of determining the bending moments at the supports either by calculation or in some other way. The calculation of the bending moment can be replaced by a method of graphical construction, due to Mohr, and depending on the two following theorems:—

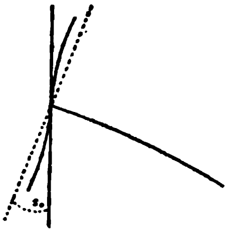

Fig. 18.

(i.) The curve of the central-line of each span of a beam, when the bending moment M is given,[1] is identical with the catenary or funicular curve passing through the ends of the span under a (fictitious) load per unit length of the span equal to M/EI, the horizontal tension in the funicular being unity.

(ii.) The directions of the tangents to this funicular curve at the ends of the span are the same for all statically equivalent systems of (fictitious) load.

When M is known, the magnitude of the resultant shearing stress at any section is dM/dx, where x is measured along the beam.

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[1] The sign of M is shown by the arrow-heads in fig. 19, for which, with y downwards,

$$EI\frac{d^2y}{dx^2}+M=0.$$

58. Let l be the length of a span of a loaded beam (fig. 19), M_1 and M_2 the bending moments at the ends, M the bending moment at a section distant x from the end (M_1), M′ the bending moment at the same section when the same span with the same load is simply supported; then M is given by the formula

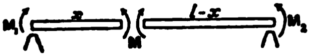

FIG. 19.

$$M = M' + M_1\frac{l-x}{l} + M_2\frac{x}{l},$$

and thus a fictitious load statically equivalent to M/EI can be easily found when M′ has been found. If we draw a curve (fig. 20) to pass through the ends of the span, so that its ordinate represents the value of M′/EI, the corresponding fictitious loads are statically equivalent to a single load, of amount represented by the area of the curve, placed at the point of the span vertically above the centre of gravity of this area. If PN is the ordinate of this curve, and if at the ends of the span we erect ordinates in the proper sense to represent M_1/EI and M_2/EI, the bending moment at any point is represented by the length PQ.[1] For a uniformly distributed load the curve of M′ is a parabola $M' = \frac{1}{2}wx(l-x)$, where w is the load per unit of length; and the statically equivalent fictitious load is $\frac{1}{12}wl^3$/EI placed at the middle point G of the span; also the loads statically equivalent to the fictitious loads $M_1(l-x)/l$EI and M_2x/lEI are $\frac{1}{2}M_1l$/EI and $\frac{1}{2}M_2l$/EI placed at the points g, g' of trisection of the span. The funicular polygon for the fictitious loads can thus be drawn, and the direction of the central-line at the supports is determined when the bending moments at the supports are known.

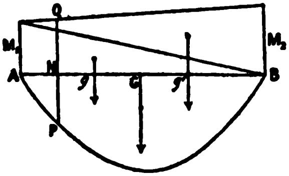

FIG. 20.

59. When there is more than one span the funiculars in question may be drawn for each of the spans, and, if the bending moments at the ends of the extreme spans are known, the intermediate ones can be determined. This determination depends on two considerations: (1) the fictitious loads corresponding to the bending moment at any support are proportional to the lengths of the spans which abut on that support; (2) the sides of two funiculars that end at any support coincide in direction. Fig. 21 illustrates the method for the case of a uniform beam on three supports A, B, C, the ends A and C being freely supported. There will be an unknown bending moment M_0 at B, and the system[2] of fictitious loads is $\frac{1}{12}w$AB³/EI at G the middle point of AB, $\frac{1}{12}w$BC³/EI at G the middle point of BC, $-\frac{1}{2}M_0$AB/EI at g and $-\frac{1}{2}M_0$BC/EI at g', where g and g' are the points of trisection nearer to B of the spans AB, BC. The centre of gravity of the two latter is a fixed point independent of M_0, and the line VK of the figure is the vertical through this point. We draw AD and CE to represent the loads at G and G′ in magnitude; then D and E are fixed points. We construct any triangle UVW whose sides UV, UW pass through D, B, and whose vertices lie on the verticals gU, VK, g'W; the point F where VW meets DB is a fixed point, and the lines EF, DK are the two sides (2, 4) of the required funiculars which do not pass through A, B or C. The remaining sides (1, 3, 5) can then be drawn, and the side 3 necessarily passes through B; for the triangle UVW and the triangle whose sides are 2, 3, 4 are in perspective.

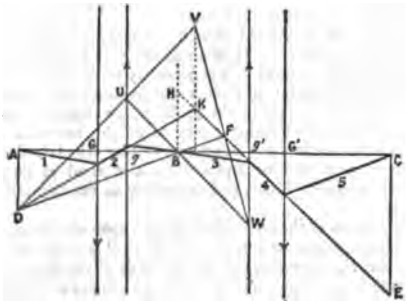

FIG. 21.

The bending moment M_0 is represented in the figure by the vertical line BH where H is on the continuation of the side 4, the scale being given by

$$\frac{\text{BH}}{\text{CE}} = \frac{\frac{1}{2}M_0\text{BC}}{\frac{1}{12}w\text{BC}^3};$$

this appears from the diagrams of forces, fig. 22, in which the oblique lines are marked to correspond to the sides of the funiculars to which they are parallel.

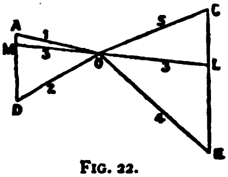

FIG. 22.

In the application of the method to more complicated cases there are two systems of fixed points corresponding to F, by means of which the sides of the funiculars are drawn.

60. *Finite Bending of Thin Rod.*—The equation

curvature = bending moment ÷ flexural rigidity

may also be applied to the problem of the flexure in a principal plane of a very thin rod or wire, for which the curvature need not be small. When the forces that produce the flexure are applied at the ends only, the curve into which the central-line is bent is one of a definite family of curves, to which the name *elastica* has been given, and there is a division of the family into two species according as the external forces are applied directly to the ends or are applied to rigid arms attached to the ends; the curves of the former species are characterized by the presence of inflections at all the points at which they cut the line of action of the applied forces.

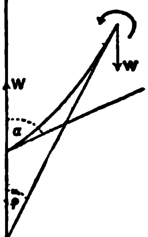

FIG. 23.

We select this case for consideration. The problem of determining the form of the curve (cf. fig. 23) is mathematically identical with the problem of determining the motion of a simple circular pendulum oscillating through a finite angle, as is seen by comparing the differential equation of the curve

$$\text{EI}\frac{d^2\phi}{ds^2} + \text{W}\sin\phi = 0$$

with the equation of motion of the pendulum

$$l\frac{d^2\phi}{dt^2} + g\sin\phi = 0.$$

The length L of the curve between two inflections corresponds to the time of oscillation of the pendulum from rest to rest, and we thus have

$$\text{L}\sqrt{(\text{W/EI})} = 2\text{K},$$

where K is the real quarter period of elliptic functions of modulus sin ½α, and α is the angle at which the curve cuts the line of action of the applied forces. Unless the length of the rod exceeds $\pi\sqrt{(\text{EI/W})}$ it will not bend under the force, but when the length is great enough there may be more than two points of inflection and more than one bay of the curve; for n bays ($n+1$ inflections) the length must exceed $n\pi\sqrt{(\text{EI/W})}$. Some of the forms of the curve are shown in fig. 24.

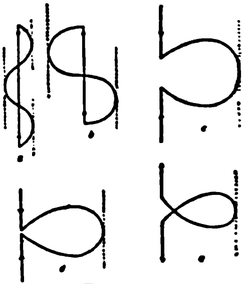

FIG. 24.

For the form d, in which two bays make a figure of eight, we have

$$\text{L}\sqrt{(\text{W/EI})} = 4{\cdot}6,\ \alpha = 130°$$

approximately. It is noteworthy that whenever the length and force admit of a sinuous form, such as a or b, with more than two inflections, there is also possible a crossed form, like e, with two inflections only; the latter form is stable and the former unstable.

61. The particular case of the above for which α is very small is a curve of sines of small amplitude, and the result in this case has been applied to the problem of the buckling of struts under thrust. When the strut, of length L, is

---

[1] The figure is drawn for a case where the bending moment has the same sign throughout.

[2] M_0 is taken to have, as it obviously has, the opposite sense to that shown in fig. 19.

maintained upright at its lower end, and loaded at its upper end, it is simply contracted, unless $L'^2W > \frac{1}{4}\pi^2EI$, for the lower end corresponds to a point at which the tangent is vertical on an elastica for which the line of inflections is also vertical, and thus the length must be half of one bay (fig. 25, *a*). For greater lengths or loads the strut tends to bend or buckle under the load. For a very slight excess of L'^2W above $\frac{1}{4}\pi^2EI$, the theory on which the above discussion is founded, is not quite adequate, as it assumes the central-line of the strut to be free from extension or contraction, and it is probable that bending without extension does not take place when the length or the force exceeds the critical value but slightly. It should be noted also that the formula has no application to short struts, as the theory from which it is derived is founded on the assumption that the length is great compared with the diameter (cf. § 56).

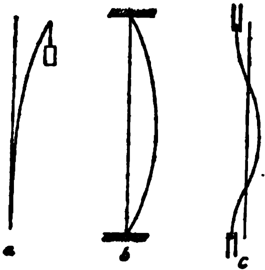

FIG. 25.

The condition of buckling, corresponding to the above, for a long strut, of length L′, when both ends are free to turn is $L'^2W > \pi^2EI$; for the central-line forms a complete bay (fig. 25, *b*); if both ends are maintained in the same vertical line, the condition is $L'^2W > 4\pi^2EI$, the central-line forming a complete bay and two half bays (fig. 25, *c*).

62. In our consideration of flexure it has so far been supposed that the bending takes place in a principal plane. We may remove this restriction by resolving the forces that tend to produce bending into systems of forces acting in the two principal planes. To each plane there corresponds a particular flexural rigidity, and the systems of forces in the two planes give rise to independent systems of stress, strain and displacement, which must be superposed in order to obtain the actual state. Applying this process to the problem of §§ 48-54, and supposing that one principal axis of a cross-section at its centroid makes an angle θ with the vertical, then for any shape of section the neutral surface or locus of unextended fibres cuts the section in a line DD′, which is conjugate to the vertical diameter CP with respect to any ellipse of inertia of the section. The central-line is bent into a plane curve which is not in a vertical plane, but is in a plane through the line CY which is perpendicular to DD′ (fig. 26).

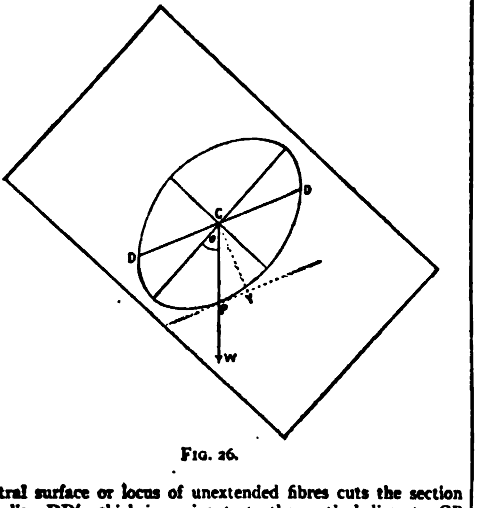

FIG. 26.

63. *Bending and Twisting of Thin Rods.*—When a very thin rod or wire is bent and twisted by applied forces, the forces on any part of it limited by a normal section are balanced by the tractions across the section, and these tractions are statically equivalent to certain forces and couples at the centroid of the section; we shall call them the *stress-resultants* and the *stress-couples*. The stress-couples consist of two flexural couples in the two principal planes, and the torsional couple about the tangent to the central-line. The torsional couple is the product of the torsional rigidity and the twist produced; the torsional rigidity is exactly the same as for a straight rod of the same material and section twisted without bending, as in Saint-Venant's torsion problem (§ 42). The twist τ is connected with the deformation of the wire in this way: if we suppose a very small ring which fits the cross-section of the wire to be provided with a pointer in the direction of one principal axis of the section at its centroid, and to move along the wire with velocity v, the pointer will rotate about the central-line with angular velocity τv. The amount of the flexural couple for either principal plane at any section is the product of the flexural rigidity for that plane, and the resolved part in that plane of the curvature of the central line at the centroid of the section; the resolved part of the curvature along the normal to any plane is obtained by treating the curvature as a vector directed along the normal to the osculating plane and projecting this vector. The flexural couples reduce to a single couple in the osculating plane proportional to the curvature when the two flexural rigidities are equal, and in this case only.

The stress-resultants across any section are tangential forces in the two principal planes, and a tension or thrust along the central-line; when the stress-couples and the applied forces are known these stress-resultants are determinate. The existence, in particular, of the resultant tension or thrust parallel to the central-line does not imply sensible extension or contraction of the central filament, and the tension per unit area of the cross-section to which it would be equivalent is small compared with the tensions and pressures in longitudinal filaments not passing through the centroid of the section; the moments of the latter tensions and pressures constitute the flexural couples.

64. We consider, in particular, the case of a naturally straight spring or rod of circular section, radius c, and of homogeneous isotropic material. The torsional rigidity is $\frac{1}{4}E\pi c^4/(1+\sigma)$; and the flexural rigidity, which is the same for all planes through the central-line, is $\frac{1}{4}E\pi c^4$; we shall denote these by C and A respectively. The rod may be held bent by suitable forces into a curve of double curvature with an amount of twist τ, and then the torsional couple is $C\tau$, and the flexural couple in the osculating plane is A/ρ, where ρ is the radius of circular curvature. Among the curves in which the rod can be held by forces and couples applied at its ends only, one is a circular helix; and then the applied forces and couples are equivalent to a wrench about the axis of the helix.

Let α be the angle and r the radius of the helix, so that ρ is $r\sec^2\alpha$; and let R and K be the force and couple of the wrench (fig. 27).

Then the couple formed by R and an equal and opposite force at any section and the couple K are equivalent to the torsional and flexural couples at the section, and this gives the equations for R and K

$$R = A\frac{\sin\alpha\cos^2\alpha}{r^2} - C\tau\frac{\cos\alpha}{r},$$

$$K = A\frac{\cos^3\alpha}{r} + C\tau\sin\alpha.$$

The thrust across any section is $R\sin\alpha$ parallel to the tangent to the helix, and the shearing stress-resultant is $R\cos\alpha$ at right angles to the osculating plane.

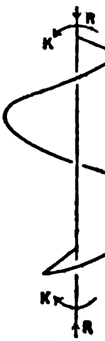

FIG. 27.

When the twist is such that, if the rod were simply unbent, it would also be untwisted, τ is $(\sin\alpha\cos\alpha)/r$, and then, restoring the values of A and C, we have

$$R=\frac{E\pi c^4}{4r^2}\frac{\sigma}{1+\sigma}\sin\alpha\cos^2\alpha,$$

$$K=\frac{E\pi c^4}{4r}\frac{1+\sigma\cos^2\alpha}{1+\sigma}\cos\alpha.$$

65. The theory of spiral springs affords an application of these results. The stress-couples called into play when a naturally helical spring (α, r) is held in the form of a helix (α', r'), are equal to the differences between those called into play when a straight rod of the same material and section is held in the first form, and those called into play when it is held in the second form.

Thus the torsional couple is

$$C\left(\frac{\sin\alpha'\cos\alpha'}{r'}-\frac{\sin\alpha\cos\alpha}{r}\right),$$

and the flexural couple is

$$A\left(\frac{\cos^2\alpha'}{r'}-\frac{\cos^2\alpha}{r}\right).$$

The wrench (R, K) along the axis by which the spring can be held in the form (α', r') is given by the equations

$$R=A\frac{\sin\alpha'}{r'}\left(\frac{\cos^2\alpha'}{r'}-\frac{\cos^2\alpha}{r}\right)-C\frac{\cos\alpha'}{r'}\left(\frac{\sin\alpha'\cos\alpha'}{r'}-\frac{\sin\alpha\cos\alpha}{r}\right),$$

$$K=A\cos\alpha'\left(\frac{\cos^2\alpha'}{r'}-\frac{\cos^2\alpha}{r}\right)+C\sin\alpha'\left(\frac{\sin\alpha'\cos\alpha'}{r'}-\frac{\sin\alpha\cos\alpha}{r}\right).$$

When the spring is slightly extended by an axial force F, $=-R$, and there is no couple, so that K vanishes, and α', r' differ very little from α, r, it follows from these equations that the axial elongation, δx, is connected with the axial length x and the force F by the equation

$$F=\frac{E\pi c^4}{4r^2}\frac{\sin\alpha}{1+\sigma\cos^2\alpha}\frac{\delta x}{x},$$

and that the loaded end is rotated about the axis of the helix through a small angle

$$\frac{4\sigma Fxr\cos\alpha}{E\pi c^4},$$

the sense of the rotation being such that the spring becomes more tightly coiled.

66. A horizontal pointer attached to a vertical spiral spring would be made to rotate by loading the spring, and the angle through which it turns might be used to measure the load, at any rate, when the load is not too great; but a much more sensitive contrivance is the twisted strip devised by W. E. Ayrton and J. Perry. A very thin, narrow rectangular strip of metal is given a permanent twist about its longitudinal middle line, and a pointer is attached to it at right angles to this line. When the strip is subjected to longitudinal tension the pointer rotates through a considerable angle. G. H. Bryan (*Phil. Mag.*, December 1890) has succeeded in constructing a theory of the action of the strip, according to which it is regarded as a strip of *plating* in the form of a right helicoid, which, after extension of the middle line, becomes a portion of a slightly different helicoid; on account of the thinness of the strip, the change of curvature of the surface is considerable, even when the extension is small, and the pointer turns with the generators of the helicoid.

If b stands for the breadth and t for the thickness of the strip, and τ for the permanent twist, the approximate formula for the angle θ through which the strip is untwisted on the application of a load W was found to be

$$\theta=\frac{Wb\tau(1+\sigma)}{2Et^3\left(1+\frac{(1+\sigma)}{30}\frac{b^4\tau^2}{t^2}\right)}.$$

The quantity $b\tau$ which occurs in the formula is the total twist in a length of the strip equal to its breadth, and this will generally be very small; if it is small of the same order as t/b, or a higher order, the formula becomes $\frac{1}{2}Wb\tau(1+\sigma)/Et^3$, with sufficient approximation, and this result appears to be in agreement with observations of the behaviour of such strips.

67. *Thin Plate under Pressure.*—The theory of the deformation of plates, whether plane or curved, is very intricate, partly because of the complexity of the kinematical relations involved. We shall here indicate the nature of the effects produced in a thin plane plate, of isotropic material, which is slightly bent by pressure. This theory should have an application to the stress produced in a ship's plates. In the problem of the cylinder under internal pressure (§ 77 below) the most important stress is the circumferential tension, counteracting the tendency of the circular filaments to expand under the pressure; but in the problem of a plane plate some of the filaments parallel to the plane of the plate are extended and others are contracted, so that the tensions and pressures along them give rise to resultant couples but not always to resultant forces. Whatever forces are applied to bend the plate, these couples are always expressible, at least approximately in terms of the principal curvatures produced in the surface which, before strain, was the middle plane of the plate. The simplest case is that of a rectangular plate, bent by a distribution of couples applied to its edges, so that the middle surface becomes a cylinder of large radius R; the requisite couple per unit of length of the straight edges is of amount C/R, where C is a certain constant; and the requisite couple per unit of length of the circular edges is of amount $C\sigma/R$, the latter being required to resist the tendency to anticlastic curvature (cf. §47). If normal sections of the plate are supposed drawn through the generators and circular sections of the cylinder, the action of the neighbouring portions on any portion so bounded involves flexural couples of the above amounts. When the plate is bent in any manner, the curvature produced at each section of the middle surface may be regarded as arising from the superposition of two cylindrical curvatures; and the flexural couples across normal sections through the lines of curvature, estimated per unit of length of those lines, are $C(1/R_1+\sigma/R_2)$ and $C(1/R_2+\sigma/R_1)$, where R_1 and R_2 are the principal radii of curvature. The value of C for a plate of small thickness $2h$ is $\frac{2}{3}Eh^3/(1-\sigma^2)$. Exactly as in the problem of the beam (§§ 48, 56), the action between neighbouring portions of the plate generally involves shearing stresses across normal sections as well as flexural couples; and the resultants of these stresses are determined by the conditions that, with the flexural couples, they balance the forces applied to bend the plate.

68. To express this theory analytically, let the middle plane of the plate in the unstrained position be taken as the plane of (x, y), and let normal sections at right angles to the axes of x and y be drawn through any point. After strain let w be the displacement of this point in the direction perpendicular to the plane, marked p in fig. 28. If the axes of x and y were parallel to the lines of curvature at the point, the flexural couple acting across the section normal to x (or y) would have the axis of y (or x) for its axis; but when the lines of curvature are inclined to the axes of co-ordinates, the flexural couple across a section normal to either axis has a component about that axis as well as a component about the perpendicular axis. Consider an element ABCD of the section at right angles to the axis of x, contained between two lines near together and perpendicular to the middle plane. The action of the portion of the plate to the right upon the portion to the left, across the element, gives rise to a couple about the middle line (y) of amount, estimated per unit of length of that line, equal to $C\left(\frac{\partial^2 w}{\partial x^2}+\sigma\frac{\partial^2 w}{\partial y^2}\right)$, $=G_1$, say, and to a couple, similarly estimated, about the normal (x) of amount $-C(1-\sigma)\frac{\partial^2 w}{\partial x\partial y}$, $=H$, say. The

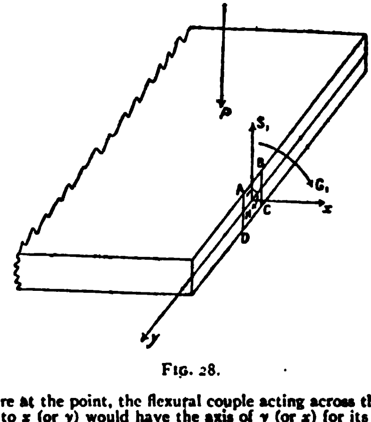

FIG. 28.

corresponding couples on an element of a section at right angles to the axis of y, estimated per unit of length of the axis of x, are of amounts $-C\left(\frac{\partial^2 w}{\partial y^2}+\sigma\frac{\partial^2 w}{\partial x^2}\right)$, $=G_2$ say, and $-H$. The resultant S_1 of the shearing stresses on the element ABCD, estimated as before, is given by the equation $S_1=\frac{\partial G_1}{\partial x}-\frac{\partial H}{\partial y}$ (cf. § 57), and the corresponding resultant S_2 for an element perpendicular to the axis of y is given by the equation $S_2=-\frac{\partial H}{\partial x}-\frac{\partial G_2}{\partial y}$. If the plate is bent by a pressure p per unit of area, the equation of equilibrium is $\frac{\partial S_1}{\partial x}+\frac{\partial S_2}{\partial y}=p$, or, in terms of w,

$$\frac{\partial^4 w}{\partial x^4}+\frac{\partial^4 w}{\partial y^4}+2\frac{\partial^4 w}{\partial x^2\partial y^2}=\frac{p}{C}.$$

This equation, together with the special conditions at the rim, suffices for the determination of w, and then all the quantities here introduced are determined. Further, the most important of the stress-components are those which act across elements of normal sections: the tension in direction x, at a distance z from the middle plane measured in the direction of p, is of amount $-\frac{3Cz}{2h^3}\left(\frac{\partial^2 w}{\partial x^2}+\sigma\frac{\partial^2 w}{\partial y^2}\right)$, and there is a corresponding tension in direction y; the shearing stress consisting of traction parallel to y on planes $x=\text{const.}$, and traction parallel to x on planes $y=\text{const.}$, is of amount $\frac{3C(1-\sigma)z}{2h^3}\frac{\partial^2 w}{\partial x\partial y}$; these tensions and shearing stresses are equivalent to two principal tensions, in the directions of the lines of curvature of the surface into which the middle plane is bent, and they give rise to the flexural couples.

69. In the special example of a circular plate, of radius a, supported at the rim, and held bent by a uniform pressure p, the value of w at a point distant r from the axis is

$$\frac{1}{64}\frac{p}{C}(a^2-r^2)\left(\frac{5+\sigma}{1+\sigma}a^2-r^2\right)$$

and the most important of the stress components is the radial tension, of which the amount at any point is $\frac{3}{32}(3+\sigma)pz(a^2-r)/h^3$; the maximum radial tension is about $\frac{1}{3}(a/h)^2p$, and, when the thickness is small compared with the diameter, this is a large multiple of p.

70. *General Theorems.*—Passing now from these questions of flexure and torsion, we consider some results that can be deduced from the general equations of equilibrium of an elastic solid body.

The form of the general expression for the potential energy (§ 27) stored up in the strained body leads, by a general property of quadratic functions, to a reciprocal theorem relating to the effects produced in the body by two different systems of forces, viz.: The whole work done by the forces of the first system, acting over the displacements produced by the forces of the second system, is equal to the whole work done by the forces of the second system, acting over the displacements produced by the forces of the first system. By a suitable choice of the second system of forces, the average values of the component stresses and strains produced by given forces, considered as constituting the first system, can be obtained, even when the distribution of the stress and strain cannot be determined.

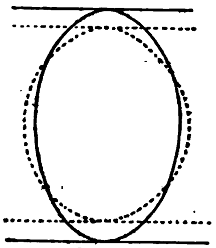

FIG. 29.

Taking for example the problem presented by an isotropic body of any form[1] pressed between two parallel planes distant l apart (fig. 29), and denoting the resultant pressure by p, we find that the diminution of volume $-\delta v$ is given by the equation

$$-\delta v=lp/3k,$$

where k is the modulus of compression, equal to $\frac{1}{3}E/(1-2\sigma)$. Again, take the problem of the changes produced in a heavy body by different ways of supporting it; when the body is suspended from one or more points in a horizontal plane its volume is increased by

$$\delta v=Wh/3k,$$

where W is the weight of the body, and h the depth of its centre of gravity below the plane; when the body is supported by upward vertical pressures at one or more points in a horizontal plane the volume is diminished by

$$-\delta v=Wh'/3k,$$

where h' is the height of the centre of gravity above the plane; if the body is a cylinder, of length l and section A, standing with its base on a smooth horizontal plane, its length is shortened by an amount

$$-\delta l=Wl/2EA;$$

if the same cylinder lies on the plane with its generators horizontal, its length is increased by an amount

$$\delta l=\sigma Wh'/EA.$$

71. In recent years important results have been found by considering the effects produced in an elastic solid by forces applied at isolated points.

Taking the case of a single force F applied at a point in the interior, we may show that the stress at a distance r from the point consists of

(1) a radial pressure of amount

$$\frac{2-\sigma}{1-\sigma}\frac{F}{4\pi}\frac{\cos\theta}{r^2},$$

(2) tension in all directions at right angles to the radius of amount

$$\frac{1-2\sigma}{2(1-\sigma)}\frac{F\cos\theta}{4\pi\ r^2},$$

(3) shearing stress consisting of traction acting along the radius dr on the surface of the cone $\theta=\text{const.}$ and traction acting along the meridian $d\theta$ on the surface of the sphere $r=\text{const.}$ of amount

$$\frac{1-2\sigma}{2(1-\sigma)}\frac{F}{4\pi}\frac{\sin\theta}{r^2},$$

where θ is the angle between the radius vector r and the line of action of F. The line marked T in fig. 30 shows the direction of the tangential traction on the spherical surface.

Thus the lines of stress are in and perpendicular to the meridian plane, and the direction of one of those in the meridian plane is inclined to the radius vector r at an angle

$$\tfrac{1}{2}\tan^{-1}\left(\frac{2-4\sigma}{5-4\sigma}\tan\theta\right)$$

The corresponding displacement at any point is compounded of a radial displacement of amount

$$\frac{1+\sigma}{2(1-\sigma)}\frac{F}{4\pi E}\frac{\cos\theta}{r}$$

and a displacement parallel to the line of action of F of amount

$$\frac{(3-4\sigma)(1+\sigma)}{2(1-\sigma)}\frac{F}{4\pi E}\frac{1}{r}.$$

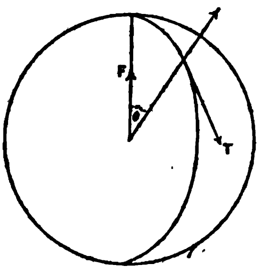

FIG. 30.

The effects of forces applied at different points and in different directions can be obtained by summation, and the effect of continuously distributed forces can be obtained by integration.

72. The stress system considered in § 71 is equivalent, on the plane through the origin at right angles to the line of action of F, to a resultant pressure of magnitude $\frac{1}{2}$F at the origin and a radial traction of amount $\frac{1-2\sigma}{2(1-\sigma)}\frac{F}{4\pi r^2}$, and, by the application of this system of tractions to a solid bounded by a plane, the displacement just described would be produced. There is also another stress system for a solid so bounded which is equivalent, on the same plane, to a resultant pressure at the origin, and a radial traction proportional to $1/r^2$, but these are in the ratio $2\pi:r^{-2}$, instead of being in the ratio $4\pi(1-\sigma):(1-2\sigma)r^{-2}$

The second stress system (see fig. 31) consists of:

(1) radial pressure $F'r^{-2}$,

(2) tension in the meridian plane across the radius vector of amount

$$F'r^{-2}\cos\theta/(1+\cos\theta),$$

(3) tension across the meridian plane of amount

$$F'r^{-2}/(1+\cos\theta),$$

(4) shearing stress as in § 71 of amount

$$F'r^{-2}\sin\theta/(1+\cos\theta),$$

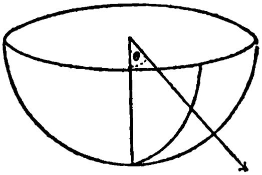

FIG. 31.

and the stress across the plane boundary consists of a resultant pressure of magnitude $2\pi F'$ and a radial traction of amount $F'r^{-2}$. If then we superpose the component stresses of the last section multiplied by $4(1-\sigma)W/F$, and the component stresses here written down multiplied by $-(1-2\sigma)\ W/2\pi F$, the stress on the plane boundary will reduce to a single pressure W at the origin. We shall thus obtain the stress system at any point due to such a force applied at one point of the boundary.

---

[1] The line joining the points of contact must be normal to the planes.

In the stress system thus arrived at the traction across any plane parallel to the boundary is directed away from the place where W is supported, and its amount is $3W\cos^2\theta/2\pi r^2$. The corresponding displacement consists of

(1) a horizontal displacement radially outwards from the vertical through the origin of amount

$$\frac{W(1+\sigma)\sin\theta}{2\pi Er}\left(\cos\theta-\frac{1-2\sigma}{1+\cos\theta}\right),$$

(2) a vertical displacement downwards of amount

$$\frac{W(1+\sigma)}{2\pi Er}\{2(1-\sigma)+\cos^2\theta\}.$$

The effects produced by a system of loads on a solid bounded by a plane can be deduced.

The results for a solid body bounded by an infinite plane may be interpreted as giving the local effects of forces applied to a small part of the surface of a body. The results show that pressure is transmitted into a body from the boundary in such a way that the traction at a point on a section parallel to the boundary is the same at all points of any sphere which touches the boundary at the point of pressure, and that its amount at any point is inversely proportional to the square of the radius of this sphere, while its direction is that of a line drawn from the point of pressure to the point at which the traction is estimated. The transmission of force through a solid body indicated by this result was strikingly demonstrated in an attempt that was made to measure the lunar deflexion of gravity; it was found that the weight of the observer on the floor of the laboratory produced a disturbance of the instrument sufficient to disguise completely the effect which the instrument had been designed to measure (see G. H. Darwin, *The Tides and Kindred Phenomena in the Solar System*, London, 1898).

73. There is a corresponding theory of two-dimensional systems, that is to say, systems in which either the displacement is parallel to a fixed plane, or there is no traction across any plane of a system of parallel planes. This theory shows that, when pressure is applied at a point of the edge of a plate in any direction in the plane of the plate, the stress developed in the plate consists exclusively of radial pressure across any circle having the point of pressure as centre, and the magnitude of this pressure is the same at all points of any circle which touches the edge at the point of pressure, and its amount at any point is inversely proportional to the radius of this circle. This result leads to a number of interesting solutions of problems relating to plane systems; among these may be mentioned the problem of a circular plate strained by any forces applied at its edge.

74. The results stated in § 72 have been applied to give an account of the nature of the actions concerned in the impact of two solid bodies. The dissipation of energy involved in the impact is neglected, and the resultant pressure between the bodies at any instant during the impact is equal to the rate of destruction of momentum of either along the normal to the plane of contact drawn towards the interior of the other. It has been shown that in general the bodies come into contact over a small area bounded by an ellipse, and remain in contact for a time which varies inversely as the fifth root of the initial relative velocity.

For equal spheres of the same material, with $\sigma=\frac{1}{4}$, impinging directly with relative velocity v, the patches that come into contact are circles of radius

$$\left(\frac{45\pi}{256}\right)^{\frac{1}{5}}\left(\frac{v}{V}\right)^{\frac{2}{5}}r,$$

where r is the radius of either, and V the velocity of longitudinal waves in a thin bar of the material. The duration of the impact is approximately

$$(2\cdot9432)\left(\frac{2025\pi^2}{512}\right)^{1/5}\frac{r}{v^{1/5}V^{4/5}}.$$

For two steel spheres of the size of the earth impinging with a velocity of 1 cm. per second the duration of the impact would be about twenty-seven hours. The fact that the duration of impact is, for moderate velocities, a considerable multiple of the time taken by a wave of compression to travel through either of two impinging bodies has been ascertained experimentally, and constitutes the reason for the adequacy of the statical theory here described.

75. *Spheres and Cylinders.*—Simple results can be found for spherical and cylindrical bodies strained by radial forces.

For a sphere of radius a, and of homogeneous isotropic material of density ρ, strained by the mutual gravitation of its parts, the stress at a distance r from the centre consists of

(1) uniform hydrostatic pressure of amount $\frac{1}{10}g\rho a(3-\sigma)/(1-\sigma)$,

(2) radial tension of amount $\frac{1}{10}g\rho(r^2/a)(3-\sigma)/(1-\sigma)$,

(3) uniform tension at right angles to the radius vector of amount

$$\tfrac{1}{10}g\rho(r^2/a)(1+3\sigma)/(1-\sigma),$$

where g is the value of gravity at the surface. The corresponding strains consist of

(1) uniform contraction of all lines of the body of amount

$$\tfrac{1}{30}k^{-1}g\rho a(3-\sigma)/(1-\sigma),$$

(2) radial extension of amount $\frac{1}{10}k^{-1}g\rho(r^2/a)(1+\sigma)/(1-\sigma)$,

(3) extension in any direction at right angles to the radius vector of amount

$$\tfrac{1}{30}k^{-1}g\rho(r^2/a)(1+\sigma)/(1-\sigma),$$

where k is the modulus of compression. The volume is diminished by the fraction $g\rho a/5k$ of itself. The parts of the radii vectores within the sphere $r=a\{(3-\sigma)/(3+3\sigma)\}^{1/2}$ are contracted, and the parts without this sphere are extended. The application of the above results to the state of the interior of the earth involves a neglect of the caution emphasized in § 40, viz. that the strain determined by the solution must be small if the solution is to be accepted. In a body of the size and mass of the earth, and having a resistance to compression and a rigidity equal to those of steel, the radial contraction at the centre, as given by the above solution, would be nearly ¼, and the radial extension at the surface nearly ⅓, and these fractions can by no means be regarded as "small."

76. In a spherical shell of homogeneous isotropic material, of internal radius r_1 and external radius r_0, subjected to pressure p_0 on the outer surface, and p_1 on the inner surface, the stress at any point distant r from the centre consists of

(1) uniform tension in all directions of amount $\dfrac{p_1r_1^3-p_0r_0^3}{r_0^3-r_1^3}$,

(2) radial pressure of amount $\dfrac{p_1-p_0}{r_0^3-r_1^3}\dfrac{r_0^3r_1^3}{r^3}$,

(3) tension in all directions at right angles to the radius vector of amount

$$\frac{1}{2}\frac{p_1-p_0}{r_0^3-r_1^3}\frac{r_0^3r_1^3}{r^3}.$$

The corresponding strains consist of

(1) uniform extension of all lines of the body of amount

$$\frac{1}{3k}\frac{p_1r_1^3-p_0r_0^3}{r_0^3-r_1^3},$$

(2) radial contraction of amount $\dfrac{1}{2\mu}\dfrac{p_1-p_0}{r_0^3-r_1^3}\dfrac{r_0^3r_1^3}{r^3}$,

(3) extension in all directions at right angles to the radius vector of amount

$$\frac{1}{4\mu}\frac{p_1-p_0}{r_0^3-r_1^3}\frac{r_0^3r_1^3}{r^3},$$

where μ is the modulus of rigidity of the material, $=\frac{1}{2}E/(1+\sigma)$. The volume included between the two surfaces of the body is increased by the fraction $\dfrac{p_1r_1^3-p_0r_0^3}{k(r_0^3-r_1^3)}$ of itself, and the volume within the inner surface is increased by the fraction

$$\frac{3(p_1-p_0)}{4\mu}\frac{r_0^3}{r_0^3-r_1^3}+\frac{p_1r_1^3-p_0r_0^3}{k(r_0^3-r_1^3)}$$

of itself. For a shell subject only to internal pressure p the greatest extension is the extension at right angles to the radius at the inner surface, and its amount is

$$\frac{pr_1^3}{r_0^3-r_1^3}\left(\frac{1}{3k}+\frac{1}{4\mu}\frac{r_0^3}{r_1^3}\right)$$

the greatest tension is the transverse tension at the inner surface, and its amount is $p(\frac{1}{2}r_0^3+r_1^3)/(r_0^3-r_1^3)$.

77. In the problem of a cylindrical shell under pressure a complication may arise from the effects of the ends; but when the ends are free from stress the solution is very simple. With notation similar to that in § 76 it can be shown that the stress at a distance r from the axis consists of

(1) uniform tension in all directions at right angles to the axis of amount

$$\frac{p_1r_1^2-p_0r_0^2}{r_0^2-r_1^2}.$$

(2) radial pressure of amount $\dfrac{p_1-p_0}{r_0^2-r_1^2}\dfrac{r_0^2r_1^2}{r^2}$,

(3) hoop tension numerically equal to this radial pressure.

The corresponding strains consist of

(1) uniform extension of all lines of the material at right angles to the axis of amount

$$\frac{1-\sigma}{E}\frac{p_1r_1^2-p_0r_0^2}{r_0^2-r_1^2},$$

(2) radial contraction of amount

$$\frac{1+\sigma}{E}\frac{p_1-p_0}{r_0^2-r_1^2}\frac{r_0^2r_1^2}{r^2},$$

(3) extension along the circular filaments numerically equal to this radial contraction.

(4) uniform contraction of the longitudinal filaments of amount

$$\frac{2\sigma}{E}\frac{p_1r_1^2-p_0r_0^2}{r_0^2-r_1^2}.$$

For a shell subject only to internal pressure p the greatest extension is the circumferential extension at the inner surface, and its amount is

$$\frac{p}{E}\left(\frac{r_0^2+r_1^2}{r_0^2-r_1^2}+\sigma\right);$$

the greatest tension is the hoop tension at the inner surface, and its amount is $p(r_0^2+r_1^2)/(r_0^2-r_1^2)$.

78. When the ends of the tube, instead of being free, are closed by disks, so that the tube becomes a closed cylindrical vessel, the longitudinal extension is determined by the condition that the resultant longitudinal tension in the walls balances the resultant normal pressure on either end. This condition gives the value of the extension of the longitudinal filaments as

$$(p_1r_1^2-p_0r_0^2)/3k(r_0^2-r_1^2),$$

where k is the modulus of compression of the material. The result may be applied to the experimental determination of k, by measuring the increase of length of a tube subjected to internal pressure (A. Mallock, *Proc. R. Soc. London*, lxxiv., 1904, and C. Chree, *ibid.*).

79. The results obtained in § 77 have been applied to gun construction; we may consider that one cylinder is heated so as to slip over another upon which it shrinks by cooling, so that the two form a single body in a condition of initial stress.

We take P as the measure of the pressure between the two, and p for the pressure within the inner cylinder by which the system is afterwards strained, and denote by r the radius of the common surface. To obtain the stress at any point we superpose the system consisting of radial pressure $p\frac{r_1^2}{r^2}\frac{r_0^2-r^2}{r_0^2-r_1^2}$ and hoop tension $p\frac{r_1^2}{r^2}\frac{r_0^2+r^2}{r_0^2-r_1^2}$ upon a system which, for the outer cylinder, consists of radial pressure $P\frac{r'^2}{r^2}\frac{r_0^2-r^2}{r_0^2-r'^2}$ and hoop tension $P\frac{r'^2}{r^2}\frac{r_0^2+r^2}{r_0^2-r'^2}$, and for the inner cylinder consists of radial pressure $P\frac{r'^2}{r^2}\frac{r^2-r_1^2}{r'^2-r_1^2}$ and hoop tension $P\frac{r'^2}{r^2}\frac{r^2+r_1^2}{r'^2-r_1^2}$. The hoop tension at the inner surface is less than it would be for a tube of equal thickness without initial stress in the ratio

$$1-\frac{P}{p}\frac{2r'^2}{r_0^2+r_1^2}\frac{r_0^2-r_1^2}{r'^2-r_1^2}:1.$$

This shows how the strength of the tube is increased by the initial stress. When the initial stress is produced by tightly wound wire, a similar gain of strength accrues.

80. In the problem of determining the distribution of stress and strain in a circular cylinder, rotating about its axis, simple solutions have been obtained which are sufficiently exact for the two special cases of a thin disk and a long shaft.

Suppose that a circular disk of radius a and thickness $2l$, and of density ρ, rotates about its axis with angular velocity ω, and consider the following systems of superposed stresses at any point distant r from the axis and z from the middle plane:

(1) uniform tension in all directions at right angles to the axis of amount $\frac{1}{8}\omega^2\rho a^2(3+\sigma)$,

(2) radial pressure of amount $\frac{1}{8}\omega^2\rho r^2(3+\sigma)$,

(3) pressure along the circular filaments of amount $\frac{1}{8}\omega^2\rho r^2(1+3\sigma)$,

(4) uniform tension in all directions at right angles to the axis of amount $\frac{1}{6}\omega^2\rho(l^2-3z^2)\sigma(1+\sigma)/(1-\sigma)$.

The corresponding strains may be expressed as

(1) uniform extension of all filaments at right angles to the axis of amount

$$\frac{1-\sigma}{E}\tfrac{1}{8}\omega^2\rho a^2(3+\sigma),$$

(2) radial contraction of amount

$$\frac{1-\sigma^2}{E}\tfrac{3}{8}\omega^2\rho r^2,$$

(3) contraction along the circular filaments of amount

$$\frac{1-\sigma^2}{E}\tfrac{1}{8}\omega^2\rho r^2,$$

(4) extension of all filaments at right angles to the axis of amount

$$\frac{1}{E}\tfrac{1}{6}\omega^2\rho(l^2-3z^2)\sigma(1+\sigma),$$

(5) contraction of the filaments normal to the plane of the disk of amount

$$\frac{2\sigma}{E}\tfrac{1}{8}\omega^2\rho a^2(3+\sigma)-\frac{\sigma}{E}\tfrac{1}{2}\omega^2\rho r^2(1+\sigma)+\frac{2\sigma}{E}\tfrac{1}{6}\omega^2\rho(l^2-3z^2)\sigma\frac{(1+\sigma)}{1-\sigma}.$$

The greatest extension is the circumferential extension near the centre, and its amount is

$$\frac{(3+\sigma)(1-\sigma)}{8E}\omega^2\rho a^2+\frac{\sigma(1+\sigma)}{6E}\omega^2\rho l^2.$$

The longitudinal contraction is required to make the plane faces of the disk free from pressure, and the terms in l and z enable us to avoid tangential traction on any cylindrical surface. The system of stresses and strains thus expressed satisfies all the conditions, except that there is a small radial tension on the bounding surface of amount per unit area $\frac{1}{6}\omega^2\rho(l^2-3z^2)\sigma(1+\sigma)/(1-\sigma)$. The resultant of these tensions on any part of the edge of the disk vanishes, and the stress in question is very small in comparison with the other stresses involved when the disk is thin; we may conclude that, for a thin disk, the expressions given represent the actual condition at all points which are not very close to the edge (cf. § 55). The effect to the longitudinal contraction is that the plane faces become slightly concave (fig. 32).

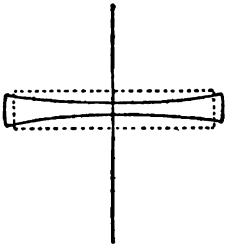

FIG. 32.

81. The corresponding solution for a disk with a circular axle-hole (radius b) will be obtained from that given in the last section by superposing the following system of additional stresses:

(1) radial tension of amount $\frac{1}{8}\omega^2\rho b^2(1-a^2/r^2)(3+\sigma)$,

(2) tension along the circular filaments of amount

$$\tfrac{1}{8}\omega^2\rho b^2(1+a^2/r^2)(3+\sigma).$$

The corresponding additional strains are

(1) radial contraction of amount

$$\frac{3+\sigma}{8E}\left\{(1+\sigma)\frac{a^2}{r^2}-(1-\sigma)\right\}\omega^2\rho b^2,$$

(2) extension along the circular filaments of amount

$$\frac{3+\sigma}{8E}\left\{(1+\sigma)\frac{a^2}{r^2}+(1-\sigma)\right\}\omega^2\rho b^2.$$

(3) contraction of the filaments parallel to the axis of amount

$$\frac{\sigma(3+\sigma)}{4E}\omega^2\rho b^2.$$

Again, the greatest extension is the circumferential extension at the inner surface, and, when the hole is very small, its amount is nearly double what it would be for a complete disk.

82. In the problem of the rotating shaft we have the following stress-system:

(1) radial tension of amount $\frac{1}{8}\omega^2\rho(a^2-r^2)(3-2\sigma)/(1-\sigma)$,

(2) circumferential tension of amount

$$\tfrac{1}{8}\omega^2\rho\{a^2(3-2\sigma)/(1-\sigma)-r^2(1+2\sigma)/(1-\sigma)\},$$

(3) longitudinal tension of amount $\frac{1}{4}\omega^2\rho(a^2-2r^2)\sigma/(1-\sigma)$.

The resultant longitudinal tension at any normal section vanishes, and the radial tension vanishes at the bounding surface; and thus the expressions here given may be taken to represent the actual condition at all points which are not very close to the ends of the shaft. The contraction of the longitudinal filaments is uniform and equal to $\frac{1}{2}\omega^2\rho a^2\sigma/E$. The greatest extension in the rotating shaft is the circumferential extension close to the axis, and its amount is $\frac{1}{8}\omega^2\rho a^2(3-5\sigma)/E(1-\sigma)$.

The value of any theory of the strength of long rotating shafts founded on these formulae is diminished by the circumstance that at sufficiently high speeds the shaft may tend to take up a curved form, the straight form being unstable. The shaft is then said to *whirl*. This occurs when the period of rotation of the shaft is very nearly coincident with one of its periods of lateral vibration. The lowest speed at which whirling can take place in a shaft of length l, freely supported at its ends, is given by the formula

$$\omega^2\rho=\tfrac{1}{4}Ea^2(\pi/l)^4.$$

As in § 61, this formula should not be applied unless the length of the shaft is a considerable multiple of its diameter. It implies that whirling is to be expected whenever ω approaches this critical value.

83. When the forces acting upon a spherical or cylindrical body are not radial, the problem becomes more complicated. In the case of the sphere deformed by any forces it has been completely solved, and the solution has been applied by Lord Kelvin and

Sir G. H. Darwin to many interesting questions of cosmical physics. The nature of the stress produced in the interior of the earth by the weight of continents and mountains, the spheroidal figure of a rotating solid planet, the rigidity of the earth, are among the questions which have in this way been attacked. Darwin concluded from his investigation that, to support the weight of the existing continents and mountain ranges, the materials of which the earth is composed must, at great depths (1600 kilometres), have at least the strength of granite. Kelvin concluded from his investigation that the actual heights of the tides in the existing oceans can be accounted for only on the supposition that the interior of the earth is solid, and of rigidity nearly as great as, if not greater than, that of steel.

84. Some interesting problems relating to the strains produced in a cylinder of finite length by forces distributed symmetrically round the axis have been solved. The most important is that of a cylinder crushed between parallel planes in contact with its plane ends. The solution was applied to explain the discrepancies that have been observed in different tests of crushing strength according as the ends of the test specimen are or are not prevented from spreading. It was applied also to explain the fact that in such tests small conical pieces are sometimes cut out at the ends subjected to pressure.

85. *Vibrations and Waves.*—When a solid body is struck, or otherwise suddenly disturbed, it is thrown into a state of vibration. There always exist dissipative forces which tend to destroy the vibratory motion, one cause of the subsidence of the motion being the communication of energy to surrounding bodies. When these dissipative forces are disregarded, it is found that an elastic solid body is capable of vibrating in such a way that the motion of any particle is simple harmonic motion, all the particles completing their oscillations in the same period and being at any instant in the same phase, and the displacement of any selected one in any particular direction bearing a definite ratio to the displacement of an assigned one in an assigned direction. When a body is moving in this way it is said to be *vibrating in a normal mode.* For example, when a tightly stretched string of negligible flexural rigidity, such as a violin string may be taken to be, is fixed at the ends, and vibrates transversely in a normal mode, the displacements of all the particles have the same direction, and their magnitudes are proportional at any instant to the ordinates of a curve of sines. Every body possesses an infinite number of normal modes of vibration, and the *frequencies* (or numbers of vibrations per second) that belong to the different modes form a sequence of increasing numbers. For the string, above referred to, the fundamental tone and the various overtones form an harmonic scale, that is to say, the frequencies of the normal modes of vibration are proportional to the integers 1, 2, 3, . . . In all these modes except the first the string vibrates as if it were divided into a number of equal pieces, each having fixed ends; this number is in each case the integer defining the frequency. In general the normal modes of vibration of a body are distinguished one from another by the number and situation of the surfaces (or other *loci*) at which some characteristic displacement or traction vanishes. The problem of determining the normal modes and frequencies of free vibration of a body of definite size, shape and constitution, is a mathematical problem of a similar character to the problem of determining the state of stress in the body when subjected to given forces. The bodies which have been most studied are strings and thin bars, membranes, thin plates and shells, including bells, spheres and cylinders. Most of the results are of special importance in their bearing upon the theory of sound.

86. The most complete success has attended the efforts of mathematicians to solve the problem of free vibrations for an isotropic sphere. It appears that the modes of vibration fall into two classes: one characterized by the absence of a radial component of displacement, and the other by the absence of a radial component of rotation (§ 14). In each class there is a doubly infinite number of modes. The displacement in any mode is determined in terms of a single spherical harmonic function, so that there are modes of each class corresponding to spherical harmonics of every integral degree; and for each degree there is an infinite number of modes, differing from one another in the number and position of the concentric spherical surfaces at which some characteristic displacement vanishes. The most interesting modes are those in which the sphere becomes slightly spheroidal, being alternately prolate and oblate during the course of a vibration; for these vibrations tend to be set up in a spherical planet by tide-generating forces. In a sphere of the size of the earth, supposed to be incompressible and as rigid as steel, the period of these vibrations is 66 minutes.

87. The theory of free vibrations has an important bearing upon the question of the strength of structures subjected to sudden blows or shocks. The stress and strain developed in a body by sudden applications of force may exceed considerably those which would be produced by a gradual application of the same forces. Hence there arises the general question of *dynamical resistance*, or of the resistance of a body to forces applied so quickly that the inertia of the body comes sensibly into play. In regard to this question we have two chief theoretical results. The first is that the strain produced by a force suddenly applied may be as much as twice the statical strain, that is to say, as the strain which would be produced by the same force when the body is held in equilibrium under its action; the second is that the sudden reversal of the force may produce a strain three times as great as the statical strain. These results point to the importance of specially strengthening the parts of any machine (*e.g.* screw propeller shafts) which are subject to sudden applications or reversals of load. The theoretical limits of twice, or three times, the statical strain are not in general attained. For example, if a thin bar hanging vertically from its upper end is suddenly loaded at its lower end with a weight equal to its own weight, the greatest dynamical strain bears to the greatest statical strain the ratio 1·63:1; when the attached weight is four times the weight of the bar the ratio becomes 1·84:1. The method by which the result just mentioned is reached has recently been applied to the question of the breaking of winding ropes used in mines. It appeared that, in order to bring the results into harmony with the observed facts, the strain in the supports must be taken into account as well as the strain in the rope (J. Perry, *Phil. Mag.*, 1906 (vi.), vol. ii.).

88. The immediate effect of a blow or shock, locally applied to a body, is the generation of a wave which travels through the body from the locality first affected. The question of the propagation of waves through an elastic solid body is historically of very great importance; for the first really successful efforts to construct a theory of elasticity (those of S. D. Poisson, A. L. Cauchy and G. Green) were prompted, at least in part, by Fresnel's theory of the propagation of light by transverse vibrations. For many years the luminiferous medium was identified with the isotropic solid of the theory of elasticity. Poisson showed that a disturbance communicated to the body gives rise to two waves which are propagated through it with different velocities; and Sir G. G. Stokes afterwards showed that the quicker wave is a wave of irrotational dilatation, and the slower wave is a wave of rotational distortion accompanied by no change of volume. The velocities of the two waves in a solid of density ρ are $\sqrt{\{(\lambda+2\mu)/\rho\}}$ and $\sqrt{(\mu/\rho)}$, λ and μ being the constants so denoted in § 26. When the surface of the body is free from traction, the waves on reaching the surface are reflected; and thus after a little time the body would, if there were no dissipative forces, be in a very complex state of motion due to multitudes of waves passing to and fro through it. This state can be expressed as a state of vibration, in which the motions belonging to the various normal modes (§ 85) are superposed, each with an appropriate amplitude and phase. The waves of dilatation and distortion do not, however, give rise to different modes of vibration, as was at one time supposed, but any mode of vibration in general involves both dilatation and rotation. There are exceptional results for solids of revolution; such solids possess normal modes of vibration which involve no dilatation. The existence of a boundary to the solid body has another effect, besides reflexion, upon the propagation of waves. Lord Rayleigh has shown that any disturbance originating at the surface gives rise to waves which travel away over the surface as well as to waves which travel through the interior; and any internal disturbance, on reaching the surface, also gives rise to such superficial waves. The velocity of the superficial waves is a little less than that of the waves of distortion:

$0{\cdot}9554\sqrt{(\mu/\rho)}$ when the material is incompressible $0{\cdot}9194\sqrt{(\mu/\rho)}$ when the Poisson's ratio belonging to the material is ¼.

89. These results have an application to the propagation of earthquake shocks (see also EARTHQUAKE). An internal disturbance should, if the earth can be regarded as solid, give rise to three wave-motions: two propagated through the interior of the earth with different velocities, and a third propagated over the surface. The results of seismographic observations have independently led to the recognition of three phases of the recorded vibrations: a set of "preliminary tremors" which are received at different stations at such times as to show that they are transmitted directly through the interior of the earth with a velocity of about 10 km. per second, a second set of preliminary tremors which are received at different stations at such times as to show that they are transmitted directly through the earth with a velocity of about 5 km. per second, and a "main shock," or set of large vibrations, which becomes sensible at different stations at such times as to show that a wave is transmitted over the surface of the earth with a velocity of about 3 km. per second. These results can be interpreted if we assume that the earth is a solid body the greater part of which is practically homogeneous, with high values for the rigidity and the resistance to compression, while the superficial portions have lower values for these quantities. The rigidity of the central portion would be about $(1{\cdot}4)10^{12}$ dynes per square cm., which is considerably greater than that of steel, and the resistance to compression would be about $(3{\cdot}8)10^{12}$ dynes per square cm. which is much greater than that of any known material. The high value of the resistance to compression is not surprising when account is taken of the great pressures, due to gravitation, which must exist in the interior of the earth. The high value of the rigidity can be regarded as a confirmation of Lord Kelvin's estimate founded on tidal observations (§ 83).

90. *Strain produced by Heat.*—The mathematical theory of elasticity as at present developed takes no account of the strain which is produced in a body by unequal heating. It appears to be impossible in the present state of knowledge to form as in § 39 a system of differential equations to determine both the stress and the temperature at any point of a solid body the temperature of which is liable to variation. In the cases of isothermal and adiabatic changes, that is to say, when the body is slowly strained without variation of temperature, and also when the changes are effected so rapidly that there is no gain or loss of heat by any element, the internal energy of the body is sufficiently expressed by the strain-energy-function (§§ 27, 30). Thus states of equilibrium and of rapid vibration can be determined by the theory that has been explained above. In regard to thermal effects we can obtain some indications from general thermodynamic theory. The following passages extracted from the article "Elasticity" contributed to the 9th edition of the *Encyclopaedia Britannica* by Sir W. Thomson (Lord Kelvin) illustrate the nature of these indications:—

"From thermodynamic theory it is concluded that cold is produced whenever a solid is strained by opposing, and heat when it is strained by yielding to, any elastic force of its own, the strength of which would diminish if the temperature were raised; but that, on the contrary, heat is produced when a solid is strained against, and cold when it is strained by yielding to, any elastic force of its own, the strength of which would increase if the temperature were raised. When the strain is a condensation or dilatation, uniform in all directions, a fluid may be included in the statement. Hence the following propositions:—

"(1) A cubical compression of any elastic fluid or solid in an ordinary condition causes an evolution of heat; but, on the contrary, a cubical compression produces cold in any substance, solid or fluid, in such an abnormal state that it would contract if heated while kept under constant pressure. Water below its temperature (3·9° Cent.) of maximum density is a familiar instance.

"(2) If a wire already twisted be suddenly twisted further, always, however, within its limits of elasticity, cold will be produced; and if it be allowed suddenly to untwist, heat will be evolved from itself (besides heat generated externally by any work allowed to be wasted, which it does in untwisting). It is assumed that the torsional rigidity of the wire is diminished by an elevation of temperature, as the writer of this article had found it to be for copper, iron, platinum and other metals.

"(3) A spiral spring suddenly drawn out will become lower in temperature, and will rise in temperature when suddenly allowed to draw in. [This result has been experimentally verified by Joule ('Thermodynamic Properties of Solids,' *Phil. Trans.*, 1858) and the amount of the effect found to agree with that calculated, according to the preceding thermodynamic theory, from the amount of the weakening of the spring which he found by experiment.]

"(4) A bar or rod or wire of any substance with or without a weight hung on it, or experiencing any degree of end thrust, to begin with, becomes cooled if suddenly elongated by end pull or by diminution of end thrust, and warmed if suddenly shortened by end thrust or by diminution of end pull; except abnormal cases in which with constant end pull or end thrust elevation of temperature produces shortening; in every such case pull or diminished thrust produces elevation of temperature, thrust or diminished pull lowering of temperature.

"(5) An india-rubber band suddenly drawn out (within its limits of elasticity) becomes warmer; and when allowed to contract, it becomes colder. Any one may easily verify this curious property by placing an india-rubber band in slight contact with the edges of the lips, then suddenly extending it—it becomes very perceptibly warmer: hold it for some time stretched nearly to breaking, and then suddenly allow it to shrink—it becomes quite startlingly colder, the cooling effect being sensible not merely to the lips but to the fingers holding the band. The first published statement of this curious observation is due to J. Gough (*Mem. Lit. Phil. Soc. Manchester*, 2nd series, vol. i. p. 288), quoted by Joule in his paper on 'Thermodynamic Properties of Solids' (cited above). The thermodynamic conclusion from it is that an india-rubber band, stretched by a constant weight of sufficient amount hung on it, must, when heated, pull up the weight, and, when cooled, allow the weight to descend: this Gough, independently of thermodynamic theory, had found to be actually the case. The experiment any one can make with the greatest ease by hanging a few pounds weight on a common india-rubber band, and taking a red-hot coal in a pair of tongs, or a red-hot poker, and moving it up and down close to the band. The way in which the weight rises when the red-hot body is near, and falls when it is removed, is quite startling. Joule experimented on the amount of shrinking per degree of elevation of temperature, with different weights hung on a band of vulcanized india-rubber, and found that they closely agreed with the amounts calculated by Thomson's theory from the heating effects of pull, and cooling effects of ceasing to pull, which he had observed in the same piece of india-rubber."

91. *Initial Stress.*—It has been pointed out above (§ 20) that the "unstressed" state, which serves as a zero of reckoning for strains and stresses is never actually attained, although the strain (measured from this state), which exists in a body to be subjected to experiment, may be very slight. This is the case when the "initial stress," or the stress existing before the experiment, is small in comparison with the stress developed during the experiment, and the limit of linear elasticity (§ 32) is not exceeded. The existence of initial stress has been correlated above with the existence of body forces such as the force of gravity, but it is not necessarily dependent upon such forces. A sheet of metal rolled into a cylinder, and soldered to maintain the tubular shape, must be in a state of considerable initial stress quite apart from the action of gravity. Initial stress is utilized in many manufacturing processes, as, for example, in the construction of ordnance, referred to in § 79, in the winding of golf balls by means of india-rubber in a state of high tension (see the report of the case *The Haskell Golf Ball Company* v. *Hutchinson & Main* in *The Times* of March 1, 1906). In the case of a body of ordinary dimensions it is such internal stress

as this which is especially meant by the phrase "initial stress." Such a body, when in such a state of internal stress, is sometimes described as "self-strained." It would be better described as "self-stressed." The somewhat anomalous behaviour of cast iron has been supposed to be due to the existence within the metal of initial stress. As the metal cools, the outer layers cool more rapidly than the inner, and thus the state of initial stress is produced. When cast iron is tested for tensile strength, it shows at first no sensible range either of perfect elasticity or of linear elasticity; but after it has been loaded and unloaded several times its behaviour begins to be more nearly like that of wrought iron or steel. The first tests probably diminish the initial stress.

92. From a mathematical point of view the existence of initial stress in a body which is "self-stressed" arises from the fact that the equations of equilibrium of a body free from body forces or surface tractions, viz. the equations of the type

$$\frac{\partial X_x}{\partial x}+\frac{\partial X_y}{\partial y}+\frac{\partial Z_x}{\partial z}=0,$$

possess solutions which differ from zero. If, in fact, ϕ_1, ϕ_2, ϕ_3 denote any arbitrary functions of x, y, z, the equations are satisfied by putting

$$X_x=\frac{\partial^2\phi_3}{\partial y^2}+\frac{\partial^2\phi_2}{\partial z^2},\dots,Y_z=-\frac{\partial^2\phi_1}{\partial y\partial z},\dots;$$

and it is clear that the functions ϕ_1, ϕ_2, ϕ_3 can be adjusted in an infinite number of ways so that the bounding surface of the body may be free from traction.

93. Initial stress due to body forces becomes most important in the case of a gravitating planet. Within the earth the stress that arises from the mutual gravitation of the parts is very great. If we assumed the earth to be an elastic solid body with moduluses of elasticity no greater than those of steel, the strain (measured from the unstressed state) which would correspond to the stress would be much too great to be calculated by the ordinary methods of the theory of elasticity (§ 75). We require therefore some other method of taking account of the initial stress. In many investigations, for example those of Lord Kelvin and Sir G. H. Darwin referred to in § 83, the difficulty is turned by assuming that the material may be treated as practically incompressible; but such investigations are to some extent incomplete, so long as the corrections due to a finite, even though high, resistance to compression remain unknown. In other investigations, such as those relating to the propagation of earthquake shocks and to gravitational instability, the possibility of compression is an essential element of the problem. By gravitational instability is meant the tendency of gravitating matter to condense into nuclei when slightly disturbed from a state of uniform diffusion; this tendency has been shown by J. H. Jeans (*Phil. Trans.* A. 201, 1903) to have exerted an important influence upon the course of evolution of the solar system. For the treatment of such questions Lord Rayleigh (*Proc. R. Soc. London*, A. 77, 1906) has advocated a method which amounts to assuming that the initial stress is hydrostatic pressure, and that the actual state of stress is to be obtained by superposing upon this initial stress a stress related to the state of strain (measured from the initial state) by the same formulae as hold for an elastic solid body free from initial stress. The development of this method is likely to lead to results of great interest.

AUTHORITIES.—In regard to the analysis requisite to prove the results set forth above, reference may be made to A. E. H. Love, *Treatise on the Mathematical Theory of Elasticity* (2nd ed., Cambridge, 1906), where citations of the original authorities will also be found. The following treatises may be mentioned: Navier, *Résumé des leçons sur l'application de la mécanique* (3rd ed., with notes by Saint-Venant, Paris, 1864); G. Lamé, *Leçons sur la théorie mathématique de l'élasticité des corps solides* (Paris, 1852); A. Clebsch, *Theorie der Elasticität fester Körper* (Leipzig, 1862; French translation with notes by Saint-Venant, Paris, 1883); F. Neumann, *Vorlesungen über die Theorie der Elasticität* (Leipzig, 1885); Thomson and Tait, *Natural Philosophy* (Cambridge, 1879, 1883); Todhunter and Pearson, *History of the Elasticity and Strength of Materials* (Cambridge, 1886–1893). The article "Elasticity" by Sir W. Thomson (Lord Kelvin) in 9th ed. of *Encyc. Brit.* (reprinted in his *Mathematical and Physical Papers*, iii., Cambridge, 1890) is especially valuable, not only for the exposition of the theory and its practical applications, but also for the tables of physical constants which are there given. (A. E. H. L.)

ELATERITE, also termed ELASTIC BITUMEN and MINERAL CAOUTCHOUC, a mineral hydrocarbon, which occurs at Castleton in Derbyshire, in the lead mines of Odin and elsewhere. It varies somewhat in consistency, being sometimes soft, elastic and sticky; often closely resembling india-rubber; and occasionally hard and brittle. It is usually dark brown in colour and slightly translucent. A substance of similar physical character is found in the Coorong district of South Australia, and is hence termed coorongite, but Prof. Ralph Tate considers this to be a vegetable product.

ELATERIUM, a drug consisting of a sediment deposited by the juice of the fruit of *Ecballium Elaterium*, the squirting cucumber, a native of the Mediterranean region. The plant, which is a member of the natural order Cucurbitaceae, resembles the vegetable marrow in its growth. The fruit resembles a small cucumber, and when ripe is highly turgid, and separates almost at a touch from the fruit stalk. The end of the stalk forms a stopper, on the removal of which the fluid contents of the fruit, together with the seeds, are squirted through the aperture by the sudden contraction of the wall of the fruit. To prepare the drug the fruit is sliced lengthwise and slightly pressed; the greenish and slightly turbid juice thus obtained is strained and set aside; and the deposit of elaterium formed after a few hours is collected on a linen filter, rapidly drained, and dried on porous tiles at a gentle heat. Elaterium is met with in commerce in light, thin, friable, flat or slightly incurved opaque cakes, of a greyish-green colour, bitter taste and tea-like smell.

The drug is soluble in alcohol, but insoluble in water and ether. The official dose is $\frac{1}{10}$–$\frac{1}{2}$ grain, and the British pharmacopeia directs that the drug is to contain from 20 to 25% of the active principle elaterinum or elaterin. A resin in the natural product aids its action. Elaterin is extracted from elaterium by chloroform and then precipitated by ether. It has the formula $C_{20}H_{28}O_5$. It forms colourless scales which have a bitter taste, but it is highly inadvisable to taste either this substance or elaterium. Its dose is $\frac{1}{40}$–$\frac{1}{10}$ grain, and the British pharmacopeia contains a useful preparation, the Pulvis Elaterini Compositus, which contains one part of the active principle in forty.

The action of this drug resembles that of the saline aperients, but is much more powerful. It is the most active hydragogue purgative known, causing also much depression and violent griping. When injected subcutaneously it is inert, as its action is entirely dependent upon its admixture with the bile. The drug is undoubtedly valuable in cases of dropsy and Bright's disease, and also in cases of cerebral haemorrhage, threatened or present. It must not be used except in urgent cases, and must invariably be employed with the utmost care, especially if the state of the heart be unsatisfactory.

ELBA (Gr. *Αἰθαλία*; Lat. *Ilva*), an island off the W. coast of Italy, belonging to the province of Leghorn, from which it is 45 m. S., and 7 m. S.W. of Piombino, the nearest point of the mainland. Pop. (1901) 25,043 (including Pianosa). It is about 19 m. long, 6½ m. broad, and 140 sq. m. in area; and its highest point is 3340 ft. (Monte Capanne). It forms, like Giglio and Monte Cristo, part of a sunken mountain range extending towards Corsica and Sardinia.

The oldest rocks of Elba consist of schist and serpentine which in the eastern part of the island are overlaid by beds containing Silurian and Devonian fossils. The Permian may be represented, but the Trias is absent, and in general the older Palaeozoic rocks are overlaid directly by the Rhaetic and Lias. The Liassic beds are often metamorphosed and the limestones contain garnet and wollastonite. The next geological formation which is represented is the Eocene, consisting of nummulitic limestone, sandstone and schist. The Miocene and Pliocene are absent. The most remarkable feature in the geology of Elba is the extent of the granitic and ophiolitic eruptions of the Tertiary period. Serpentines, peridotites and diabases are interstratified with the Eocene deposits. The granite, which is intruded through the Eocene beds, is associated with a pegmatite containing tourmaline and cassiterite. The celebrated iron ore of Elba is of

Tertiary age and occurs indifferently in all the older rocks. The deposits are superficial, resulting from the opening out of veins at the surface, and consist chiefly of haematite. These ores were worked by the ancients, but so inefficiently that their spoil-heaps can be smelted again with profit. This process is now gone through on the island itself. The granite was also quarried by the Romans, but is not now much worked.

Parts of the island are fertile, and the cultivation of vines, and the tunny and sardine fishery, also give employment to a part of the population. The capital of the island is Portoferraio—pop. (1901) 5987—in the centre of the N. coast, enclosed by an amphitheatre of lofty mountains, the slopes of which are covered with villas and gardens. This is the best harbour, the ancient *Portus Argous*. The town was built and fortified by Cosimo I. in 1548, who called it Cosmopolis. Above the harbour, between the forts Stella and Falcone, is the palace of Napoleon I., and 4 m. to the S.W. is his villa; while on the N. slope of Monte Capanne is another of his country houses. The other villages in the island are Campo nell' Elba, on the S. near the W. end, Marciana and Marciana Marina on the N. of the island near the W. extremity, Porto Longone, on the E. coast, with picturesque Spanish fortifications, constructed in 1602 by Philip III.; Rio dell' Elba and Rio Marina, both on the E. side of the island, in the mining district. At Le Grotte, between Portoferraio and Rio dell' Elba, and at Capo Castello, on the N.E. of the island, are ruins of Roman date.

Elba was famous for its mines in early times, and the smelting furnaces gave it its Greek name of *A' θαλία* ("soot island"). In Roman times, and until 1900, however, owing to lack of fuel, the smelting was done on the mainland. In 453 B.C. Elba was devastated by a Syracusan squadron. From the 11th to the 14th century it belonged to Pisa, and in 1399 came under the dukes of Piombino. In 1548 it was ceded by them to Cosimo I. of Florence. In 1596 Porto Longone was taken by Philip III. of Spain, and retained until 1709, when it was ceded to Naples. In 1802 the island was given to France by the peace of Amiens. On Napoleon's deposition, the island was ceded to him with full sovereign rights, and he resided there from the 5th of May 1814 to the 26th of February 1815. After his fall it was restored to Tuscany, and passed with it to Italy in 1860.

See Sir R. Colt Hoare, *A Tour through the Island of Elba* (London, 1814).

ELBE (the *Albis* of the Romans and the *Labe* of the Czechs), a river of Germany, which rises in Bohemia not far from the frontiers of Silesia, on the southern side of the Riesengebirge, at an altitude of about 4600 ft. Of the numerous small streams (Seifen or Flessen as they are named in the district) whose confluent waters compose the infant river, the most important are the Weisswasser, or White Water, and the Elbseifen, which is formed in the same neighbourhood, but at a little lower elevation. After plunging down the 140 ft. of the Elbfall, the latter stream unites with the steep torrential Weisswasser at Mädelstegbaude, at an altitude of 2230 ft., and thereafter the united stream of the Elbe pursues a southerly course, emerging from the mountain glens at Hohenelbe (1495 ft.), and continuing on at a soberer pace to Pardubitz, where it turns sharply to the west, and at Kolin (730 ft.), some 27 m. farther on, bends gradually towards the north-west. A little above Brandeis it picks up the Iser, which, like itself, comes down from the Riesengebirge, and at Melnik it has its stream more than doubled in volume by the Moldau, a river which winds northwards through the heart of Bohemia in a sinuous, trough-like channel carved through the plateaux. Some miles lower down, at Leitmeritz (433 ft.), the waters of the Elbe are tinted by the reddish Eger, a stream which drains the southern slopes of the Erzgebirge. Thus augmented, and swollen into a stream 140 yds. wide, the Elbe carves a path through the basaltic mass of the Mittelgebirge, churning its way through a deep, narrow rocky gorge. Then the river winds through the fantastically sculptured sandstone mountains of the "Saxon Switzerland," washing successively the feet of the lofty Lilienstein (932 ft. above the Elbe), the scene of one of Frederick the Great's military exploits in the Seven Years' War, Königstein (797 ft. above the Elbe), where in times of war Saxony has more than once stored her national purse for security, and the pinnacled rocky wall of the Bastei, towering 650 ft. above the surface of the stream. Shortly after crossing the Bohemian-Saxon frontier, and whilst still struggling through the sandstone defiles, the stream assumes a north-westerly direction, which on the whole it preserves right away to the North Sea. At Pirna the Elbe leaves behind it the stress and turmoil of the Saxon Switzerland, rolls through Dresden, with its noble river terraces, and finally, beyond Meissen, enters on its long journey across the North German plain, touching Torgau, Wittenberg, Magdeburg, Wittenberge, Hamburg, Harburg and Altona on the way, and gathering into itself the waters of the Mulde and Saale from the left, and those of the Schwarze Elster, Havel and Elde from the right. Eight miles above Hamburg the stream divides into the Norder (or Hamburg) Elbe and the Süder (or Harburg) Elbe, which are linked together by several cross-channels, and embrace in their arms the large island of Wilhelmsburg and some smaller ones. But by the time the river reaches Blankenese, 7 m. below Hamburg, all these anastomosing branches have been reunited, and the Elbe, with a width of 4 to 9 m. between bank and bank, travels on between the green marshes of Holstein and Hanover until it becomes merged in the North Sea off Cuxhaven. At Kolin the width is about 100 ft., at the mouth of the Moldau about 300, at Dresden 960, and at Magdeburg over 1000. From Dresden to the sea the river has a total fall of only 280 ft., although the distance is about 430 m. For the 75 m. between Hamburg and the sea the fall is only 3½ ft. One consequence of this is that the bed of the river just below Hamburg is obstructed by a bar, and still lower down is choked with sandbanks, so that navigation is confined to a relatively narrow channel down the middle of the stream. But unremitting efforts have been made to maintain a sufficient fairway up to Hamburg (*q.v.*). The tide advances as far as Geesthacht, a little more than 100 m. from the sea. The river is navigable as far as Melnik, that is, the confluence of the Moldau, a distance of 525 m., of which 67 are in Bohemia. It total length is 725 m., of which 190 are in Bohemia, 77 in the kingdom of Saxony, and 350 in Prussia, the remaining 108 being in Hamburg and other states of Germany. The area of the drainage basin is estimated at 56,000 sq. m.

Navigation.—Since 1842, but more especially since 1871, improvements have been made in the navigability of the Elbe by all the states which border upon its banks. As a result of these labours there is now in the Bohemian portion of the river a minimum depth of 2 ft. 8 in., whilst from the Bohemian frontier down to Magdeburg the minimum depth is 3 ft., and from Magdeburg to Hamburg, 3 ft. 10 in. In 1896 and 1897 Prussia and Hamburg signed covenants whereby two channels are to be kept open to a depth of 9¾ ft., a width of 656 ft., and a length of 550 yds. between Bunthaus and Ortkathen, just above the bifurcation of the Norder Elbe and the Süder Elbe. In 1869 the maximum burden of the vessels which were able to ply on the upper Elbe was 250 tons; but in 1899 it was increased to 800 tons. The large towns through which the river flows have vied with one another in building harbours, providing shipping accommodation, and furnishing other facilities for the efficient navigation of the Elbe. In this respect the greatest efforts have naturally been made by Hamburg; but Magdeburg, Dresden, Meissen, Riesa, Tetschen, Aussig and other places have all done their relative shares, Magdeburg, for instance, providing a commercial harbour and a winter harbour. In spite, however, of all that has been done, the Elbe remains subject to serious inundations at periodic intervals. Among the worst floods were those of the years 1774, 1799, 1815, 1830, 1845, 1862, 1890 and 1909. The growth of traffic up and down the Elbe has of late years become very considerable. A towing chain, laid in the bed of the river, extends from Hamburg to Aussig, and by this means, as by paddle-tug haulage, large barges are brought from the port of Hamburg into the heart of Bohemia. The fleet of steamers and barges navigating the Elbe is in point of fact greater than on any other German river. In addition to goods thus conveyed, enormous quantities of timber are floated down the Elbe: the weight of the rafts passing the station of Schandau on the Saxon Bohemian frontier amounting in 1901 to 333,000 tons.

A vast amount of traffic is directed to Berlin, by means of the Havel-Spree system of canals, to the Thuringian states and the Prussian province of Saxony, to the kingdom of Saxony and Bohemia, and to the various riverine states and provinces of the lower and middle Elbe. The passenger traffic, which is in the hands of the Sächsisch-Böhmische Dampfschifffahrtsgesellschaft is limited to Bohemia and Saxony, steamers plying up and down the stream from Dresden to Melnik, occasionally continuing the journey up the Moldau to Prague, and down the river as far as Riesa, near the northern frontier of Saxony, and on the average 1½ million passengers are conveyed.

In 1877–1879, and again in 1888–1895, some 100 m. of canal were dug, 5 to 6½ ft. deep and of various widths, for the purpose of connecting the Elbe, through the Havel and the Spree, with the system of the Oder. The most noteworthy of these connexions are the Elbe Canal (14½ m. long), the Reek Canal (9½ m.), the Rüdersdorfer Gewässer (11½ m.), the Rheinsberger Canal (11¼ m.), and the Sacrow-Paretzer Canal (10 m.), besides which the Spree has been canalized for a distance of 28 m., and the Elbe for a distance of 70 m. Since 1896 great improvements have been made in the Moldau and the Bohemian Elbe, with the view of facilitating communication between Prague and the middle of Bohemia generally on the one hand, and the middle and lower reaches of the Elbe on the other. In the year named a special commission was appointed for the regulation of the Moldau and Elbe between Prague and Aussig, at a cost estimated at about £1,000,000, of which sum two-thirds were to be borne by the Austrian empire and one-third by the kingdom of Bohemia. The regulation is effected by locks and movable dams, the latter so designed that in times of flood or frost they can be dropped flat on the bottom of the river. In 1901 the Austrian government laid before the Reichsrat a canal bill, with proposals for works estimated to take twenty years to complete, and including the construction of a canal between the Oder, starting at Prerau, and the upper Elbe at Pardubitz, and for the canalization of the Elbe from Pardubitz to Melnik (see AUSTRIA: *Waterways*). In 1900 Lübeck was put into direct communication with the Elbe at Lauenburg by the opening of the Elbe-Trave Canal, 42 m. in length, and constructed at a cost of £1,177,700, of which the state of Lübeck contributed £802,700, and the kingdom of Prussia £375,000. The canal has been made 72 ft. wide at the bottom, 105 to 126 ft. wide at the top, has a minimum depth of 8¼ ft., and is equipped with seven locks, each 262½ ft. long and 39⅓ ft. wide. It is thus able to accommodate vessels up to 800 tons burden; and the passage from Lübeck to Lauenburg occupies 18 to 21 hours. In the first year of its being open (June 1900 to June 1901) a total of 115,000 tons passed through the canal.[1] A gigantic project has also been put forward for providing water communication between the Rhine and the Elbe, and so with the Oder, through the heart of Germany. This scheme is known as the Midland Canal. Another canal has been projected for connecting Kiel with the Elbe by means of a canal trained through the Plön Lakes.

Bridges.—The Elbe is crossed by numerous bridges, as at Königgrätz, Pardubitz, Kolin, Leitmeritz, Tetschen, Schandau, Pirna, Dresden, Meissen, Torgau, Wittenberg, Rosslau, Barby, Magdeburg, Rathenow, Wittenberge, Dömitz, Lauenburg, and Hamburg and Harburg. At all these places there are railway bridges, and nearly all, but more especially those in Bohemia, Saxony and the middle course of the river—these last on the main lines between Berlin and the west and south-west of the empire—possess a greater or less strategic value. At Leitmeritz there is an iron trellis bridge, 600 yds long. Dresden has four bridges, and there is a fifth bridge at Loschwitz, about 3 m. above the city. Meissen has a railway bridge, in addition to an old road bridge. Magdeburg is one of the most important railway centres in northern Germany; and the Elbe, besides being bridged—it divides there into three arms—several times for vehicular traffic, is also spanned by two fine railway bridges. At both Hamburg and Harburg, again, there are handsome railway bridges, the one (1868–1873 and 1894) crossing the northern Elbe, and the other (1900) the southern Elbe, and the former arm is also crossed by a fine triple-arched bridge (1888) for vehicular traffic.

Fish.—The river is well stocked with fish, both salt-water and fresh-water species being found in its waters, and several varieties of fresh-water fish in its tributaries. The kinds of greatest economic value are sturgeon, shad, salmon, lampreys, eels, pike and whiting.

Tolls.—In the days of the old German empire no fewer than thirty-five different tolls were levied between Melnik and Hamburg, to say nothing of the special dues and privileged exactions of various riparian owners and political authorities. After these had been *de facto*, though not *de jure*, in abeyance during the period of the Napoleonic wars, a commission of the various Elbe states met and drew up a scheme for their regulation, and the scheme, embodied in the Elbe Navigation Acts, came into force in 1822. By this a definite number of tolls, at fixed rates, was substituted for the often arbitrary tolls which had been exacted previously. Still further relief was afforded in 1844 and in 1850, on the latter occasion by the abolition of all tolls between Melnik and the Saxon frontier. But the number of tolls was only reduced to one, levied at Wittenberge, in 1863, about one year after Hanover was induced to give up the Stade or Brunsbüttel toll in return for a compensation of 2,857,340 thalers. Finally, in 1870, 1,000,000 thalers were paid to Mecklenburg and 85,000 thalers to Anhalt, which thereupon abandoned all claims to levy tolls upon the Elbe shipping, and thus navigation on the river became at last entirely free.

History.—The Elbe cannot rival the Rhine in the picturesqueness of the scenery it travels through, nor in the glamour which its romantic and legendary associations exercise over the imagination. But it possesses much to charm the eye in the deep glens of the Riesengebirge, amid which its sources spring, and in the bizarre rock-carving of the Saxon Switzerland. It has been indirectly or directly associated with many stirring events in the history of the German peoples. In its lower course, whatever is worthy of record clusters round the historical vicissitudes of Hamburg—its early prominence as a missionary centre (Ansgar) and as a bulwark against Slav and marauding Northman, its commercial prosperity as a leading member of the Hanseatic League, and its sufferings during the Napoleonic wars, especially at the hands of the ruthless Davoût. The bridge over the river at Dessau recalls the hot assaults of the *condottiere* Ernst von Mansfeld in April 1626, and his repulse by the crafty generalship of Wallenstein. But three years later this imperious leader was checked by the heroic resistance of the "Maiden" fortress of Magdeburg; though two years later still she lost her reputation, and suffered unspeakable horrors at the hands of Tilly's lawless and unlicensed soldiery. Mühlberg, just outside the Saxon frontier, is the place where Charles V. asserted his imperial authority over the Protestant elector of Saxony, John Frederick, the Magnanimous or Unfortunate, in 1547. Dresden, Aussig and Leitmeritz are all reminiscent of the fierce battles of the Hussite wars, and the last named of the Thirty Years' War. But the chief historical associations of the upper (*i.e.* the Saxon and Bohemian) Elbe are those which belong to the Seven Years' War, and the struggle of the great Frederick of Prussia against the power of Austria and her allies. At Pirna (and Lilienstein) in 1756 he caught the entire Saxon army in his fowler's net, after driving back at Lobositz the Austrian forces which were hastening to their asistance; but only nine months later he lost his reputation for "invincibility" by his crushing defeat at Kolin, where the great highway from Vienna to Dresden crosses the Elbe. Not many miles distant, higher up the stream, another decisive battle was fought between the same national antagonists, but with a contrary result, on the memorable 3rd of July 1866.

See M. Buchheister, "Die Elbe u. der Hafen von Hamburg," in *Mitteil. d. Geog. Gesellsch. in Hamburg* (1899), vol. xv. pp. 131-188; V. Kurs, "Die künstlichen Wasserstrassen des deutschen

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[1] See *Der Bau des Elbe-Trave Canals und seine Vorgeschichte* (Lübeck, 1900).

Reichs," in *Geog. Zeitschrift* (1898), pp. 601-617; and (the official) *Der Elbstrom* (1900); B. Weissenborn, *Die Elbzölle und Elbstapelplätze im Mittelalter* (Halle, 1900); Daniel, *Deutschland*; and A. Supan, *Wasserstrassen und Binnenschiffahrt* (Berlin, 1902).

ELBERFELD, a manufacturing town of Germany, in the Prussian Rhine province, on the Wupper, and immediately west of and contiguous to Barmen (*q.v.*). Pop. (1816) 21,710; (1840) 31,514; (1885) 109,218; (1905) 167,382. Elberfeld-Barmen, although administratively separate, practically form a single whole. It winds, a continuous strip of houses and factories, for 9 m. along the deep valley, on both banks of the Wupper, which is crossed by numerous bridges, the engirdling hills crowned with woods. Local intercommunication is provided by an electric tramway line and a novel hanging railway—on the Langen mono-rail system—suspended over the bed of the river, with frequent stations. In the centre of the town are a number of irregular and narrow streets, and the river, polluted by the refuse of dye-works and factories, constitutes a constant eyesore. Yet within recent years great alterations have been effected; in the newer quarters are several handsome streets and public buildings; in the centre many insanitary dwellings have been swept away, and their place occupied by imposing blocks of shops and business premises, and a magnificent new town-hall, erected in a dominant position. Among the most recent improvements must be mentioned the Brausenwerther Platz, flanked by the theatre, the public baths, and the railway station and administrative offices. There are eleven Evangelical and five Roman Catholic churches (noticeable among the latter the Suitbertuskirche), a synagogue, and chapels of various other sects. Among other public buildings may be enumerated the civic hall, the law courts and the old town-hall.

The town is particularly rich in educational, industrial, philanthropic and religious institutions. The schools include the Gymnasium (founded in 1592 by the Protestant community as a Latin school), the Realgymnasium (founded in 1830, for "modern" subjects and Latin), the Oberrealschule and Realschule (founded 1893, the latter wholly "modern"), two girls' high schools, a girls' middle-class school, a large number of popular schools, a mechanics' and polytechnic school, a school of mechanics, an industrial drawing school, a commercial school, and a school for the deaf and dumb. There are also a theatre, an institute of music, a library, a museum, a zoological garden, and numerous scientific societies. The town is the seat of the Berg Bible Society. The majority of the inhabitants are Protestant, with a strong tendency towards Pietism; but the Roman Catholics number upwards of 40,000, forming about one-fourth of the total population. The industries of Elberfeld are on a scale of great magnitude. It is the chief centre in Germany of the cotton, wool, silk and velvet manufactures, and of upholstery, drapery and haberdashery of all descriptions, of printed calicoes, of Turkey-red and other dyes, and of fine chemicals. Leather and rubber goods, gold, silver and aluminium wares, machinery, wall-paper, and stained glass are also among other of its staple products. Commerce is lively and the exports to foreign countries are very considerable. The railway system is well devised to meet the requirements of its rapidly increasing trade. Two main lines of railway traverse the valley; that on the south is the main line from Aix-la-Chapelle, Cologne and Düsseldorf to central Germany and Berlin, that on the north feeds the important towns of the Ruhr valley.

The surroundings of Elberfeld are attractive, and public grounds and walks have been recently opened on the hills around with results eminently beneficial to the health of the population.

In the 12th century the site of Elberfeld was occupied by the castle of the lords of Elverfeld, feudatories of the archbishops of Cologne. The fief passed later into the possession of the counts of Berg. The industrial development of the place started with a colony of bleachers, attracted by the clear waters of the Wupper, who in 1532 were granted the exclusive privilege of bleaching yarn. It was not, however, until 1610 that Elberfeld was raised to the status of a town, and in 1640 was surrounded with walls. In 1760 the manufacture of silk was introduced, and dyeing with Turkey-red in 1780; but it was not till the end of the century that its industries developed into importance under the influence of Napoleon's continental system, which barred out British competition. In 1815 Elberfeld was assigned by the congress of Vienna, with the grand-duchy of Berg, to Prussia, and its prosperity rapidly developed under the Prussian Zollverein.

See Coutelle, *Elberfeld, topographisch-statistische Darstellung* (Elberfeld, 1853); Schell, *Geschichte der Stadt Elberfeld* (1900); A. Shadwell, *Industrial Efficiency* (London, 1906); and Jorde, *Führer durch Elberfeld und seine Umgebung* (1902).

ELBEUF, a town of northern France in the department of Seine-Inférieure, 14 m. S.S.W. of Rouen by the western railway. Pop. (1906) 17,800. Elbeuf, a town of wide, clean streets, with handsome houses and factories, stands on the left bank of the Seine at the foot of hills over which extends the forest of Elbeuf. A tribunal and chamber of commerce, a board of trade-arbitrators, a lycée, a branch of the Bank of France, a school of industry, a school of cloth manufacture and a museum of natural history are among its institutions. The churches of St Étienne and St Jean, both of the Renaissance period with later additions, preserve stained glass of the 16th century. The hôtel-de-ville and the Cercle du Commerce are the chief modern buildings. The town with its suburbs, Orival, Caudebec-lès-Elbeuf, St Aubin and St Pierre, is one of the principal and most ancient seats of the woollen manufacture in France; more than half the inhabitants are directly maintained by the staple industry and numbers more by the auxiliary crafts. As a river-port it has a brisk trade in the produce of the surrounding district as well as in the raw materials of its manufactures, especially in wool from La Plata, Australia and Germany. Two bridges, one of them a suspension-bridge, communicate with St Aubin on the opposite bank of the Seine, and steamboats ply regularly to Rouen.

Elbeuf was, in the 13th century, the centre of an important fief held by the house of Harcourt, but its previous history goes back at least to the early years of the Norman occupation, when it appears under the name of Hollebof. It passed into the hands of the houses of Rieux and Lorraine, and was raised to the rank of a duchy in the peerage of France by Henry III. in favour of Charles of Lorraine (d. 1605), grandson of Claude, duke of Guise, master of the hounds and master of the horse of France. The last duke of Elbeuf was Charles Eugène of Lorraine, prince de Lambesc, who distinguished himself in 1789 by his energy in repressing risings of the people at Paris. He fought in the army of the Bourbons, and later in the service of Austria, and died in 1825.

ELBING, a seaport town of Germany, in the kingdom of Prussia, 49 m. by rail E.S.E. of Danzig, on the Elbing, a small river which flows into the Frische Haff about 5 m. from the town, and is united with the Nogat or eastern arm of the Vistula by means of the Kraffohl canal. Pop. (1905) 55,627. By the Elbing-Oberländischer canal, 110 m. long, constructed in 1845–1860, Lakes Geserich and Drewenz are connected with Lake Drausen, and consequently with the port of Elbing. The old town was formerly surrounded by fortifications, but of these only a few fragments remain. There are several churches, among them the Marienkirche (dating from the 15th century and restored in 1887), a classical school (Gymnasium) founded in 1536, a modern school (Realschule), a public library of over 28,000 volumes, and several charitable institutions. The town-hall (1894) contains a historical museum.

Elbing is a place of rapidly growing industries. At the great Schichau iron-works, which employ thousands of workmen, are built most of the torpedo-boats and destroyers for the German navy, as well as larger craft, locomotives and machinery. In addition to this there are at Elbing important iron foundries, and manufactories of machinery, cigars, lacquer and metal ware, flax and hemp yarn, cotton, linen, organs, &c. There is a considerable trade also in agricultural produce.

The origin of Elbing was a colony of traders from Lübeck and Bremen, which established itself under the protection of a castle of the Teutonic Knights, built in 1237. In 1246 the town acquired "Lübeck rights," *i.e.* the full autonomy conceded by the charter of the emperor Frederick II. in 1226 (see Lübeck), and it was early admitted to the Hanseatic League. In 1454 the town repudiated the overlordship of the Teutonic Order, and placed itself under the protection of the king of Poland, becoming the seat of a Polish voivode. From this event dates a decline in its prosperity, a decline hastened by the wars of the early 18th century. In 1698, and again in 1703, it was seized by the elector of Brandenburg as security for a debt due to him by the Polish king. It was taken and held to ransom by Charles XII. of Sweden, and in 1710 was captured by the Russians. In 1772, when it fell to Prussia through the first partition of Poland, it was utterly decayed.

See Fuchs, *Gesch. der Stadt Elbing* (Elbing, 1818–1852); Rhode, *Der Elbinger Kreis in topographischer, historischer, und statistischer Hinsicht* (Danzig, 1871); Wernick, *Elbing* (Elbing, 1888).

ELBOW, in anatomy, the articulation of the *humerus*, the bone of the upper arm, and the *ulna* and *radius*, the bones of the fore-arm (see Joints). The word is thus applied to things which are like this joint in shape, such as a sharp bend of a stream or river, an angle in a tube, &c. The word is derived from the O. Eng. *elnboga*, a combination of *eln*, the forearm, and *boga*, a bow or bend. This combination is common to many Teutonic languages, cf Ger. *Ellbogen*. *Eln* still survives in the name of a linear measure, the "ell," and is derived from the O. Teut. *alina*, cognate with Lat. *ulna* and Gr. ὠλένη, the forearm. The use of the arm as a measure of length is illustrated by the uses of *ulna*, in Latin, cubit, and fathom.

ELBURZ, or Alburz (from O. Pers. *Hara-bere-zaiti*, the "High Mountain"), a great chain of mountains in northern Persia, separating the Caspian depression from the Persian highlands, and extending without any break for 650 m. from the western shore of the Caspian Sea to north-eastern Khorasan. According to the direction, or strike, of its principal ranges the Elburz may be divided into three sections: the first 120 m. in length with a direction nearly N. to S., the second 240 m. in length with a direction N.W. to S.E., and the third 290 m. in length striking S.W. to N.E. The first section, which is connected with the system of the Caucasus, and begins west of Lenkoran in 39° N. and 45° E., is known as the Talish range and has several peaks 9000 to 10,000 ft. in height. It runs almost parallel to the western shore of the Caspian, and west of Astara is only 10 or 12 m. distant from the sea. At the point west of Resht, where the direction of the principal range changes to one of N.W. to S.E., the second section of the Elburz begins, and extends from there to beyond Mount Demavend, east of Teheran. South of Resht this section is broken through at almost a right angle by the Safid Rud (White river), and along it runs the principal commercial road between the Caspian and inner Persia, Resht-Kazvin-Teheran. The Elburz then splits into three principal ranges running parallel to one another and connected at many places by secondary ranges and spurs. Many peaks of the ranges in this section have an altitude of 11,000 to 13,000 ft., and the elevation of the passes leading over the ranges varies between 7000 and 10,000 ft. The highest peaks are situated in the still unexplored district of Talikan, N.W. of Teheran, and thence eastwards to beyond Mount Demavend. The part of the Elburz immediately north of Teheran is known as the Kuh i Shimran (mountain of Shimran, from the name of the Shimran district on its southern slopes) and culminates in the Sar i Tochal (12,600 ft.). Beyond it, and between the border of Talikan in the N.W. and Mount Demavend in the N.E., are the ranges Azadbur, Kasil, Kachang, Kendevan, Shahzad, Varzeh, Derbend i Sar and others, with elevations of 12,000 to 13,500 ft., while Demavend towers above them all with its altitude of 19,400 ft. The eastern foot of Demavend is washed by the river Herhaz (called Lar river in its upper course), which there breaks through the Elburz in a S.-N. direction in its course to the Caspian, past the city of Amol. The third section of the Elburz, with its principal ranges striking S.W. to N.E., has a length of about 290 m., and ends some distance beyond Bujnurd in northern Khorasan, where it joins the Ala Dagh range, which has a direction to the S.E., and, continuing with various appellations to northern Afghanistan, unites with the Paropamisus. For about two-thirds of its length—from its beginning to Khush Yailak—the third section consists of three principal ranges connected by lateral ranges and spurs. It also has many peaks over 10,000 ft. in height, and the Nizva mountain on the southern border of the unexplored district of Hazarjirib, north of Semnan, and the Shahkuh, between Shahrud and Astarabad, have an elevation exceeding 13,000 ft. Beyond Khush Yailak (meaning "pleasant summer quarters"), with an elevation of 10,000 ft., are the Kuh i Buhar (8000) and Kuh i Suluk (8000), which latter joins the Ala Dagh (11,000).

The northern slopes of the Elburz and the lowlands which lie between them and the Caspian, and together form the provinces of Gilan, Mazandaran and Astarabad, are covered with dense forest and traversed by hundreds (Persian writers say 1362) of perennial rivers and streams. The breadth of the lowlands between the foot of the hills and the sea is from 2 to 25 m., the greatest breadth being in the meridian of Resht in Gilan, and in the districts of Amol, Sari and Barfurush in Mazandaran. The inner slopes and ranges of the Elburz south of the principal watershed, generally the central one of the three principal ranges which are outside of the fertilizing influence of the moisture brought from the sea, have little or no natural vegetation, and those farthest south are, excepting a few stunted cypresses, completely arid and bare.

"North of the principal watershed forest trees and general verdure refresh the eye. Gurgling water, strips of sward and tall forest trees, backed by green hills, make a scene completely unlike the usual monotony of Persian landscape. The forest scenery much resembles that of England, with fine oaks and greensward. South of the watershed the whole aspect of the landscape is as hideous and disappointing as scenery in Afghanistan. Ridge after ridge of bare hill and curtain behind curtain of serrated mountain, certainly sometimes of charming greys and blues, but still all bare and naked, rugged and arid" (Beresford Lovett, *Proc. R.G.S.*, Feb. 1883).

The higher ranges of the Elburz are snow-capped for the greater part of the year, and some, which are not exposed to the refracted heat from the arid districts of inner Persia, are rarely without snow. Water is plentiful in the Elburz, and situated in well-watered valleys and gorges are innumerable flourishing villages, embosomed in gardens and orchards, with extensive cultivated fields and meadows, and at higher altitudes small plateaus, under snow until March or April, afford cool camping grounds to the nomads of the plains, and luxuriant grazing to their sheep and cattle during the summer. (A. H.-S.)

ELCHE, a town of eastern Spain, in the province of Alicante, on the river Vinalapo. Pop. (1900) 27,308. Elche is the meeting-place of three railways, from Novelda, Alicante and Murcia. It contains no building of high architectural merit, except, perhaps, the collegiate church of Santa Maria, with its lofty blue-tiled dome and fine west doorway. But the costume and physiognomy of the inhabitants, the narrow streets and flat-roofed, whitewashed houses, and more than all, the thousands of palm-trees in its gardens and fields, give the place a strikingly Oriental aspect, and render it unique among the cities of Spain. The cultivation of the palm is indeed the principal occupation; and though the dates are inferior to those of the Barbary States, upwards of 22,500 tons are annually exported. The blanched fronds are also sold in large quantities for the processions of Palm Sunday, and after they have received the blessing of the priest they are regarded throughout Spain as certain defences against lightning. Other thriving local industries include the manufacture of oil, soap, flour, leather, alcohol and esparto grass rugs. The harbour of Elche is Santa Pola (pop. 4100), situated 6 m. E.S.E., where the Vinalapo enters the Mediterranean, after forming the wide lagoon known as the Albufera de Elche.

Elche is usually identified with the Iberian *Helike*, afterwards the Roman colony of *Ilici* or *Illici*. From the 8th century to the 13th it was held by the Moors, who finally failed to recapture it from the Spaniards in 1332.

ELCHINGEN, a village of Germany, in the kingdom of Bavaria, not far from the Danube, 5 m. N.E. from Ulm. Here, on the 14th of October 1805, the Austrians under Laudon were defeated by the French under Ney, who by taking the bridge decided the day and gained for himself the title of duke of Elchingen.

ELDAD BEN MAḤLI, also surnamed had-Dani, Abu-Dani, David-had-Dani, or the Danite, Jewish traveller, was the supposed author of a Jewish travel-narrative of the 9th century A.D., which enjoyed great authority in the middle ages, especially on the question of the Lost Ten Tribes. Eldad first set out to visit his Hebrew brethren in Africa and Asia. His vessel was wrecked, and he fell into the hands of cannibals; but he was saved by his leanness, and by the opportune invasion of a neighbouring tribe. After spending four years with his new captors, he was ransomed by a fellow-countryman, a merchant of the tribe of Issachar. He then (according to his highly fabulous narrative) visited the territory of Issachar, in the mountains of Media and Persia; he also describes the abodes of Zabulon, on the "other side" of the Paran Mountains, extending to Armenia and the Euphrates; of Reuben, on another side of the same mountains; of Ephraim and Half Manasseh, in Arabia, not far from Mecca; and of Simeon and the other Half of Manasseh, in Chorazin, six months' journey from Jerusalem. Dan, he declares, sooner than join in Jeroboam's scheme of an Israelite war against Judah, had migrated to Cush, and finally, with the help of Naphthali, Asher and Gad, had founded an independent Jewish kingdom in the Gold Land of Havila, beyond Abyssinia. The tribe of Levi had also been miraculously guided, from near Babylon, to Havila, where they were enclosed and protected by the mystic river Sambation or Sabbation, which on the Sabbath, though calm, was veiled in impenetrable mist, while on other days it ran with a fierce untraversable current of stones and sand.

Apart from these tales, we have the genuine Eldad, a celebrated Jewish traveller and philologist; who flourished *c.* A.D. 830–890; to whom the work above noticed is ascribed; who was a native either of S. Arabia, Palestine or Media; who journeyed in Egypt, Mesopotamia, North Africa, and Spain; who spent several years at Kairawan in Tunis; who died on a visit to Cordova, and whose authority, as to the lost tribes, is supported by a great Hebrew doctor of his own time, Ẓemaḥ Gaon, the rector of the Academy at Sura (A.D. 889–898). It is possible that a certain relationship exists (as suggested by Epstein and supported by D. H. Müller) between the famous apocryphal *Letter of Prester John* (of *c.* A.D. 1165) and the narrative of Eldad; but the affinity is not close. Eldad is quoted as an authority on linguistic difficulties by the leading medieval Jewish grammarians and lexicographers.

The work ascribed to Eldad is in Hebrew, divided into six chapters, probably abbreviated from the original text. The first edition appeared at Mantua about 1480; the second at Constantinople in 1516; this was reprinted at Venice in 1544 and 1605, and at Jessnitz in 1722. A Latin version by Gilb. Génébrard was published at Paris in 1563, under the title of *Eldad Danius . . . de Judaeis clausis eorumque in Aethiopia . . . imperio*, and was afterwards incorporated in the translator's *Chronologia Hebraeorum* of 1584; a German version appeared at Prague in 1695, and another at Jessnitz in 1723. In 1838 E. Carmoly edited and translated a fuller recension which he had found in a MS. from the library of Eliezer Ben Hasan, forwarded to him by David Zabach of Morocco (see *Relation d'Eldad le Danite*, Paris, 1838). Both forms are printed by Dr Jellinek in his *Bet-ha-Midrasch*, vols. ii. p. 102, &c., and iii. p. 6, &c. (Leipzig, 1853–1855). See also Bartolocci, *Bibliotheca magna Rabbinica*, i. 101-130; Fürst, *Bibliotheca Judaica*, i. 30, &c.; Hirsch Graetz, *Geschichte der Juden* (3rd ed., Leipzig, 1895), v. 239-244; Rossi, *Dizionario degli Ebrei*; Steinschneider, *Cat. librorum Hebraeorum in bibliotheca Bodleiana*, cols. 923-925; Kitto's *Biblical Cyclopaedia* (3rd edition, *sub nomine*); Abr. Epstein, *Eldad ha-Dani* (Pressburg, 1891); D. H. Müller, "Die Recensionen und Versionen des Eldad had-Dani," in *Denkschriften d. Wiener Akad.* (Phil.-Hist. Cl.), vol. xli. (1892), pp. 1-80.

ELDER (Gr. *πρεσβύτερος*), the name given at different times to a ruler or officer in certain political and ecclesiastical systems of government.

1. The office of elder is in its origin political and is a relic of the old patriarchal system. The unit of primitive society is always the family; the only tie that binds men together is that of kinship. "The eldest male parent," to quote Sir Henry Maine,[1] "is absolutely supreme in his household. His dominion extends to life and death and is as unqualified over his children and their houses as over his slaves." The tribe, which is a later development, is always an aggregate of families or clans, not a collection of individuals. "The union of several clans for common political action," as Robertson Smith says, "was produced by the pressure of practical necessity, and always tended towards dissolution when this practical pressure was withdrawn. The only organization for common action was that the leading men of the clans consulted together in time of need, and their influence led the masses with them. Out of these conferences arose the senates of elders found in the ancient states of Semitic and Aryan antiquity alike."[2] With the development of civilization there came a time when age ceased to be an indispensable condition of leadership. The old title was, however, generally retained, *e.g.* the *γέροντες* so often mentioned in Homer, the *γερουσία* of the Dorian states, the *senatus* and the *patres conscripti* of Rome, the sheikh or elder of Arabia, the alderman of an English borough, the *seigneur* (Lat. *senior*) of feudal France.

2. It was through the influence of Judaism that the originally political office of elder passed over into the Christian Church and became ecclesiastical. The Israelites inherited the office from their Semitic ancestors (just as did the Moabites and the Midianites, of whose elders we read in Numbers xxii. 7), and traces of it are found throughout their history. Mention is made in Judges viii. 14 of the elders of Succoth whom "Gideon taught with thorns of the wilderness and with briers." It was to the elders of Israel in Egypt that Moses communicated the plan of Yahweh for the redemption of the people (Exodus iii. 16). During the sojourn in the wilderness the elders were the intermediaries between Moses and the people, and it was out of the ranks of these elders that Moses chose a council of seventy "to bear with him the burden of the people" (Numbers xi. 16). The elders were the governors of the people and the administrators of justice. There are frequent references to their work in the latter capacity in the book of Deuteronomy, especially in relation to the following crimes—the disobedience of sons; slander against a wife; the refusal of levirate marriage; manslaughter; and blood-revenge. Their powers were gradually curtailed by (*a*) the development of the monarchy, to which of course they were in subjection, and which became the court of appeal in questions of law;[3] (*b*) the appointment of special judges, probably chosen from amongst the elders themselves, though their appointment meant the loss of privilege to the general body; (*c*) the rise of the priestly orders, which usurped many of the prerogatives that originally belonged to the elders. But in spite of the rise of new authorities, the elders still retained a large amount of influence. We hear of them frequently in the Persian, Greek and Roman periods. In the New Testament the members of the Sanhedrin in Jerusalem are very frequently termed "elders" or *πρεσβύτεροι*, and from them the name was taken over by the Church.

3. The name "elder" was probably the first title bestowed upon the officers of the Christian Church—since the word deacon does not occur in connexion with the appointment of the Seven in Acts vi. Its universal adoption is due not only to its currency amongst the Jews, but also to the fact that it was frequently used as the title of magistrates in the cities and villages of Asia Minor. For the history of the office of elder in the early Church and the relation between elders and bishops see PRESBYTER.

4. In modern times the use of the term is almost entirely confined to the Presbyterian church, the officers of which are always called elders. According to the Presbyterian theory of church government there are two classes of elders—"teaching elders," or those specially set apart to the pastoral office, and "ruling elders," who are laymen, chosen generally by the congregation and set apart by ordination to be associated with the pastor in the oversight and government of the church. When

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[1] *Ancient Law*, p. 126.

[2] *Religion of the Semites*, p. 34.

[3] There is a hint at this even in the Pentateuch, "every great matter they shall bring unto thee, but every small matter they shall judge themselves."

the word is used without any qualification it is understood to apply to the latter class alone. For an account of the duties, qualifications and powers of elders in the Presbyterian Church see PRESBYTERIANISM.

See W. R. Smith, *History of the Semites*; H. Maine, *Ancient Law*; E. Schürer, *The Jewish People in the Time of Christ*; J. Wellhausen, *History of Israel and Judah*; G. A. Deissmann, *Bible Studies*, p. 154.

ELDER (O. Eng. *ellarn*; Ger. *Holunder*; Fr. *sureau*), the popular designation of the deciduous shrubs and trees constituting the genus *Sambucus* of the natural order Caprifoliaceae. The Common Elder, *S. nigra*, the bourtree of Scotland, is found in Europe, the north of Africa, Western Asia, the Caucasus, and Southern Siberia; in sheltered spots it attains a height of over 20 ft. The bark is smooth; the shoots are stout and angular, and the leaves glabrous, pinnate, with oval or elliptical leaflets. The flowers, which form dense flat-topped clusters (corymbose cymes), with five main branches, have a cream-coloured, gamopetalous, five-lobed corolla, five stamens, and three sessile stigmas; the berries are purplish-black, globular and three- or four-seeded, and ripen about September. The elder thrives best in moist, well-drained situations, but can be grown in a great diversity of soils. It grows readily from young shoots, which after a year are fit for transplantation. It is found useful for making screen-fences in bleak, exposed situations, and also as a shelter for other shrubs in the outskirts of plantations. By clipping two or three times a year, it may be made close and compact in growth. The young trees furnish a brittle wood, containing much pith; the wood of old trees is white, hard and close-grained, polishes well, and is employed for shoemakers' pegs, combs, skewers, mathematical instruments and turned articles. Young elder twigs deprived of pith have from very early times been in request for making whistles, popguns and other toys.

The elder was known to the ancients for its medicinal properties, and in England the inner bark was formerly administered as a cathartic. The flowers (*sambuci flores*) contain a volatile oil, and serve for the distillation of elder-flower water (*aqua sambuci*), used in confectionery, perfumes and lotions. The leaves of the elder are employed to impart a green colour to fat and oil (*unguentum sambuci foliorum* and *oleum viride*), and the berries for making wine, a common adulterant of port. The leaves and bark emit a sickly odour, believed to be repugnant to insects. Christopher Gullet (*Phil. Trans.*, 1772, lxii. p. 348) recommends that cabbages, turnips, wheat and fruit trees, to preserve them from caterpillars, flies and blight, should be whipped with twigs of young elder. According to German folklore, the hat must be doffed in the presence of the elder-tree; and in certain of the English midland counties a belief was once prevalent that the cross of Christ was made from its wood, which should therefore never be used as fuel, or treated with disrespect (see *Quart. Rev.* cxiv. 233). It was, however, a common medieval tradition, alluded to by Ben Jonson, Shakespeare and other writers, that the elder was the tree on which Judas hanged himself; and on this account, probably, to be crowned with elder was in olden times accounted a disgrace. In Cymbeline (act iv. s. 2) "the stinking elder" is mentioned as a symbol of grief. In Denmark the tree is supposed by the superstitious to be under the protection of the "Elder-mother": its flowers may not be gathered without her leave; its wood must not be employed for any household furniture; and a child sleeping in an elder-wood cradle would certainly be strangled by the Elder-mother.

Several varieties are known in cultivation: *aurea*, golden elder, has golden-yellow leaves; *laciniata*, parsley-leaved elder, has the leaflets cut into fine segments; *rotundifolia* has rounded leaflets; forms also occur with variegated white and yellow leaves, and *virescens* is a variety having white bark and green-coloured berries. The scarlet-berried elder, *S. racemosa*, is the handsomest species of the genus. It is a native of various parts of Europe, growing in Britain to a height of over 15 ft., but often producing no fruit. The dwarf elder or Danewort (supposed to have been introduced into Britain by the Danes), *S. Ebulus*, a common European species, reaches a height of about 6 ft. Its cyme is hairy, has three principal branches, and is smaller than that of *S. nigra*; the flowers are white tipped with pink. All parts of the plant are cathartic and emetic.

ELDON, JOHN SCOTT, 1st EARL OF (1751–1838), lord high chancellor of England, was born at Newcastle on the 4th of June 1751. His grandfather, William Scott of Sandgate, a suburb of Newcastle, was clerk to a "fitter"—a sort of water-carrier and broker of coals. His father, whose name also was William, began life as an apprentice to a fitter, in which service he obtained the freedom of Newcastle, becoming a member of the gild of Hoastmen (coal-fitters); later in life he became a principal in the business, and attained a respectable position as a merchant in Newcastle, accumulating property worth nearly £20,000.

John Scott was educated at the grammar school of his native town. He was not remarkable at school for application to his studies, though his wonderful memory enabled him to make good progress in them; he frequently played truant and was whipped for it, robbed orchards, and indulged in other questionable schoolboy freaks; nor did he always come out of his scrapes with honour and a character for truthfulness. When he had finished his education at the grammar school, his father thought of apprenticing him to his own business, to which an elder brother Henry had already devoted himself; and it was only through the interference of his elder brother William (afterwards Lord Stowell, *q.v.*) who had already obtained a fellowship at University College, Oxford, that it was ultimately resolved that he should continue the prosecution of his studies. Accordingly, in 1766, John Scott entered University College with the view of taking holy orders and obtaining a college living. In the year following he obtained a fellowship, graduated B.A. in 1770, and in 1771 won the prize for the English essay, the only university prize open in his time for general competition.

His wife was the eldest daughter of Aubone Surtees, a Newcastle banker. The Surtees family objected to the match, and attempted to prevent it; but a strong attachment had sprung up between them. On the 18th November 1772 Scott, with the aid of a ladder and an old friend, carried off the lady from her father's house in the Sandhill, across the border to Blackshiels, in Scotland, where they were married. The father of the bridegroom objected not to his son's choice, but to the time he chose to marry; for it was a blight on his son's prospects, depriving him of his fellowship and his chance of church preferment. But while the bride's family refused to hold intercourse with the pair, Mr Scott, like a prudent man and an affectionate father, set himself to make the best of a bad matter, and received them kindly, settling on his son £2000. John returned with his wife to Oxford, and continued to hold his fellowship for what is called the year of grace given after marriage, and added to his income by acting as a private tutor. After a time Mr Surtees was reconciled with his daughter, and made a liberal settlement on her.

John Scott's year of grace closed without any college living falling vacant; and with his fellowship he gave up the church and turned to the study of law. He became a student at the Middle Temple in January 1773. In 1776 he was called to the bar, intending at first to establish himself as an advocate in his native town, a scheme which his early success led him to abandon, and he soon settled to the practice of his profession in London, and on the northern circuit. In the autumn of the year in which he was called to the bar his father died, leaving him a legacy of £1000 over and above the £2000 previously settled on him.

In his second year at the bar his prospects began to brighten. His brother William, who by this time held the Camden professorship of ancient history, and enjoyed an extensive acquaintance with men of eminence in London, was in a position materially to advance his interests. Among his friends was the notorious Andrew Bowes of Gibside, to the patronage of whose house the rise of the Scott family was largely owing. Bowes having contested Newcastle and lost it, presented an election petition against the return of his opponent. Young Scott was retained as junior counsel in the case, and though he lost the petition he did not fail to improve the opportunity which it afforded for displaying his talents. This engagement, in the commencement of his second year at the bar, and the dropping in of occasional fees, must have raised his hopes; and he now abandoned the scheme of becoming a provincial barrister. A year or two of dull drudgery and few fees followed, and he began to be much depressed. But in 1780 we find his prospects suddenly improved, by his appearance in the case of *Ackroyd* v. *Smithson*, which became a leading case settling a rule of law; and young Scott, having lost his point in the inferior court, insisted on arguing it, on appeal, against the opinion of his clients, and carried it before Lord Thurlow, whose favourable consideration he won by his able argument. The same year Bowes again retained him in an election petition; and in the year following Scott greatly increased his reputation by his appearance as leading counsel in the Clitheroe election petition. From this time his success was certain. In 1782 he obtained a silk gown, and was so far cured of his early modesty that he declined accepting the king's counselship if precedence over him were given to his junior, Thomas (afterwards Lord) Erskine, though the latter was the son of a peer and a most accomplished orator. He was now on the high way to fortune. His health, which had hitherto been but indifferent, strengthened with the demands made upon it; his talents, his power of endurance, and his ambition all expanded together. He enjoyed a considerable practice in the northern part of his circuit, before parliamentary committees and at the chancery bar. By 1787 his practice at the equity bar had so far increased that he was obliged to give up the eastern half of his circuit (which embraced six counties) and attend it only at Lancaster.

In 1782 he entered parliament for Lord Weymouth's close borough of Weobley, which Lord Thurlow obtained for him without solicitation. In parliament he gave a general and independent support to Pitt. His first parliamentary speeches were directed against Fox's India Bill. They were unsuccessful. In one he aimed at being brilliant; and becoming merely laboured and pedantic, he was covered with ridicule by Sheridan, from whom he received a lesson which he did not fail to turn to account. In 1788 he was appointed solicitor-general, and was knighted, and at the close of this year he attracted attention by his speeches in support of Pitt's resolutions on the state of the king (George III., who then laboured under a mental malady) and the delegation of his authority. It is said that he drew the Regency Bill, which was introduced in 1789. In 1793 Sir John Scott was promoted to the office of attorney-general, in which it fell to him to conduct the memorable prosecutions for high treason against British sympathizers with French republicanism,—amongst others, against the celebrated Horne Tooke. These prosecutions, in most cases, were no doubt instigated by Sir John Scott, and were the most important proceedings in which he was ever professionally engaged. He has left on record, in his *Anecdote Book*, a defence of his conduct in regard to them. A full account of the principal trials, and of the various legislative measures for repressing the expressions of popular opinion for which he was more or less responsible, will be found in Twiss's *Public and Private Life of the Lord Chancellor Eldon*, and in the *Lives of the Lord Chancellors*, by Lord Campbell.

In 1799 the office of chief justice of the Court of Common Pleas falling vacant, Sir John Scott's claim to it was not overlooked; and after seventeen years' service in the Lower House, he entered the House of Peers as Baron Eldon. In February 1801 the ministry of Pitt was succeeded by that of Addington, and the chief justice now ascended the woolsack. The chancellorship was given to him professedly on account of his notorious anti-Catholic zeal. From the peace of Amiens (1802) till 1804 Lord Eldon appears to have interfered little in politics. In the latter year we find him conducting the negotiations which resulted in the dismissal of Addington and the recall of Pitt to office as prime minister. Lord Eldon was continued in office as chancellor under Pitt; but the new administration was of short duration, for on the 23rd of January 1806 Pitt died, worn out with the anxieties of office, and his ministry was succeeded by a coalition, under Lord Grenville. The death of Fox, who became foreign secretary and leader of the House of Commons, soon, however, broke up the Grenville administration; and in the spring of 1807 Lord Eldon once more, under Lord Liverpool's administration, returned to the woolsack, which, from that time, he continued to occupy for about twenty years, swaying the cabinet, and being in all but name prime minister of England. It was not till April 1827, when the premiership, vacant through the paralysis of Lord Liverpool, fell to Canning, the chief advocate of Roman Catholic emancipation, that Lord Eldon, in the seventy-sixth year of his age, finally resigned the chancellorship. When, after the two short administrations of Canning and Goderich, it fell to the duke of Wellington to construct a cabinet, Lord Eldon expected to be included, if not as chancellor, at least in some important office, but he was overlooked, at which he was much chagrined. Notwithstanding his frequent protests that he did not covet power, but longed for retirement, we find him again, so late as 1835, within three years of his death, in hopes of office under Peel. He spoke in parliament for the last time in July 1834.

In 1821 Lord Eldon had been created Viscount Encombe and earl of Eldon by George IV., whom he managed to conciliate, partly, no doubt, by espousing his cause against his wife, whose advocate he had formerly been, and partly through his reputation for zeal against the Roman Catholics. In the same year his brother William, who from 1798 had filled the office of judge of the High Court of Admiralty, was raised to the peerage under the title of Lord Stowell.

Lord Eldon's wife, his dear "Bessy," his love for whom is a beautiful feature in his life, died before him, on the 28th of June 1831. By nature she was of simple character, and by habits acquired during the early portion of her husband's career almost a recluse. Two of their sons reached maturity—John, who died in 1805, and William Henry John, who died unmarried in 1832. Lord Eldon himself survived almost all his immediate relations. His brother William died in 1836. He himself died in London on the 13th of January 1838, leaving behind him two daughters, Lady Frances Bankes and Lady Elizabeth Repton, and a grandson John (1805-1854), who succeeded him as second earl, the title subsequently passing to the latter's son John (b. 1846).

Lord Eldon was no legislator—his one aim in politics was to keep in office, and maintain things as he found them; and almost the only laws he helped to pass were laws for popular coercion. For nearly forty years he fought against every improvement in law, or in the constitution—calling God to witness, on the smallest proposal of reform, that he foresaw from it the downfall of his country. Without any political principles, properly so called, and without interest in or knowledge of foreign affairs, he maintained himself and his party in power for an unprecedented period by his great tact, and in virtue of his two great political properties—of zeal against every species of reform, and zeal against the Roman Catholics. To pass from his political to his judicial character is to shift to ground on which his greatness is universally acknowledged. His judgments, which have received as much praise for their accuracy as abuse for their clumsiness and uncouthness, fill a small library. But though intimately acquainted with every nook and cranny of the English law, he never carried his studies into foreign fields, from which to enrich our legal literature; and it must be added that against the excellence of his judgments, in too many cases, must be set off the hardships, worse than injustice, that arose from his protracted delays in pronouncing them. A consummate judge and the narrowest of politicians, he was doubt on the bench, and promptness itself in the political arena. For literature, as for art, he had no feeling. What intervals of leisure he enjoyed from the cares of office he filled up with newspapers and the gossip of old cronies. Nor were his intimate associates men of refinement and taste; they were rather good fellows who quietly enjoyed a good bottle and a joke; he uniformly avoided encounters of wit with his equals. He is said to have been parsimonious, and certainly he was quicker to receive than to reciprocate hospitalities; but his mean establishment and mode of life are explained by the retired habits of his wife, and her dislike of company. His manners were very winning and courtly, and in the circle of his immediate relatives he is said to have always been lovable and beloved.

"In his person," says Lord Campbell, "Lord Eldon was about the middle size, his figure light and athletic, his features regular and handsome, his eye bright and full, his smile remarkably benevolent, and his whole appearance prepossessing. The advance of years rather increased than detracted from these personal advantages. As he sat on the judgment-seat, 'the deep thought betrayed in his furrowed brow—the large eyebrows, overhanging eyes that seemed to regard more what was taking place within than around him—his calmness, that would have assumed a character of sternness but for its perfect placidity—his dignity, repose and venerable age, tended at once to win confidence and to inspire respect' (Townsend). He had a voice both sweet and deep-toned, and its effect was not injured by his Northumbrian burr, which, though strong, was entirely free from harshness and vulgarity."

AUTHORITIES.—Horace Twiss, *Life of Lord Chancellor Eldon* (1844); W. E. Surtees, *Sketch of the Lives of Lords Stowell and Eldon* (1846); Lord Campbell, *Lives of the Chancellors*; W. C. Townsend, *Lives of Twelve Eminent Judges* (1846); *Greville Memoirs.*

EL DORADO (Span. "the gilded one"), a name applied, first, to the king or chief priest of a South American tribe who was said to cover himself with gold dust at a yearly religious festival held near Santa Fé de Bogotá; next, to a legendary city called Manoa or Omoa; and lastly, to a mythical country in which gold and precious stones were found in fabulous abundance. The legend, which has never been traced to its ultimate source, had many variants, especially as regards the situation attributed to Manoa. It induced many Spanish explorers to lead expeditions in search of treasure, but all failed. Among the most famous were the expedition undertaken by Diego de Ordaz, whose lieutenant Martinez claimed to have been rescued from shipwreck, conveyed inland, and entertained at Omoa by "El Dorado" himself (1531); and the journeys of Orellana (1540—1541), who passed down the Rio Napo to the valley of the Amazon; that of Philip von Hutten (1541–1545), who led an exploring party from Coro on the coast of Caracas; and of Gonzalo Ximenes de Quesada (1569), who started from Santa Fé de Bogotá. Sir Walter Raleigh, who resumed the search in 1595, described Manoa as a city on Lake Parimá in Guiana. This lake was marked on English and other maps until its existence was disproved by A. von Humboldt (1769–1859). Meanwhile the name of El Dorado came to be used metaphorically of any place where wealth could be rapidly acquired. It was given to a county in California, and to towns and cities in various states. In literature frequent allusion is made to the legend, perhaps the best-known references being those in Milton's *Paradise Lost* (vi. 411) and Voltaire's *Candide* (chs. 18, 19).

See A. F. A. Bandelier, *The Gilded Man, El Dorado* (New York, 1893).

ELDUAYEN, JOSÉ DE, 1st Marquis del Pazo de la Merced (1823–1898), Spanish politician, was born in Madrid on the 22nd of June 1823. He was educated in the capital, took the degree of civil engineer, and as such directed important works in Asturias and Galicia, entered the Cortes in 1856 as deputy for Vigo, and sat in all the parliaments until 1867 as member of the Union Liberal with Marshal O'Donnell. He attacked the Miraflores cabinet in 1864, and became under-secretary of the home office when Canovas was minister in 1865. He was made a councillor of state in 1866, and in 1868 assisted the other members of the Union Liberal in preparing the revolution. In the Cortes of 1872 he took much part in financial debates. He accepted office as member of the last Sagasta cabinet under King Amadeus. On the proclamation of the republic Elduayen very earnestly co-operated in the Alphonsist conspiracy, and endeavoured to induce the military and politicians to work together. He went abroad to meet and accompany the prince after the *pronunciamiento* of Marshal Campos, landed with him at Valencia, was made governor of Madrid, a marquis, grand cross of Charles III., and minister for the colonies in 1878. He accepted the portfolio of foreign affairs in the Canovas cabinet from 1883 to 1885, and was made a life senator. He always prided himself on having been one of the five members of the Cortes of 1870 who voted for Alphonso XII. when that parliament elected Amadeus of Savoy. He died at Madrid on the 24th of June 1898.

ELEANOR OF AQUITAINE (*c.* 1122–1204), wife of the English king Henry II., was the daughter and heiress of Duke William X. of Aquitaine, whom she succeeded in April 1137. In accordance with arrangements made by her father, she at once married Prince Louis, the heir to the French crown, and a month later her husband became king of France under the title of Louis VII. Eleanor bore Louis two daughters but no sons. This was probably the reason why their marriage was annulled by mutual consent in 1151, but contemporary scandal-mongers attributed the separation to the king's jealousy. It was alleged that, while accompanying her husband on the Second Crusade (1146–1149), Eleanor had been unduly familiar with her uncle, Raymond of Antioch. Chronology is against this hypothesis, since Louis and she lived on good terms together for two years after the Crusade. There is still less ground for the supposition that Henry of Anjou, whom she married immediately after the divorce, had been her lover before it. This second marriage, with a youth some years her junior, was purely political. The duchy of Aquitaine required a strong ruler, and the union with Anjou was eminently desirable. Louis, who had hoped that Aquitaine would descend to his daughters, was mortified and alarmed by the Angevin marriage; all the more so when Henry of Anjou succeeded to the English crown in 1154. From this event dates the beginning of the secular strife between England and France which runs like a red thread through medieval history.

Eleanor bore to her second husband five sons and three daughters; John, the youngest of their children, was born in 1167. But her relations with Henry passed gradually through indifference to hatred. Henry was an unfaithful husband, and Eleanor supported her sons in their great rebellion of 1173. Throughout the latter years of the reign she was kept in a sort of honourable confinement. It was during her captivity that Henry formed his connexion with Rosamond Clifford, the Fair Rosamond of romance. Eleanor, therefore, can hardly have been responsible for the death of this rival, and the romance of the poisoned bowl appears to be an invention of the next century.

Under the rule of Richard and John the queen became a political personage of the highest importance. To both her sons the popularity which she enjoyed in Aquitaine was most valuable. But in other directions also she did good service. She helped to frustrate the conspiracy with France which John concocted during Richard's captivity. She afterwards reconciled the king and the prince, thus saving for John the succession which he had forfeited by his misconduct. In 1199 she crushed an Angevin rising in favour of John's nephew, Arthur of Brittany. In 1201 she negotiated a marriage between her grand-daughter, Blanche of Castile, and Louis of France, the grandson of her first husband. It was through her staunch defence of Mirabeau in Poitou that John got possession of his nephew's person. She died on the 1st of April 1204; and was buried at Fontevrault. Although a woman of strong passions and great abilities she is, historically, less important as an individual than as the heiress of Aquitaine, a part of which was, through her second marriage, united to England for some four hundred years.

See the chronicles cited for the reigns of Henry II., Richard I. and John. Also Sir J. H. Ramsay, *Angevin Empire* (London, 1903); K. Norgate, *England under the Angevin Kings* (London, 1887); and A. Strickland, *Lives of the Queens of England*, vol. i. (1841).

(H. W. C. D.)

ELEATIC SCHOOL, a Greek school of philosophy which came into existence towards the end of the 6th century B.C., and ended with Melissus of Samos (fl. *c.* 450 B.C.). It took its name from Elea, a Greek city of lower Italy, the home of its chief exponents, Parmenides and Zeno. Its foundation is often attributed to Xenophanes of Colophon, but, although there is much in his speculations which formed part of the later Eleatic doctrine, it is probably more correct to regard Parmenides as the founder of the school. At all events, it was Parmenides who gave it its fullest development. The main doctrines of the Eleatics were evolved in opposition on the one hand, to the physical theories of the early physical philosophers who explained all existence in terms of primary matter (see Ionian School), and, on the other hand, to the theory of Heraclitus that all existence may be summed up as perpetual change. As against these theories the Eleatics maintained that the true explanation of things lies in the conception of a universal unity of being. The senses with their changing and inconsistent reports cannot cognize this unity; it is by thought alone that we can pass beyond the false appearances of sense and arrive at the knowledge of being, at the fundamental truth that "the All is One." There can be no creation, for being cannot come from not-being; a thing cannot arise from that which is different from it. The errors of common opinion arise to a great extent from the ambiguous use of the verb "to be," which may imply existence or be merely the copula which connects subject and predicate.

In these main contentions the Eleatic school achieved a real advance, and paved the way to the modern conception of metaphysics. Xenophanes in the middle of the 6th century had made the first great attack on the crude mythology of early Greece, including in his onslaught the whole anthropomorphic system enshrined in the poems of Homer and Hesiod. In the hands of Parmenides this spirit of free thought developed on metaphysical lines. Subsequently, whether from the fact that such bold speculations were obnoxious to the general sense of propriety in Elea, or from the inferiority of its leaders, the school degenerated into verbal disputes as to the possibility of motion, and similar academic trifling. The best work of the school was absorbed in the Platonic metaphysic (see E. Caird, *Evolution of Theology in the Greek Philosophers*, 1904).

See further the articles on Xenophanes; Parmenides; Zeno (of Elea); Melissus, with the works there quoted; also the histories of philosophy by Zeller, Gomperz, Windelband, &c.

ELECAMPANE (Med. Lat. *Enula Campana*), a perennial composite plant, the *Inula Helenium* of botanists, which is common in many parts of Britain, and ranges throughout central and southern Europe, and in Asia as far eastwards as the Himalayas. It is a rather rigid herb, the stem of which attains a height of from 3 to 5 ft.; the leaves are large and toothed, the lower ones stalked, the rest embracing the stem; the flowers are yellow, 2 in. broad, and have many rays, each three-notched at the extremity. The root is thick, branching and mucilaginous, and has a warm, bitter taste and a camphoraceous odour. For medicinal purposes it should be procured from plants not more than two or three years old. Besides *inulin*, $C_{12}H_{20}O_{10}$, a body isomeric with starch, the root contains *helenin*, C_6H_8O, a stearoptene, which may be prepared in white acicular crystals, insoluble in water, but freely soluble in alcohol. When freed from the accompanying inula-camphor by repeated crystallization from alcohol, helenin melts at 110° C. By the ancients the root was employed both as a medicine and as a condiment, and in England it was formerly in great repute as an aromatic tonic and stimulant of the secretory organs. "The fresh roots of elecampane preserved with sugar, or made into a syrup or conserve," are recommended by John Parkinson in his *Theatrum Botanicum* as "very effectual to warm a cold and windy stomack, and the pricking and stitches therein or in the sides caused by the Spleene, and to helpe the cough, shortnesse of breath, and wheesing in the Lungs." As a drug, however, the root is now seldom resorted to except in veterinary practice, though it is undoubtedly possessed of antiseptic properties. In France and Switzerland it is used in the manufacture of absinthe.

ELECTION (from Lat. *eligere*, to pick out), the method by which a choice or selection is made by a constituent body (the electors or electorate) of some person to fill a certain office or dignity. The procedure itself is called an election. Election, as a special form of selection, is naturally a loose term covering many subjects; but except in the theological sense (the doctrine of election), as employed by Calvin and others, for the choice by God of His "elect," the legal sense (see Election, *in law*, below), and occasionally as a synonym for personal choice (one's own "election"), it is confined to the selection by the preponderating vote of some properly constituted body of electors of one of two or more candidates, sometimes for admission only to some private social position (as in a club), but more particularly in connexion with public representative positions in political government. It is thus distinguished from arbitrary methods of appointment, either where the right of nominating rests in an individual, or where pure chance (such as selection by lot) dictates the result. The part played by different forms of election in history is alluded to in numerous articles in this work, dealing with various countries and various subjects. It is only necessary here to consider certain important features in the elections, as ordinarily understood, namely, the exercise of the right of voting for political and municipal offices in the United Kingdom and America. See also the articles Parliament; Representation; Voting; Ballot, &c., and United States: *Political Institutions*. For practical details as to the conduct of political elections in England reference must be made to the various text-books on the subject; the candidate and his election agent require to be on their guard against any false step which might invalidate his return.

Law in the United Kingdom.—Considerable alterations have been made in recent years in the law of Great Britain and Ireland relating to the procedure at parliamentary and municipal elections, and to election petitions.

As regards parliamentary elections (which may be either the "general election," after a dissolution of parliament, or "by-elections," when casual vacancies occur during its continuance), the most important of the amending statutes is the Corrupt and Illegal Practices Act 1883. This act, and the Parliamentary Elections Act 1868, as amended by it, and other enactments dealing with corrupt practices, are temporary acts requiring annual renewal. As regards municipal elections, the Corrupt Practices (Municipal Elections) Act 1872 has been repealed by the Municipal Corporations Act 1882 for England, and by the Local Government (Ireland) Act 1898 for Ireland. The governing enactments for England are now the Municipal Corporations Act 1882, part iv., and the Municipal Elections (Corrupt and Illegal Practices) Act 1884, the latter annually renewable. The provisions of these enactments have been applied with necessary modifications to municipal and other local government elections in Ireland by orders of the Irish Local Government Board made under powers conferred by the Local Government (Ireland) Act 1898. In Scotland the law regulating municipal and other local government elections is now to be found in the Elections (Scotland) (Corrupt and Illegal Practices) Act 1890.

The alterations in the law have been in the direction of greater strictness in regard to the conduct of elections, and increased control in the public interest over the proceedings on election petitions. Various acts and payments which were previously lawful in the absence of any corrupt bargain or motive are now altogether forbidden under the name of "illegal practices" as distinguished from "corrupt practices." Failure on the part of a parliamentary candidate or his election agent to comply with the requirements of the law in any particular is sufficient to invalidate the return (see the articles Bribery and Corrupt Practices). Certain relaxations are, however, allowed in consideration of the difficulty of absolutely avoiding all deviation from the strict rules laid down. Thus, where the judges who try an election petition report that there has been treating, undue influence, or any illegal practice by the candidate or his election agent, but that it was trivial, unimportant and of a limited character, and contrary to the orders and without the sanction or connivance of the candidate or his election agent, and that the candidate and his election agent took all reasonable means for preventing corrupt and illegal practices, and that the election was otherwise free from such practices on their part, the election will not be avoided. The court has also the power to relieve from the consequences of certain innocent contraventions of the law caused by inadvertence or miscalculation.

The inquiry into a disputed parliamentary election was formerly conducted before a committee of the House of Commons, chosen as nearly as possible from both sides of the House for that particular business. The decisions of these tribunals laboured

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under the suspicion of being prompted by party feeling, and by an act of 1868 the jurisdiction was finally transferred to judges of the High Court, notwithstanding the general unwillingness of the bench to accept a class of business which they feared might bring their integrity into dispute. Section 11 of the act ordered, *inter alia*, that the trial of every election petition shall be conducted before a *puisne judge* of one of the common law courts at Westminster and Dublin; that the said courts shall each select a judge to be placed on the rota for the trial of election petitions; that the said judges shall try petitions standing for trial according to seniority or otherwise, as they may agree; that the trial shall take place in the county or borough to which the petition refers, unless the court should think it desirable to hold it elsewhere. The judge shall determine "whether the member whose return is complained of, or any and what other person, was duly returned and elected, or whether the election was void," and shall certify his determination to the speaker. When corrupt practices have been charged the judge shall also report (1) whether any such practice has been committed by or with the knowledge or consent of any candidate, and the nature thereof, (2) the names of persons proved to have been guilty of any corrupt practice; and (3) whether corrupt practices have extensively prevailed at the election. Questions of law were to be referred to the decision of the court of common pleas. On the abolition of that court by the Judicature Act 1873, the jurisdiction was transferred to the common pleas division, and again on the abolition of that division was transferred to the king's bench division, in whom it is now vested. The rota of judges for the trial of election petitions is also supplied by the king's bench division. The trial now takes place before two judges instead of one; and, when necessary, the number of judges on the rota may be increased. Both the judges who try a petition are to sign the certificates to be made to the speaker. If they differ as to the validity of a return, they are to state such difference in their certificate, and the return is to be held good; if they differ as to a report on any other matter, they are to certify their difference and make no report on such matter. The director of public prosecutions attends the trial personally or by representative. It is his duty to watch the proceedings in the public interest, to issue summonses to witnesses whose evidence is desired by the court, and to prosecute before the election court or elsewhere those persons whom he thinks to have been guilty of corrupt or illegal practices at the election in question. If an application is made for leave to withdraw a petition, copies of the affidavits in support are to be delivered to him; and he is entitled to be heard and to call evidence in opposition to such application. Witnesses are not excused from answering criminating questions; but their evidence cannot be used against them in any proceedings except criminal proceedings for perjury in respect of that evidence. If a witness answers truly all questions which he is required by the court to answer, he is entitled to receive a certificate of indemnity, which will save him from all proceedings for any offence under the Corrupt Practices Acts committed by him before the date of the certificate at or in relation to the election, except proceedings to enforce any incapacity incurred by such offence. An application for leave to withdraw a petition must be supported by affidavits from all the parties to the petition and their solicitors, and by the election agents of all of the parties who were candidates at the election. Each of these affidavits is to state that to the best of the deponent's knowledge and belief there has been no agreement and no terms or undertaking made or entered into as to the withdrawal, or, if any agreement has been made, shall state its terms. The applicant and his solicitor are also to state in their affidavits the grounds on which the petition is sought to be withdrawn. If any person makes an agreement for the withdrawal of a petition in consideration of a money payment, or of the promise that the seat shall be vacated or another petition withdrawn, or omits to state in his affidavit that he has made an agreement, lawful or unlawful, for the withdrawal, he is guilty of an indictable misdemeanour. The report of the judges to the speaker is to contain particulars as to illegal practices similar to those previously required as to corrupt practices; and they are to report further whether any candidate has been guilty by his agents of an illegal practice, and whether certificates of indemnity have been given to persons reported guilty of corrupt or illegal practices.

The Corrupt Practices Acts apply, with necessary variations in details, to parliamentary elections in Scotland and Ireland.

The amendments in the law as to municipal elections are generally similar to those which have been made in parliamentary election law. The procedure on trial of petitions is substantially the same, and wherever no other provision is made by the acts or rules the procedure on the trial of parliamentary election petitions is to be followed. Petitions against municipal elections were dealt with in 35 & 36 Vict. c. 60. The election judges appoint a number of barristers, not exceeding five, as commissioners to try such petitions. No barrister can be appointed who is of less than fifteen years' standing, or a member of parliament, or holder of any office of profit (other than that of recorder) under the crown; nor can any barrister try a petition in any borough in which he is recorder or in which he resides, or which is included in his circuit. The barrister sits without a jury. The provisions are generally similar to those relating to parliamentary elections. The petition may allege that the election was avoided as to the borough or ward on the ground of general bribery, &c., or that the election of the person petitioned against was avoided by corrupt practices, or by personal disqualification, or that he had not the majority of lawful votes. The commissioner who tries a petition sends to the High Court a certificate of the result, together with reports as to corrupt and illegal practices, &c., similar to those made to the speaker by the judges who try a parliamentary election petition. The Municipal Elections (Corrupt and Illegal Practices) Act 1884 applied to school board elections subject to certain variations, and has been extended by the Local Government Act 1888 to county council elections, and by the Local Government Act 1894 to elections by parochial electors. The law in Scotland is on the same lines, and extends to all non-parliamentary elections, and, as has been stated, the English statutes have been applied with adaptations to all municipal and local government elections in Ireland.

United States.—Elections are much more frequent in the United States than they are in Great Britain, and they are also more complicated. The terms of elective officers are shorter; and as there are also more offices to be filled, the number of persons to be voted for is necessarily much greater. In the year of a presidential election the citizen may be called upon to vote at one time for all of the following: (1) National candidates—president and vice-president (indirectly through the electoral college) and members of the House of Representatives; (2) state candidates—governor, members of the state legislature, attorney-general, treasurer, &c.; (3) county candidates—sheriff, county judges, district attorney, &c.; (4) municipal or town candidates—mayor, aldermen, selectmen, &c. The number of persons actually voted for may therefore be ten or a dozen, or it may be many more. In addition, the citizen is often called upon to vote yea or nay on questions such as amendments to the state constitutions, granting of licences, and approval or disapproval of new municipal undertakings. As there may be, and generally is, more than one candidate for each office, and as all elections are now, and have been for many years, conducted by ballot, the total number of names to appear on the ballot may be one hundred or may be several hundred. These names are arranged in different ways, according to the laws of the different states. Under the Massachusetts law, which is considered the best by reformers, the names of candidates for each office are arranged alphabetically on a "blanket" ballot, as it is called from its size, and the elector places a mark opposite the names of such candidates as he may wish to vote for. Other states, New York for example, have the blanket system, but the names of the candidates are arranged in party columns. Still other states allow the grouping on one ballot of all the candidates of a single party, and there would be therefore as many separate ballots in such states as there were parties in the field.

The qualifications for voting, while varying in the different states in details, are in their main features the same throughout the Union. A residence in the state is required of from three months to two years. Residence is also necessary, but for a shorter period, in the county, city or town, or voting precinct. A few states require the payment of a poll tax. Some require that the voter shall be able to read and understand the Constitution. This latter qualification has been introduced into several of the Southern states, partly at least to disqualify the ignorant coloured voters. In all, or practically all, the states idiots, convicts and the insane are disqualified; in some states paupers; in some of the Western states the Chinese. In some states women are allowed to vote on certain questions, or for the candidates for certain offices, especially school officials; and in four of the Western states women have the same rights of suffrage as men. The number of those who are qualified to vote, but do not avail themselves of the right, varies greatly in the different states and according to the interest taken in the election. As a general rule, but subject to exceptions, the national elections call out the largest number, the state elections next, and the local elections the smallest number of voters. In an exciting national election between 80 and 90% of the qualified voters actually vote, a proportion considerably greater than in Great Britain or Germany.

The tendency of recent years has been towards a decrease both in the number and in the frequency of elections. A president and vice-president are voted for every fourth year, in the years divisible by four, on the first Tuesday following the first Monday of November. Members of the national House of Representatives are chosen for two years on the even-numbered years. State and local elections take place in accordance with state laws, and may or may not be on the same day as the national elections. Originally the rule was for the states to hold annual elections; in fact, so strongly did the feeling prevail of the need in a democratic country for frequent elections, that the maxim "where annual elections end, tyranny begins," became a political proverb. But opinion gradually changed even in the older or Eastern states, and in 1909 Massachusetts and Rhode Island were the only states in the Union holding annual elections for governor and both houses of the state legislature. In the Western states especially state officers are chosen for longer terms—in the case of the governor often for four years—and the number of elections has correspondingly decreased. Another cause of the decrease in the number of elections is the growing practice of holding all the elections of any year on one and the same day. Before the Civil War Pennsylvania held its state elections several months before the national elections. Ohio and Indiana, until 1885 and 1881 respectively, held their state elections early in October. Maine, Vermont and Arkansas keep to September. The selection of one day in the year for all elections held in that year has resulted in a considerable decrease in the total number.

Another tendency of recent years, but not so pronounced, is to hold local elections in what is known as the "off" year; that is, on the odd-numbered year, when no national election is held. The object of this reform is to encourage independent voting. The average American citizen is only too prone to carry his national political predilections into local elections, and to vote for the local nominees of his party, without regard to the question of fitness of candidates and the fundamental difference of issues involved. This tendency to vote the entire party ticket is the more pronounced because under the system of voting in use in many of the states all the candidates of the party are arranged on one ticket, and it is much easier to vote a straight or unaltered ticket than to change or "scratch" it. Again, the voter, especially the ignorant one, refrains from scratching his ticket, lest in some way he should fail to comply with the technicalities of the law and his vote be lost. On the other hand, if local elections are held on the "off" or odd year, and there be no national or state candidates, the voter feels much more free to select only those candidates whom he considers best qualified for the various offices.

On the important question of the purity of elections it is difficult to speak with precision. In many of the states, especially those with an enlightened public spirit, such as most of the New England states and many of the North-Western, the elections are fairly conducted, there being no intimidation at all, little or no bribery, and an honest count. It can safely be said that through the Union as a whole the tendency of recent years has been decidedly towards greater honesty of elections. This is owing to a number of causes: (1) The selection of a single day for all elections, and the consequent immense number voting on that day. Some years ago, when for instance the Ohio and Indiana elections were held a few weeks before the general election, each party strained every nerve to carry them, for the sake of prestige and the influence on other states. In fact, presidential elections were often felt to turn on the result in these early voting states, and the party managers were none too scrupulous in the means employed to carry them. Bribery has decreased in such states since the change of election day to that of the rest of the country. (2) The enactment in most of the states of the Australian or secret ballot (*q.v.*) laws. These have led to the secrecy of the ballot, and hence to a greater or less extent have prevented intimidation and bribery. (3) Educational or other such test, more particularly in the Southern states, the object of which is to exclude the coloured, and especially the ignorant coloured, voters from the polls. In those southern states in which the coloured vote was large, and still more in those in which it was the majority, it was felt among the whites that intimidation or ballot-box stuffing was justified by the necessity of white supremacy. With the elimination of the coloured vote by educational or other tests the honesty of elections has increased. (4) The enactment of new and more stringent registration laws. Under these laws only those persons are allowed to vote whose names have been placed on the rolls a certain number of days or months before election. These rolls are open to public inspection, and the names may be challenged at the polls, and "colonization" or repeating is therefore almost impossible. (5) The reform of the civil service and the gradual elimination of the vicious principle of "to the victors belong the spoils." With the reform of the civil service elections become less a scramble for office and more a contest of political or economic principle. They bring into the field, therefore, a better class of candidates. (6) The enactment in a number of states of various other laws for the prevention of corrupt practices, for the publication of campaign expenses, and for the prohibition of party workers from coming within a certain specified distance of the polls. In the state of Massachusetts, for instance, an act passed in 1892, and subsequently amended, provides that political committees shall file a full statement, duly sworn to, of all campaign expenditures made by them. The act applies to all public elections except that of town officers, and also covers nominations by caucuses and conventions as well. Apart from his personal expenses such as postage, travelling expenses, &c., a candidate is prohibited from spending anything himself to promote either his nomination or his election, but he is allowed to contribute to the treasury of the political committee. The law places no limit on the amount that these committees may spend. The reform sought by the law is thorough publicity, and not only are details of receipts and expenditures to be published, but the names of contributors and the amount of their contributions. In the state of New York the act which seeks to prevent corrupt practices relies in like manner on the efficacy of publicity, but it is less effective than the Massachusetts law in that it provides simply for the filing by the candidates themselves of sworn statements of their own expenses. There is nothing to prevent their contributing to political committees, and the financial methods and the amounts expended by such committees are not made public. But behind all these causes that have led to more honest elections lies the still greater one of a healthier public spirit. In the reaction following the Civil War all reforms halted. In recent years, however, a new and healthier interest has sprung up in things political, and one result of this improved civic spirit is seen in the various laws for purification of elections. It may now be safely affirmed that in the majority of states the elections are honestly conducted; that intimidation, bribery, stuffing of the ballot boxes or other forms of corruption, when they exist, are owing in large measure to temporary or local causes; and that the tendency of recent years has been towards a decrease in all forms of corruption.

The expenses connected with elections, such as the renting and preparing of the polling-places, the payment of the clerks and other officers who conduct the elections and count the vote, are borne by the community. A candidate therefore is not, as far as the law is concerned, liable to any expense whatever. As a matter of fact he does commonly contribute to the party treasury, though in the case of certain candidates, particularly those for the presidency and for judicial offices, financial contributions are not general. The amount of a candidate's contribution varies greatly, according to the office sought, the state in which he lives, and his private wealth. On one occasion, in a district in New York, a candidate for Congress is credibly believed to have spent at one election $50,000. On the other hand, in a Congressional election in a certain district in Massachusetts, the only expenditure of one of the candidates was for the two-cent stamp placed on his letter of acceptance. No estimate of the average amount expended can be made. It is, however, the conclusion of Mr Bryce, in his *American Commonwealth*, that as a rule a seat in Congress costs the candidate less than a seat for a county division in the House of Commons. (See also BALLOT.)

ELECTION, in English law, the obligation imposed upon a party by courts of equity to choose between two inconsistent or alternative rights or claims in cases where there is a clear intention of the person from whom he derives one that he should not enjoy both. Thus a testator died seized of property in fee simple and in fee tail—he had two daughters, and devised the fee simple property to one and the entailed property to the other; the first one claimed to have her share of the entailed property as coparcener and also to retain the benefit she took under the will. It was held that she was put to her election whether she would take under the will and renounce her claim to the entailed property or take against the will, in which case she must renounce the benefits she took under the will in so far as was necessary to compensate her sister. As the essence of the doctrine is compensation, a person electing against a document does not lose all his rights under it, but the court will sequester so much only of the benefit intended for him as will compensate the persons disappointed by his election. For the same reason it is necessary that there should be a free and disposable fund passing by the instrument from which compensation can be made in the event of election against the will. If, therefore, a man having a special power of appointment appoint the fund equally between two persons, one being an object of the power and the other not an object, no question of election arises, but the appointment to the person not an object is bad.

Election, though generally arising in cases of wills, may also arise in the case of a deed. There is, however, a distinction to be observed. In the case of a will a clear intention on the part of the testator that he meant to dispose of property not his own must be shown, and parol evidence is not admissible as to this. In the case of a deed, however, no such intention need be shown, for if a deed confers a benefit and imposes a liability on the same person he cannot be allowed to accept the one and reject the other, but this must be distinguished from cases where two separate gifts are given to a person, one beneficial and the other onerous. In such a case no question of election arises and he may take the one and reject the other, unless, indeed, there are words used which make the one conditional on the acceptance of the other.

Election is either express, *e.g.* by deed, or implied; in the latter case it is often a question of considerable difficulty whether there has in fact been an election or not; each case must depend upon the particular circumstances, but quite generally it may be said that the person who has elected must have been capable of electing, aware of the existence of the doctrine of election, and have had the opportunity of satisfying himself of the relative value of the properties between which he has elected. In the case of infants the court will sometimes elect after an inquiry as to which course is the most advantageous, or if there is no immediate urgency, will allow the matter to stand over till the infant attains his majority. In the cases of married women and lunatics the courts will exercise the right for them. It sometimes happens that the parties have so dealt with the property that it would be inequitable to disturb it; in such cases the court will not interfere in order to allow of election.

ELECTORAL COMMISSION, in United States history, a commission created to settle the disputed presidential election of 1876. In this election Samuel J. Tilden, the Democratic candidate, received 184 uncontested electoral votes, and Rutherford B. Hayes, the Republican candidate, 163.[1] The states of Florida, Louisiana, Oregon and South Carolina, with a total of 22 votes, each sent in two sets of electoral ballots,[2] and from each of these states except Oregon one set gave the whole vote to Tilden and the other gave the whole vote to Hayes. From Oregon one set of ballots gave the three electoral votes of the state to Hayes; the other gave two votes to Hayes and one to Tilden.

The election of a president is a complex proceeding, the method being indicated partly in the Constitution, and being partly left to Congress and partly to the states. The manner of selecting the electors is left to state law; the electoral ballots are sent to the president of the Senate, who "shall, in the presence of the Senate and House of Representatives, open all certificates, and the votes shall then be counted." Concerning this provision many questions of vital importance arose in 1876: Did the president of the Senate count the votes, the houses being mere witnesses; or did the houses count them, the president's duties being merely ministerial? Did counting imply the determination of what should be counted, or was it a mere arithmetical process; that is, did the Constitution itself afford a method of settling disputed returns, or was this left to legislation by Congress? Might Congress or an officer of the Senate go behind a state's certificate and review the acts of its certifying officials? Might it go further and examine into the choice of electors? And if it had such powers, might it delegate them to a commission? As regards the procedure of Congress, it seems that, although in early years the president of the Senate not only performed or overlooked the electoral count but also exercised discretion in some matters very important in 1876, Congress early began to assert power, and, at least from 1821 onward, controlled the count, claiming complete power. The fact, however, that the Senate in 1876 was controlled by the Republicans and the House by the Democrats, lessened the chances of any harmonious settlement of these questions by Congress. The country seemed on the verge of civil war. Hence it was that by an act of the 29th of January 1877, Congress created the Electoral Commission to pass upon the contested returns, giving it "the same powers, if any" possessed by itself in the premises, the decisions to stand unless rejected by the two houses separately. The commission was composed of five Democratic and five Republican Congressmen, two justices of the Supreme Court of either party, and a fifth justice chosen by these four. As its members of the commission the Senate chose G. F. Edmunds of Vermont, O. P. Morton of Indiana, and F. T. Frelinghuysen of New Jersey (Republicans), and A. G. Thurman of Ohio and T. F. Bayard of Delaware (Democrats). The House chose Henry B. Payne of Ohio, Eppa Hunton of Virginia, and Josiah G. Abbott of Massachusetts (Democrats); and George F. Hoar of Massachusetts and James A. Garfield of Ohio (Republicans). The Republican judges were William Strong and Samuel F. Miller; the Democratic, Nathan Clifford and Stephen J. Field. These four chose as the fifteenth member Justice Joseph P. Bradley, a Republican but the only member not selected avowedly as a partisan. As counsel for the Democratic candidate there appeared before the commission at different times Charles O'Conor of New York, Jeremiah S. Black of Pennsylvania, Lyman Trumbull of Illinois, R. T. Merrick of the District of Columbia, Ashbel Green of New Jersey, Matthew H. Carpenter of Wisconsin, George Hoadley of Ohio, and W. C. Whitney of New York. W. M. Evarts and E. W. Stoughton of New York and Samuel Shellabarger and Stanley Matthews of Ohio appeared regularly in behalf of Mr Hayes.

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[1] The election of a vice-president was, of course, involved also. William A. Wheeler was the Republican candidate, and Thomas A. Hendricks the Democratic.

[2] A second set of electoral ballots had also been sent in from Vermont, where Hayes had received a popular majority vote of 24,000. As these ballots had been transmitted in an irregular manner, the president of the Senate refused to receive them, and was sustained in this action by the upper House.

The popular vote seemed to indicate that Hayes had carried South Carolina and Oregon, and Tilden Florida and Louisiana. It was evident, however, that Hayes could secure the 185 votes necessary to elect only by gaining every disputed ballot. As the choice of Republican electors in Louisiana had been accomplished by the rejection of several thousand Democratic votes by a Republican returning board, the Democrats insisted that the commission should go behind the returns and correct injustice; the Republicans declared that the state's action was final, and that to go behind the returns would be invading its sovereignty. When this matter came before the commission it virtually accepted the Republican contention, ruling that it could not go behind the returns except on the superficial issues of manifest fraud therein or the eligibility of electors to their office under the Constitution; that is, it could not investigate antecedents of fraud or misconduct of state officials in the results certified. All vital questions were settled by the votes of eight Republicans and seven Democrats; and as the Republican Senate would never concur with the Democratic House in overriding the decisions, all the disputed votes were awarded to Mr Hayes, who therefore was declared elected.

The strictly partisan votes of the commission and the adoption by prominent Democrats and Republicans, both within and without the commission, of an attitude toward states-rights principles quite inconsistent with party tenets and tendencies, have given rise to much severe criticism. The Democrats and the country, however, quietly accepted the decision. The judgments underlying it were two: (1) That Congress rightly claimed the power to settle such contests within the limits set; (2) that, as Justice Miller said regarding these limits, the people had never at any time intended to give to Congress the power, by naming the electors, to "decide who are to be the president and vice-president of the United States."

There is no doubt that Mr Tilden was morally entitled to the presidency, and the correction of the Louisiana frauds would certainly have given satisfaction then and increasing satisfaction later, in the retrospect, to the country. The commission might probably have corrected the frauds without exceeding its Congressional precedents. Nevertheless, the principles of its decisions must be recognized by all save ultra-nationalists as truer to the spirit of the Constitution and promising more for the good of the country than would have been the principles necessary to a contrary decision.

By an act of the 3rd of February 1887 the electoral procedure is regulated in great detail. Under this act determination by a state of electoral disputes is conclusive, subject to certain formalities that guarantee definite action and accurate certification. These formalities constitute "regularity," and are in all cases judgable by Congress. When Congress is forced by the lack or evident inconclusiveness of state action, or by conflicting state action, to decide disputes, votes are lost unless both houses concur.

Authorities.—J. F. Rhodes, *History of the United States*, vol. 7, covering 1872–1877 (New York, 1906); P. L. Haworth, *The Hayes-Tilden disputed Presidential Election of 1876* (Cleveland, 1906); J. W. Burgess, *Political Science Quarterly*, vol. 3 (1888), pp. 633-653, "The Law of the Electoral Count"; and for the sources, Senate Miscellaneous Document No. 5 (vol. 1), and House Miscel. Doc. No. 13 (vol. 2), 44 Congress, 2 Session,—*Count of the Electoral Vote. Proceedings of Congress and Electoral Commission*,—the latter identical with *Congressional Record*, vol. 5, pt. 4, 44 Cong., 2 Session; also about twenty volumes of evidence on the state elections involved. The volume called *The Presidential Counts* (New York, 1877) was compiled by Mr Tilden and his secretary.

ELECTORS (Ger. *Kurfürsten*, from *Küren*, O.H.G. *kiosan*, choose, elect, and *Fürst*, prince), a body of German princes, originally seven in number, with whom rested the election of the German king, from the 13th until the beginning of the 19th century. The German kings, from the time of Henry the Fowler (919–936) till the middle of the 13th century, succeeded to their position partly by heredity, and partly by election. Primitive Germanic practice had emphasized the element of heredity. *Reges ex nobilitate sumunt*: the man whom a German tribe recognized as its king must be in the line of hereditary descent from Woden; and therefore the genealogical trees of early Teutonic kings (as, for instance, in England those of the Kentish and West Saxon sovereigns) are carefully constructed to prove that descent from the god which alone will constitute a proper title for his descendants. Even from the first, however, there had been some opening for election; for the principle of primogeniture was not observed, and there might be several competing candidates, all of the true Woden stock. One of these competing candidates would have to be recognized (as the Anglo-Saxons said, *geceosan*); and to this limited extent Teutonic kings may be termed elective from the very first. In the other nations of western Europe this element of election dwindled, and the principle of heredity alone received legal recognition; in medieval Germany, on the contrary, the principle of heredity, while still exercising an inevitable natural force, sank formally into the background, and legal recognition was finally given to the elective principle. *De facto*, therefore, the principle of heredity exercises in Germany a great influence, an influence never more striking than in the period which follows on the formal recognition of the elective principle, when the Habsburgs (like the Metelli at Rome) *fato imperatores fiunt: de jure*, each monarch owes his accession simply and solely to the vote of an electoral college.

This difference between the German monarchy and the other monarchies of western Europe may be explained by various considerations. Not the least important of these is what seems a pure accident. Whereas the Capetian monarchs, during the three hundred years that followed on the election of Hugh Capet in 987, always left an heir male, and an heir male of full age, the German kings again and again, during the same period, either left a minor to succeed to their throne, or left no issue at all. The principle of heredity began to fail because there were no heirs. Again the strength of tribal feeling in Germany made the monarchy into a prize, which must not be the apanage of any single tribe, but must circulate, as it were, from Franconian to Saxon, from Saxon to Bavarian, from Bavarian to Franconian, from Franconian to Swabian; while the growing power of the baronage, and its habit of erecting anti-kings to emphasize its opposition to the crown (as, for instance, in the reign of Henry IV.), coalesced with and gave new force to the action of tribal feeling. Lastly, the fact that the German kings were also Roman emperors finally and irretrievably consolidated the growing tendency towards the elective principle. The principle of heredity had never held any great sway under the ancient Roman Empire (see under Emperor); and the medieval Empire, instituted as it was by the papacy, came definitely under the influence of ecclesiastical prepossessions in favour of election. The church had substituted for that descent from Woden, which had elevated the old pagan kings to their thrones, the conception that the monarch derived his crown from the choice of God, after the manner of Saul; and the theoretical choice of God was readily turned into the actual choice of the church, or, at any rate, of the general body of churchmen. If an ordinary king is thus regarded by the church as essentially elected, much more will the emperor, connected as he is with the church as one of its officers, be held to be also elected; and as a bishop is chosen by the chapter of his diocese, so, it will be thought, must the emperor be chosen by some corresponding body in his empire. Heredity might be tolerated in a mere matter of kingship: the precious trust of imperial power could not be allowed to descend according to the accidents of family succession. To Otto of Freising (*Gesta Frid.* ii. 1) it is already a point of right vindicated for itself by the excellency of the Roman Empire, as a matter of singular prerogative, that it should not descend *per sanguinis propaginem, sed per principum electionem*.

The accessions of Conrad II. (see Wipo, *Vita Cuonradi*, c. 1-2), of Lothair II. (see *Narratio de electione Lotharii*, *M.G.H.*, *Scriptt.* xii. p. 510), of Conrad III. (see Otto of Freising, *Chronicon*, vii. 22) and of Frederick I. (see Otto of Freising, *Gesta Frid.* ii. 1) had all been marked by an element, more or less pronounced, of election. That element is perhaps most considerable in the case of Lothair, who had no rights of heredity to urge. Here we read of ten princes being selected from the princes of the various duchies, to whose choice the rest promise to assent, and of these ten selecting three candidates, one of whom, Lothair, is finally chosen (apparently by the whole assembly) in a somewhat tumultuary fashion. In this case the electoral assembly would seem to be, in the last resort, the whole diet of all the princes. But a *de facto* pre-eminence in the act of election is already, during the 12th century, enjoyed by the three Rhenish archbishops, probably because of the part they afterwards played at the coronation, and also by the dukes of the great duchies—possibly because of the part they too played, as vested for the time with the great offices of the household, at the coronation feast.[1] Thus at the election of Lothair it is the archbishop of Mainz who conducts the proceedings; and the election is not held to be final until the duke of Bavaria has given his assent. The fact is that, votes being weighed by quality as well as by quantity (see Diet), the votes of the archbishops and dukes, which would first be taken, would of themselves, if unanimous, decide the election. To prevent tumultuary elections, it was well that the election should be left exclusively with these great dignitaries; and this is what, by the middle of the 13th century, had eventually been done.

The chaos of the interregnum from 1198 to 1212 showed the way for the new departure; the chaos of the great interregnum (1250–1273) led to its being finally taken. The decay of the great duchies, and the narrowing of the class of princes into a close corporation, some of whose members were the equals of the old dukes in power, introduced difficulties and doubts into the practice of election which had been used in the 12th century. The contested election of the interregnum of 1198–1212 brought these difficulties and doubts into strong relief. The famous bull of Innocent III. (*Venerabilem*), in which he decided for Otto IV. against Philip of Swabia, on the ground that, though he had fewer votes than Philip, he had a majority of the votes of those *ad quos principaliter spectat electio*, made it almost imperative that there should be some definition of these principal electors. The most famous attempt at such a definition is that of the *Sachsenspiegel*, which was followed, or combated, by many other writers in the first half of the 13th century. Eventually the contested election of 1257 brought light and definition. Here we find seven potentates acting—the same seven whom the Golden Bull recognizes in 1356; and we find these seven described in an official letter to the pope, as *principes vocem in hujusmodi electione habentes, qui sunt septem numero*. The doctrine thus enunciated was at once received. The pope acknowledged it in two bulls (1263); a cardinal, in a commentary on the bull *Venerabilem* of Innocent III., recognized it about the same time; and the erection of statues of the seven electors at Aix-la-Chapelle gave the doctrine a visible and outward expression.

By the date of the election of Rudolph of Habsburg (1273) the seven electors may be regarded as a definite body, with an acknowledged right. But the definition and the acknowledgment were still imperfect. (1) The composition of the electoral body was uncertain in two respects. The duke of Bavaria claimed as his right the electoral vote of the king of Bohemia; and the practice of *partitio* in electoral families tended to raise further difficulties about the exercise of the vote. The Golden Bull of 1356 settled both these questions. Bohemia (of which Charles IV., the author of the Golden Bull, was himself the king) was assigned the electoral vote in preference to Bavaria; and a provision annexing the electoral vote to a definite territory, declaring that territory indivisible, and regulating its descent by the rule of primogeniture instead of partition, swept away the old difficulties which the custom of partition had raised. After 1356 the seven electors are regularly the three Rhenish archbishops, Mainz, Cologne and Trier, and four lay magnates, the palatine of the Rhine, the duke of Saxony, the margrave of Brandenburg, and the king of Bohemia; the three former being vested with the three archchancellorships, and the four latter with the four offices of the royal household (see Household). (2) The rights of the seven electors, in their collective capacity as an electoral college, were a matter of dispute with the papacy. The result of the election, whether made, as at first, by the princes generally or, as after 1257, by the seven electors exclusively, was in itself simply the creation of a German king—an *electio in regem*. But since 962 the German king was also, after coronation by the pope, Roman emperor. Therefore the election had a double result: the man elected was not only *electus in regem*, but also *promovendus ad imperium*. The difficulty was to define the meaning of the term *promovendus*. Was the king elect *inevitably* to become emperor? or did the *promotio* only follow at the discretion of the pope, if he thought the king elect fit for promotion? and if so, to what extent, and according to what standard, did the pope judge of such fitness? Innocent III. had already claimed, in the bull *Venerabilem*, (1) that the electors derived their power of election, so far as it made an emperor, from the Holy See (which had originally "translated" the Empire from the East to the West), and (2) that the papacy had a *jus et auctoritas examinandi personam electam in regem et promovendam ad imperium*. The latter claim he had based on the fact that he anointed, consecrated and crowned the emperor—in other words, that he gave a spiritual office according to spiritual methods, which entitled him to inquire into the fitness of the recipient of that office, as a bishop inquires into the fitness of a candidate for ordination. Innocent had put forward this claim as a ground for deciding between competing candidates: Boniface VIII. pressed the claim against Albert I. in 1298, even though his election was unanimous; while John XXII. exercised it in its harshest form, when in 1324 he excommunicated Louis IV. for using the title and exerting the rights even of king without previous papal confirmation. This action ultimately led to a protest from the electors themselves, whose right of election would have become practically meaningless, if such assumptions had been tolerated. A meeting of the electors (*Kurverein*) at Rense in 1338 declared (and the declaration was reaffirmed by a diet at Frankfort in the same year) that *postquam aliquis eligitur in Imperatorem sive Regem ab Electoribus Imperii concorditer, vel majori parte eorundem, statim ex sola electione est Rex verus et Imperator Romanus censendus . . . nec Papae sive Sedis Apostolicae . . . approbatione . . . indiget*. The doctrine thus positively affirmed at Rense is negatively reaffirmed in the Golden Bull, in which a significant silence is maintained in regard to papal rights. But the doctrine was not in practice followed: Sigismund himself did not venture to dispense with papal approbation.

By the end of the 14th century the position of the electors, both individually and as a corporate body, had become definite and precise. Individually, they were distinguished from all other princes, as we have seen, by the indivisibility of their territories and by the custom of primogeniture which secured that indivisibility; and they were still further distinguished by the fact that their person, like that of the emperor himself, was protected by the law of treason, while their territories were only subject to the jurisdiction of their own courts. They were independent territorial sovereigns; and their position was at once the envy and the ideal of the other princes of Germany. Such had been the policy of Charles IV.; and thus had he, in the Golden Bull, sought to magnify the seven electors, and himself as one of the seven, in his capacity of king of Bohemia, even at the expense of the Empire, and of himself in his capacity of emperor. Powerful as they were, however, in their individual capacity, the electors showed themselves no less powerful as a corporate body. As such a corporate body, they may be considered from three different points of view, and as acting in three different capacities. They are an electoral body, choosing each successive emperor; they are one of the three colleges of the imperial diet (see DIET); and they are also an electoral union (*Kurfürstenverein*), acting as a separate and independent political organ even after the election, and during the reign, of the monarch. It was in this last capacity that they had met at Rense in 1338; and in the same capacity they acted repeatedly during the 15th century. According to the Golden Bull, such meetings were to be annual, and their deliberations were to concern "the safety of the Empire and the world." Annual they never were; but occasionally they became of great importance. In 1424, during the attempt at reform occasioned by the failure of German arms against the Hussites, the *Kurfürstenverein* acted, or at least it claimed to act, as the predominant partner in a duumvirate, in which the unsuccessful Sigismund was relegated to a secondary position. During the long reign of Frederick III.—a reign in which the interests of Austria were cherished, and the welfare of the Empire neglected, by that apathetic yet tenacious emperor—the electors once more attempted, in the year 1453, to erect a new central government in place of the emperor, a government which, if not conducted by themselves directly in their capacity of a *Kurfürstenverein*, should at any rate be under their influence and control. So, they hoped, Germany might be able to make head against that papal aggression, to which Frederick had yielded, and to take a leading part in that crusade against the Turks, which he had neglected. Like the previous attempt at reform during the Hussite wars, the scheme came to nothing; the forces of disunion in Germany were too strong for any central government, whether monarchical and controlled by the emperor, or oligarchical and controlled by the electors. But a final attempt, the most strenuous of all, was made in the reign of Maximilian I., and under the influence of Bertold, elector and archbishop of Mainz. The council of 1500, in which the electors (with the exception of the king of Bohemia) were to have sat, and which would have been under their control, represents the last effective attempt at a real *Reichsregiment*. Inevitably, however, it shipwrecked on the opposition of Maximilian; and though the attempt was again made between 1521 and 1530, the idea of a real central government under the control of the electors perished, and the development of local administration by the circle took its place.

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[1] This is the view of the *Sachsenspiegel*, and also of Albert of Stade (quoted in Schröder, p. 476, n. 27): "Palatinus eligit, quia dapifer est; dux Saxoniae, quia marescalcus," &c. Schröder points out (p. 479, n. 45) that "participation in the coronation feast is an express recognition of the king"; and those who are to discharge their office in the one must have had a prominent voice in the other.

In the course of the 16th century a new right came to be exercised by the electors. As an electoral body (that is to say, in the first of the three capacities distinguished above), they claimed, at the election of Charles V. in 1519 and at subsequent elections, to impose conditions on the elected monarch, and to determine the terms on which he should exercise his office in the course of his reign. This *Wahlcapitulation*, similar to the *Pacta Conventa* which limited the elected kings of Poland, was left by the diet to the discretion of the electors, though after the treaty of Westphalia an attempt was made, with some little success,[1] to turn the capitulation into a matter of legislative enactment by the diet. From this time onwards the only fact of importance in the history of the electors is the change which took place in the composition of their body during the 17th and 18th centuries. From the Golden Bull to the treaty of Westphalia (1356–1648) the composition of the electoral body had remained unchanged. In 1623, however, in the course of the Thirty Years' War, the vote of the count palatine of the Rhine had been transferred to the duke of Bavaria; and at the treaty of Westphalia the vote, with the office of imperial butler which it carried, was left to Bavaria, while an eighth vote, along with the new office of imperial treasurer, was created for the count palatine. In 1708 a ninth vote, along with the office of imperial standard-bearer, was created for Hanover; while finally, in 1778, the vote of Bavaria and the office of imperial butler returned to the counts palatine, as heirs of the duchy, on the extinction of the ducal line, while the new vote created for the Palatinate in 1648, with the office of imperial treasurer, was transferred to Brunswick-Lüneburg (Hanover) in lieu of the one which this house already held. In 1806, on the dissolution of the Holy Roman Empire, the electors ceased to exist.

LITERATURE.—T. Lindner, *Die deutschen Königswahlen und die Entstehung des Kurfürstentums* (1893), and *Der Hergang bei den deutschen Königswahlen* (1899); R. Kirchhöfer, *Zur Entstehung des Kurkollegiums* (1893); W. Maurenbrecher, *Geschichte der deutschen Königswahlen* (1889); and G. Blondel, *Étude sur Frédéric II*, p. 27 sqq. See also J. Bryce, *Holy Roman Empire* (edition of 1904), c. ix.; and R. Schröder, *Lehrbuch der deutschen Rechtsgeschichte*, pp. 471-481 and 819-820. (E. Br.)

ELECTRA ('Ηλέκτρα), "the bright one," in Greek mythology. (1) One of the seven Pleiades, daughter of Atlas and Pleïone. She is closely connected with the old constellation worship and the religion of Samothrace, the chief seat of the Cabeiri (*q.v.*), where she was generally supposed to dwell. By Zeus she was the mother of Dardanus, Iasion (or Eëtion), and Harmonia; but in the Italian tradition, which represented Italy as the original home of the Trojans, Dardanus was her son by a king of Italy named Corythus. After her amour with Zeus, Electra fled to the Palladium as a suppliant, but Athena, enraged that it had been touched by one who was no longer a maiden, flung Electra and the image from heaven to earth, where it was found by Ilus, and taken by him to Ilium; according to another tradition, Electra herself took it to Ilium, and gave it to her son Dardanus (Schol. Eurip. *Phoen.* 1136). In her grief at the destruction of the city she plucked out her hair and was changed into a comet; in another version Electra and her six sisters had been placed among the stars as the Pleiades, and the star which she represented lost its brilliancy after the fall of Troy. Electra's connexion with Samothrace (where she was also called Electryone and Strategis) is shown by the localization of the carrying off of her reputed daughter Harmonia by Cadmus, and by the fact that, according to Athenicon (the author of a work on Samothrace quoted by the scholiast on Apollonius Rhodius i. 917), the Cabeiri were Dardanus and Iasion. The gate Electra at Thebes and the fabulous island Electris were said to have been called after her (Apollodorus iii. 10. 12; Servius on *Aen.* iii. 167, vii. 207, x. 272, *Georg.* i. 138).

(2) Daughter of Agamemnon and Clytaemnestra, sister of Orestes and Iphigeneia. She does not appear in Homer, although according to Xanthus (regarded by some as a fictitious personage), to whom Stesichorus was indebted for much in his *Oresteia*, she was identical with the Homeric Laodice, and was called Electra because she remained so long unmarried ('Α-λέκτρα). She was said to have played an important part in the poem of Stesichorus, and subsequently became a favourite figure in tragedy. After the murder of her father on his return from Troy by her mother and Aegisthus, she saved the life of her brother Orestes by sending him out of the country to Strophius, king of Phanote in Phocis, who had him brought up with his own son Pylades. Electra, cruelly ill-treated by Clytaemnestra and her paramour, never loses hope that her brother will return to avenge his father. When grown up, Orestes, in response to frequent messages from his sister, secretly repairs with Pylades to Argos, where he pretends to be a messenger from Strophius bringing the news of the death of Orestes. Being admitted to the palace, he slays both Aegisthus and Clytaemnestra. According to another story (Hyginus, *Fab.* 122), Electra, having received a false report that Orestes and Pylades had been sacrificed to Artemis in Tauris, went to consult the oracle at Delphi. In the meantime Aletes, the son of Aegisthus, seized the throne of Mycenae. Her arrival at Delphi coincided with that of Orestes and Iphigeneia. The same messenger, who had already communicated the false report of the death of Orestes, informed her that he had been slain by Iphigeneia. Electra in her rage seized a burning brand from the altar, intending to blind her sister; but at the critical moment Orestes appeared, recognition took place, and the brother and sister returned to Mycenae. Aletes was slain by Orestes, and

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[1] See Schröder's *Lehrbuch der deutschen Rechtsgeschichte*, p. 820.

Electra became the wife of Pylades. The story of Electra is the subject of the *Choëphori* of Aeschylus, the *Electra* of Sophocles and the *Electra* of Euripides. It is in the Sophoclean play that Electra is most prominent.

There are many variations in the treatment of the legend, for which, as also for a discussion of the modern plays on the subject by Voltaire and Alfieri, see Jebb's Introduction to his edition of the *Electra* of Sophocles.

ELECTRICAL (or ELECTROSTATIC) **MACHINE**, a machine operating by manual or other power for transforming mechanical work into electric energy in the form of electrostatic charges of opposite sign delivered to separate conductors. Electrostatic machines are of two kinds: (1) Frictional, and (2) Influence machines.

Frictional Machines.—A primitive form of frictional electrical machine was constructed about 1663 by Otto von Guericke (1602–1686). It consisted of a globe of sulphur fixed on an axis and rotated by a winch, and it was electrically excited by the friction of warm hands held against it. Sir Isaac Newton appears to have been the first to use a glass globe instead of sulphur (*Optics*, 8th Query). F. Hawksbee in 1709 also used a revolving glass globe. A metal chain resting on the globe served to collect the charge. Later G. M. Bose (1710–1761), of Wittenberg, added the prime conductor, an insulated tube or cylinder supported on silk strings, and J. H. Winkler (1703–1770), professor of physics at Leipzig, substituted a leather cushion for the hand. Andreas Gordon (1712–1751) of Erfurt, a Scotch Benedictine monk, first used a glass cylinder in place of a sphere. Jesse Ramsden (1735–1800) in 1768 constructed his well-known form of plate electrical machine (fig. 1). A glass plate fixed to a wooden or metal shaft is rotated by a winch. It passes between two rubbers made of leather, and is partly covered with two silk aprons which extend over quadrants of its surface. Just below the places where the aprons terminate, the glass is embraced by two insulated metal forks having the sharp points projecting towards the glass, but not quite touching it. The glass is excited positively by friction with the rubbers, and the charge is drawn off by the action of the points which, when acted upon inductively, discharge negative electricity against it. The insulated conductor to which the points are connected therefore becomes positively electrified. The cushions must be connected to earth to remove the negative electricity which accumulates on them. It was found that the machine acted better if the rubbers were covered with bisulphide of tin or with F. von Kienmayer's amalgam, consisting of one part of zinc, one of tin and two of mercury. The cushions were greased and the amalgam in a state of powder spread over them. Edward Nairne's electrical machine (1787) consisted of a glass cylinder with two insulated conductors, called prime conductors, on glass legs placed near it. One of these carried the leather exacting cushions and the other the collecting metal points, a silk apron extending over the cylinder from the cushion almost to the points. The rubber was smeared with amalgam. The function of the apron is to prevent the escape of electrification from the glass during its passage from the rubber to the collecting points. Nairne's machine could give either positive or negative electricity, the first named being collected from the prime conductor carrying the collecting points and the second from the prime conductor carrying the cushion.

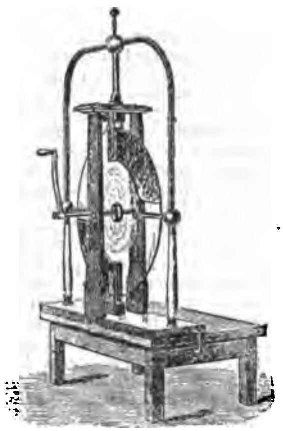

FIG. 1.—Ramsden's electrical machine.

Influence Machines.—Frictional machines are, however, now quite superseded by the second class of instrument mentioned above, namely, influence machines. These operate by electrostatic induction and convert mechanical work into electrostatic energy by the aid of a small initial charge which is continually being replenished or reinforced. The general principle of all the machines described below will be best understood by considering a simple ideal case. Imagine two Leyden jars with large brass knobs, A and B, to stand on the ground (fig. 2). Let one jar be initially charged with positive electricity on its inner coating and the other with negative, and let both have their outsides connected to earth. Imagine two insulated balls A′ and B′ so held that A′ is near A and B′ is near B. Then the positive charge on A induces two charges on A′, viz.: a negative on the side nearest and a positive on the side most removed. Likewise the negative charge on B induces a positive charge on the side of B′ nearest to it and repels negative electricity to the far side. Next let the balls A′ and B′ be connected together for a moment by a wire N called a neutralizing conductor which is subsequently removed. Then A′ will be left negatively electrified and B′ will be left positively electrified. Suppose that A′ and B′ are then made to change places. To do this we shall have to exert energy to remove A′ against the attraction of A and B′ against the attraction of B. Finally let A′ be brought in contact with B and B′ with A. The ball A′ will give up its charge of negative electricity to the Leyden jar B, and the ball B′ will give up its positive charge to the Leyden jar A. This transfer will take place because the inner coatings of the Leyden jars have greater capacity with respect to the earth than the balls. Hence the charges of the jars will be increased. The balls A′ and B′ are then practically discharged, and the above cycle of operations may be repeated. Hence, however small may be the initial charges of the Leyden jars, by a principle of accumulation resembling that of compound interest, they can be increased as above shown to any degree. If this series of operations be made to depend upon the continuous rotation of a winch or handle, the arrangement constitutes an electrostatic influence machine. The principle therefore somewhat resembles that of the self-exciting dynamo.

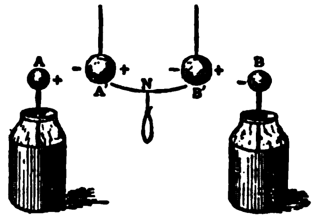

FIG. 2.

The first suggestion for a machine of the above kind seems to have grown out of the invention of Volta's electrophorus. Abraham Bennet, the inventor of the gold leaf electroscope, described a doubler or machine for multiplying electric charges (*Phil. Trans.*, 1787).

Bennet's Doubler.

The principle of this apparatus may be explained thus. Let A and C be two fixed disks, and B a disk which can be brought at will within a very short distance of either A or C. Let us suppose all the plates to be equal, and let the capacities of A and C in presence of B be each equal to p, and the coefficient of induction between A and B, or C and B, be q. Let us also suppose that the plates A and C are so distant from each other that there is no mutual influence, and that p' is the capacity of one of the disks when it stands alone. A small charge Q is communicated to A, and A is insulated, and B, uninsulated, is brought up to it; the charge on B will be $-(q/p)Q$. B is now uninsulated and brought to face C, which is uninsulated; the charge on C will be $(q/p)^2Q$. C is now insulated and connected with A, which is always insulated. B is then brought to face A and uninsulated, so that the charge on A becomes rQ, where

$$r = \frac{p}{p+p'}\left(1+\frac{q^2}{p^2}\right).$$

A is now disconnected from C, and here the first operation ends. It is obvious that at the end of n such operations the charge on A will be r^nQ, so that the charge goes on increasing in geometrical progression. If the distance between the disks could be made infinitely small each time, then the multiplier *r* would be 2, and the charge would be doubled each time. Hence the name of the apparatus.

Nicholson's doubler.

Erasmus Darwin, B. Wilson, G. C. Bohnenberger and J. C. E. Peclet devised various modifications of Bennet's instrument (see S. P. Thompson, "The Influence Machine from 1788 to 1888," *Journ. Soc. Tel. Eng.*, 1888, 17, p. 569). Bennet's doubler appears to have given a suggestion to William Nicholson (*Phil. Trans.*, 1788, p. 403) of "an instrument which by turning a winch produced the two states of electricity without friction or communication with the earth." This "revolving doubler," according to the description of Professor S. P. Thompson (*loc. cit.*), consists of two fixed plates of brass A and C (fig. 3), each two inches in diameter and separately supported on insulating arms in the same plane, so that a third revolving plate B may pass very near them without touching. A brass ball D two inches in diameter is fixed on the end of the axis that carries the plate B, and is loaded within at one side, so as to act as a counterpoise to the revolving plate B. The axis P N is made of varnished glass, and so are the axes that join the three plates with the brass axis N O. The axis N O passes through the brass piece M, which stands on an insulating pillar of glass, and supports the plates A and C. At one extremity of this axis is the ball D, and the other is connected with a rod of glass, N P, upon which is fixed the handle L, and also the piece G H, which is separately insulated. The pins E, F rise out of the back of the fixed plates A and C, at unequal distances from the axis. The piece K is parallel to G H, and both of them are furnished at their ends with small pieces of flexible wire that they may touch the pins E, F in certain points of their revolution. From the brass piece M there stands out a pin I, to touch against a small flexible wire or spring which projects sideways from the rotating plate B when it comes opposite A. The wires are so adjusted by bending that B, at the moment when it is opposite A, communicates with the ball D, and A communicates with C through GH; and half a revolution later C, when B comes opposite to it, communicates with the ball D through the contact of K with F. In all other positions A, B, C and D are completely disconnected from each other. Nicholson thus described the operation of his machine:—

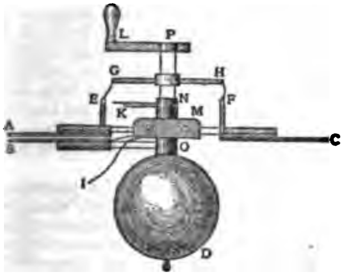

Fig. 3.—Nicholson's Revolving Doubler.

"When the plates A and B are opposite each other, the two fixed plates A and C may be considered as one mass, and the revolving plate B, together with the ball D, will constitute another mass. All the experiments yet made concur to prove that these two masses will not possess the same electric state.. .The redundant electricities in the masses under consideration will be unequally distributed; the plate A will have about ninety-nine parts, and the plate C one; and, for the same reason, the revolving plate B will have ninety-nine parts of the opposite electricity, and the ball D one. The rotation, by destroying the contacts, preserves this unequal distribution, and carries B from A to C at the same time that the tail K connects the ball with the plate C. In this situation, the electricity in B acts upon that in C, and produces the contrary state, by virtue of the communication between C and the ball; which last must therefore acquire an electricity of the same kind with that of the revolving plate. But the rotation again destroys the contact and restores B to its first situation opposite A. Here, if we attend to the effect of the whole revolution, we shall find that the electric states of the respective masses have been greatly increased; for the ninety-nine parts in A and B remain, and the one part of electricity in C has been increased so as nearly to compensate ninety-nine parts of the opposite electricity in the revolving plate B, while the communication produced an opposite mutation in the electricity of the ball. A second rotation will, of course, produce a proportional augmentation of these increased quantities; and a continuance of turning will soon bring the intensities to their maximum, which is limited by an explosion between the plates" (*Phil. Trans.*, 1788, p. 405).

Belli's doubler.

Nicholson described also another apparatus, the "spinning condenser," which worked on the same principle. Bennet and Nicholson were followed by T. Cavallo, John Read, Bohnenberger, C. B. Désormes and J. N. P. Hachette and others in the invention of various forms of rotating doubler. A simple and typical form of doubler, devised in 1831 by G. Belli (fig. 4), consisted of two curved metal plates between which revolved a pair of balls carried on an insulating stem. Following the nomenclature usual in connexion with dynamos we may speak of the conductors which carry the initial charges as the field plates, and of the moving conductors on which are induced the charges which are subsequently added to those on the field plates, as the carriers. The wire which connects two armature plates for a moment is the neutralizing conductor. The two curved metal plates constitute the field plates and must have original charges imparted to them of opposite sign. The rotating balls are the carriers, and are connected together for a moment by a wire when in a position to be acted upon inductively by the field plates, thus acquiring charges of opposite sign. The moment after they are separated again. The rotation continuing the ball thus negatively charged is made to give up this charge to that negatively electrified field plate, and the ball positively charged its charge to the positively electrified field plate, by touching little contact springs. In this manner the field plates accumulate charges of opposite sign.

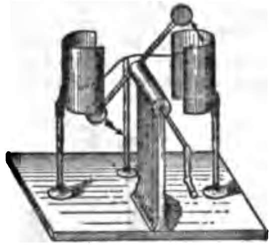

Fig. 4.—Belli's Doubler.

Varley's machine.

Modern types of influence machine may be said to date from 1860 when C. F. Varley patented a type of influence machine which has been the parent of numerous subsequent forms (*Brit. Pat. Spec.* No. 206 of 1860). In it the field plates were sheets of tin-foil attached to a glass plate (fig. 5). In front of them a disk of ebonite or glass, having carriers of metal fixed to its edge, was rotated by a winch. In the course of their rotation two diametrically opposite carriers touched against the ends of a neutralizing conductor so as to form for a moment one conductor, and the moment afterwards these two carriers were insulated, one carrying away a positive charge and the other a negative. Continuing their rotation, the positively charged carrier gave up its positive charge by touching a little knob attached to the positive field plate, and similarly for the negative charge carrier. In this way the charges on the field plates were continually replenished and reinforced. Varley also constructed a multiple form of influence machine having six rotating disks, each having a number of carriers and rotating between field plates. With this apparatus he obtained sparks 6 in. long, the initial source of electrification being a single Daniell cell.

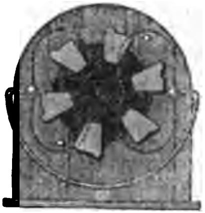

Fig. 5.—Varley's Machine.

Toepler machine.

Varley was followed by A. J. I. Toepler, who in 1865 constructed an influence machine consisting of two disks fixed on the same shaft and rotating in the same direction. Each disk carried two strips of tin-foil extending nearly over a semi-circle, and there were two field plates, one behind each disk; one of the plates was positively and the other negatively electrified. The carriers which were touched under the influence of the positive field plate passed on and gave up a portion of their negative charge to increase that of the negative field plate; in the same way the carriers which were touched under the influence of the negative field plate sent a part of their charge to augment that of the positive field plate. In this apparatus one of the charging rods communicated with one of the field plates, but the other with the neutralizing brush opposite to the other field plate. Hence one of the field plates would always remain charged when a spark was taken at the transmitting terminals.

Holtz machine.

Between 1864 and 1880, W. T. B. Holtz constructed and described a large number of influence machines which were for a long time considered the most advanced development of this type of electrostatic machine. In one form the Holtz machine consisted of a glass disk mounted on a horizontal axis F (fig. 6) which could be made to rotate at a considerable speed by a multiplying gear, part of which is seen at X. Close behind this disk was fixed another vertical disk of glass in which were cut two windows B, B. On the side of the fixed disk next the rotating disk were pasted two sectors of paper A, A, with short blunt points attached to them which projected out into the windows on the side away from the rotating disk. On the other side of the rotating disk were placed two metal combs C, C, which consisted of sharp points set in metal rods and were each connected to one of a pair of discharge balls E, D, the distance between which could be varied. To start the machine the balls were brought in contact, one of the paper armatures electrified, say, with positive electricity, and the disk set in motion. Thereupon very shortly a hissing sound was heard and the machine became harder to turn as if the disk were moving through a resisting medium. After that the discharge balls might be separated a little and a continuous series of sparks or brush discharges would take place between them. If two Leyden jars L, L were hung upon the conductors which supported the combs, with their outer coatings put in connexion with one another by M, a series of strong spark discharges passed between the discharge balls. The action of the machine is as follows: Suppose one paper armature to be charged positively, it acts by induction on the right hand comb, causing negative electricity to issue from the comb points upon the glass revolving disk; at the same time the positive electricity passes through the closed discharge circuit to the left comb and issues from its teeth upon the part of the glass disk at the opposite end of the diameter. This positive electricity electrifies the left paper armature by induction, positive electricity issuing from the blunt point upon the side farthest from the rotating disk. The charges thus deposited on the glass disk are carried round so that the upper half is electrified negatively on both sides and the lower half positively on both sides, the sign of the electrification being reversed as the disk passes between the combs and the armature by discharges issuing from them respectively. If it were not for leakage in various ways, the electrification would go on everywhere increasing, but in practice a stationary state is soon attained. Holtz's machine is very uncertain in its action in a moist climate, and has generally to be enclosed in a chamber in which the air is kept artificially dry.

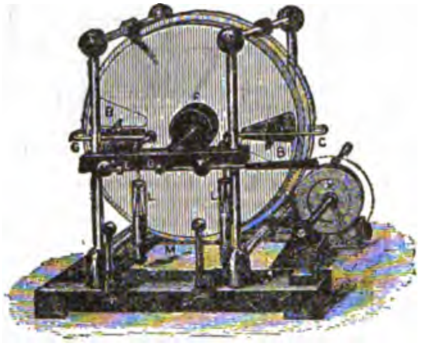

Fig. 6.—Holtz's Machine.

Voss's machine.

Robert Voss, a Berlin instrument maker, in 1880 devised a form of machine in which he claimed that the principles of Toepler and Holtz were combined. On a rotating glass or ebonite disk were placed carriers of tin-foil or metal buttons against which neutralizing brushes touched. This armature plate revolved in front of a field plate carrying two pieces of tin-foil backed up by larger pieces of varnished paper. The studs on the armature plate were charged inductively by being connected for a moment by a neutralizing wire as they passed in front of the field plates, and then gave up their charges partly to renew the field charges and partly to collecting combs connected to discharge balls. In general design and construction, the manner of moving the rotating plate and in the use of the two Leyden jars in connexion with the discharge balls, Voss borrowed his ideas from Holtz.

Wimshurst machine.

All the above described machines, however, have been thrown into the shade by the invention of a greatly improved type of influence machine first constructed by James Wimshurst about 1878. Two glass disks are mounted on two shafts in such a manner that, by means of two belts and pulleys worked from a winch shaft, the disks can be rotated rapidly in opposite directions close to each other (fig. 7). These glass disks carry on them a certain number (not less than 16 or 20) tin-foil carriers which may or may not have brass buttons upon them. The glass plates are well varnished, and the carriers are placed on the outer sides of the two glass plates. As therefore the disks revolve, these carriers travel in opposite directions, coming at intervals in opposition to each other. Each upright bearing carrying the shafts of the revolving disks also carries a neutralizing conductor or wire ending in a little brush of gilt thread. The neutralizing conductors for each disk are placed at right angles to each other. In addition there are collecting combs which occupy an intermediate position and have sharp points projecting inwards, and coming near to but not touching the carriers. These combs on opposite sides are connected respectively to the inner coatings of two Leyden jars whose outer coatings are in connexion with one another.

The operation of the machine is as follows: Let us suppose that one of the studs on the back plate is positively electrified and one at the opposite end of a diameter is negatively electrified, and that at that moment two corresponding studs on the front plate passing opposite to these back studs are momentarily connected together by the neutralizing wire belonging to the front plate. The positive stud on the back plate will act inductively on the front stud and charge it negatively, and similarly for the other stud, and as the rotation continues these charged studs will pass round and give up most of their charge through the combs to the Leyden jars. The moment, however, a pair of studs on the front plate are charged, they act as field plates to studs on the back plate which are passing at the moment, provided these last are connected by the back neutralizing wire. After a few revolutions of the disks half the studs on the front plate at any moment are charged negatively and half positively and the same on the back plate, the neutralizing wires forming the boundary between the positively and negatively charged studs. The diagram in fig. 8, taken by permission from S. P. Thompson's paper (*loc. cit.*), represents a view of the distribution of these charges on the front and back plates respectively. It will be

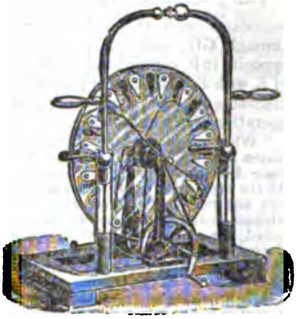

Fig. 7.—Wimshurst's Machine.

seen that each stud is in turn both a field plate and a carrier having a charge induced on it, and then passing on in turn induces further charges on other studs. Wimshurst constructed numerous very powerful machines of this type, some of them with multiple plates, which operate in almost any climate, and rarely fail to charge themselves and deliver a torrent of sparks between the discharge balls whenever the winch is turned. He also devised an alternating current electrical machine in which the discharge balls were alternately positive and negative. Large Wimshurst multiple plate influence machines are often used instead of induction coils for exciting Röntgen ray tubes in medical work. They give very steady illumination on fluorescent screens.

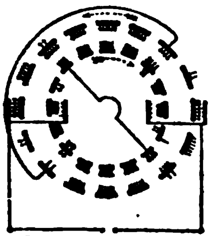

Fig. 8.—Action of the Wimshurst Machine.

In 1900 it was found by F. Tudsbury that if an influence machine is enclosed in a metallic chamber containing compressed air, or better, carbon dioxide, the insulating properties of compressed gases enable a greatly improved effect to be obtained owing to the diminution of the leakage across the plates and from the supports. Hence sparks can be obtained of more than double the length at ordinary atmospheric pressure. In one case a machine with plates 8 in. in diameter which could give sparks 2·5 in. at ordinary pressure gave sparks of 5, 7, and 8 in. as the pressure was raised to 15, 30 and 45 lb above the normal atmosphere.

The action of Lord Kelvin's replenisher (fig. 9) used by him in connexion with his electrometers for maintaining their charge, closely resembles that of Belli's doubler and will be understood from fig. 9. Lord Kelvin also devised an influence machine, commonly called a "mouse mill," for electrifying the ink in connexion with his siphon recorder. It was an electrostatic and electromagnetic machine combined, driven by an electric current and producing in turn electrostatic charges of electricity.

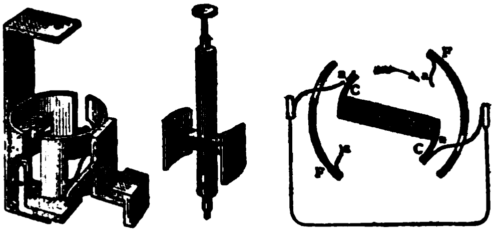

Fig. 9.—Lord Kelvin's Replenisher.

C, C, Metal carriers, fixed to ebonite cross-arm.
F, F, Brass field-plates or conductors.
a, *a*, Receiving springs.
n, *n*, Connecting springs or neutralizing brushes.

In connexion with this subject mention must also be made of the water dropping influence machine of the same inventor.[1]

The action and efficiency of influence machines have been investigated by F. Rossetti, A. Righi and F. W. G. Kohlrausch. The electromotive force is practically constant no matter what the velocity of the disks, but according to some observers the internal resistance decreases as the velocity increases. Kohlrausch, using a Holtz machine with a plate 16 in. in diameter, found that the current given by it could only electrolyse acidulated water in 40 hours sufficient to liberate one cubic centimetre of mixed gases. E. E. N. Mascart, A. Roiti, and E. Bouchotte have also examined the efficiency and current producing power of influence machines.

Bibliography.—In addition to S. P. Thompson's valuable paper on influence machines (to which this article is much indebted) and other references given, see J. Clerk Maxwell, *Treatise on Electricity and Magnetism* (2nd ed., Oxford, 1881), vol. i. p. 294; J. D. Everett, *Electricity* (expansion of part iii. of Deschanel's *Natural Philosophy*) (London, 1901), ch. iv. p. 20; A. Winkelmann, *Handbuch der Physik* (Breslau, 1905), vol. iv. pp. 50-58 (contains a large number of references to original papers); J. Gray, *Electrical Influence Machines, their Development and Modern Forms* (London, 1903). (J. A. F.)

ELECTRIC EEL (*Gymnotus electricus*), a member of the family of fishes known as *Gymnotidae*. In spite of their external similarity the *Gymnotidae* have nothing to do with the eels (*Anguilla*). They resemble the latter in the elongation of the body, the large number of vertebrae (240 in *Gymnotus*), and the absence of pelvic fins; but they differ in all the more important characters of internal structure. They are in fact allied to the carps or *Cyprinidae* and the cat-fishes or *Siluridae*. In common with these two families and the *Characinidae* of Africa and South America, the *Gymnotidae* possess the peculiar structures called *ossicula auditus* or Weberian ossicles. These are a chain of small bones belonging to the first four vertebrae, which are much modified, and connecting the air-bladder with the auditory organs. Such an agreement in the structure of so complicated and specialized an apparatus can only be the result of a community of descent of the families possessing it. Accordingly these families are now placed together in a distinct sub-order, the Ostariophysi. The *Gymnotidae* are strongly modified and degraded *Characinidae*. In them the dorsal and caudal fins are very rudimentary or absent, and the anal is very long, extending from the anus, which is under the head or throat, to the end of the body.

Gymnotus is the only genus of the family which possesses electric organs. These extend the whole length of the tail, which is four-fifths of the body. They are modifications of the lateral muscles and are supplied with numerous branches of the spinal nerves. They consist of longitudinal columns, each composed of an immense number of "electric plates." The posterior end of the organ is positive, the anterior negative, and the current passes from the tail to the head. The maximum shock is given when the head and tail of the *Gymnotus* are in contact with different points in the surface of some other animal. *Gymnotus electricus* attains a length of 3 ft. and the thickness of a man's thigh, and frequents the marshes of Brazil and the Guianas, where it is regarded with terror, owing to the formidable electrical apparatus with which it is provided. When this natural battery is discharged in a favourable position, it is sufficiently powerful to stun the largest animal; and according to A. von Humboldt, it has been found necessary to change the line of certain roads passing through the pools frequented by the electric eels. These fish are eaten by the Indians, who, before attempting to capture them, seek to exhaust their electrical power by driving horses into the ponds. By repeated discharges upon these they gradually expend this marvellous force; after which, being defenceless, they become timid, and approach the edge for shelter, when they fall an easy prey to the harpoon. It is only after long rest and abundance of food that the fish is able to resume the use of its subtle weapon. Humboldt's description of this method of capturing the fish has not, however, been verified by recent travellers.

ELECTRICITY. This article is devoted to a general sketch of the history of the development of electrical knowledge on both the theoretical and the practical sides. The two great branches of electrical theory which concern the phenomena of electricity at rest, or "frictional" or "static" electricity, and of electricity in motion, or electric currents, are treated in two separate articles, Electrostatics and Electrokinetics. The phenomena attendant on the passage of electricity through solids, through liquids and through gases, are described in the article Conduction, Electric, and also Electrolysis, and the propagation of electrical vibrations in Electric Waves. The interconnexion of magnetism (which has an article to itself) and electricity is discussed in ELECTROMAGNETISM, and these manifestations in nature in ATMOSPHERIC ELECTRICITY; AURORA POLARIS and MAGNETISM, TERRESTRIAL. The general principles of electrical engineering will be found in ELECTRICITY SUPPLY, and further details respecting the generation and use of electrical power are given in such articles as DYNAMO; MOTORS, ELECTRIC; TRANSFORMERS; ACCUMULATOR; POWER TRANSMISSION: *Electric*; TRACTION; LIGHTING: *Electric*; ELECTROCHEMISTRY and ELECTROMETALLURGY. The principles of telegraphy (land, submarine and wireless) and of telephony are discussed in the articles TELEGRAPH and TELEPHONE, and various electrical instruments are treated in separate articles such as AMPERE METER; ELECTROMETER; GALVANOMETER; VOLTMETER; WHEATSTONE'S BRIDGE; POTENTIOMETER; METER, ELECTRIC; ELECTROPHORUS; LEYDEN JAR; &c.

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[1] See Lord Kelvin, *Reprint of Papers on Electrostatics and Magnetism* (1872); "Electrophoric Apparatus and Illustrations of Voltaic Theory," p. 319; "On Electric Machines Founded on Induction and Convection," p. 330; "The Reciprocal Electrophorus," p. 337.

The term "electricity" is applied to denote the physical agency which exhibits itself by effects of attraction and repulsion when particular substances are rubbed or heated, also in certain chemical and physiological actions and in connexion with moving magnets and metallic circuits. The name is derived from the word *electrica*, first used by William Gilbert (1544-1603) in his epoch-making treatise *De magnete, magneticisque corporibus, et de magno magnete tellure*, published in 1600,[1] to denote substances which possess a similar property to amber (=*electrum*, from ἤλεκτρον) of attracting light objects when rubbed. Hence the phenomena came to be collectively called electrical, a term first used by William Barlowe, archdeacon of Salisbury, in 1618, and the study of them, electrical science.

Historical Sketch.

Gilbert was the first to conduct systematic scientific experiments on electrical phenomena. Prior to his date the scanty knowledge possessed by the ancients and enjoyed in the middle ages began and ended with facts said to have been familiar to Thales of Miletus (600 B.C.) and mentioned by Theophrastus (321 B.C.) and Pliny (A.D. 70), namely, that amber, jet and one or two other substances possessed the power, when rubbed, of attracting fragments of straw, leaves or feathers. Starting with careful and accurate observations on facts concerning the mysterious properties of amber and the lodestone, Gilbert laid the foundations of modern electric and magnetic science on the true experimental and inductive basis. The subsequent history of electricity may be divided into four well-marked periods. The first extends from the date of publication of Gilbert's great treatise in 1600 to the invention by Volta of the voltaic pile and the first production of the electric current in 1799. The second dates from Volta's discovery to the discovery by Faraday in 1831 of the induction of electric currents and the creation of currents by the motion of conductors in magnetic fields, which initiated the era of modern electrotechnics. The third covers the period between 1831 and Clerk Maxwell's enunciation of the electromagnetic theory of light in 1865 and the invention of the self-exciting dynamo, which marks another great epoch in the development of the subject; and the fourth comprises the modern development of electric theory and of absolute quantitative measurements, and above all, of the applications of this knowledge in electrical engineering. We shall sketch briefly the historical progress during these various stages, and also the growth of electrical theories of electricity during that time.

FIRST PERIOD.—Gilbert was probably led to study the phenomena of the attraction of iron by the lodestone in consequence of his conversion to the Copernican theory of the earth's motion, and thence proceeded to study the attractions produced by amber. An account of his electrical discoveries is given in the *De magnete*, lib. ii. cap. 2.[2] He invented the *versorium* or electrical needle and proved that innumerable bodies he called *electrica*, when rubbed, can attract the needle of the versorium (see ELECTROSCOPE). Robert Boyle added many new facts and gave an account of them in his book, *The Origin of Electricity*. He showed that the attraction between the rubbed body and the test object is mutual. Otto von Guericke (1602-1686) constructed the first electrical machine with a revolving ball of sulphur (see ELECTRICAL MACHINE), and noticed that light objects were repelled after being attracted by excited electrica. Sir Isaac Newton substituted a ball of glass for sulphur in the electrical machine and made other not unimportant additions to electrical knowledge. Francis Hawksbee (d. 1713) published in his book *Physico-Mechanical Experiments* (1709), and in several Memoirs in the *Phil. Trans.* about 1707, the results of his electrical inquiries. He showed that light was produced when mercury was shaken up in a glass tube exhausted of its air. Dr Wall observed the spark and crackling sound when warm amber was rubbed, and compared them with thunder and lightning (*Phil. Trans.*, 1708, 26, p. 69). Stephen Gray (1696-1736) noticed in 1720 that electricity could be excited by the friction of hair, silk, wool, paper and other bodies. In 1729 Gray made the important discovery that some bodies were conductors and others non-conductors of electricity. In conjunction with his friend Granville Wheeler (d. 1770), he conveyed the electricity from rubbed glass, a distance of 886 ft., along a string supported on silk threads (*Phil. Trans.*, 1735-1736, 39, pp. 16, 166 and 400). Jean Théophile Desaguliers (1683-1744) announced soon after that electrics were non-conductors, and conductors were non-electrics. C. F. de C. du Fay (1699-1739) made the great discovery that electricity is of two kinds, vitreous and resinous (*Phil. Trans.*, 1733, 38, p. 263), the first being produced when glass, crystal, &c. are rubbed with silk, and the second when resin, amber, silk or paper, &c. are excited by friction with flannel. He also discovered that a body charged with positive or negative electricity repels a body free to move when the latter is charged with electricity of like sign, but attracts it if it is charged with electricity of opposite sign, *i.e.* positive repels positive and negative repels negative, but positive attracts negative. It is to du Fay also that we owe the abolition of the distinction between electrics and non-electrics. He showed that all substances could be electrified by friction, but that to electrify conductors they must be insulated or supported on non-conductors. Various improvements were made in the electrical machine, and thereby experimentalists were provided with the means of generating strong electrification; C. F. Ludolff (1707-1763) of Berlin in 1744 succeeded in igniting ether with the electric spark (*Phil. Trans.*, 1744, 43, p. 167).

For a very full list of the papers and works of these early electrical philosophers, the reader is referred to the bibliography on Electricity in Dr Thomas Young's *Natural Philosophy*, vol. ii. p. 415.

In 1745 the important invention of the Leyden jar or condenser was made by E. G. von Kleist of Kammin, and almost simultaneously by Cunaeus and Pieter van Musschenbroek (1692-1761) of Leiden (see LEYDEN JAR). Sir William Watson (1715-1787) in England first observed the flash of light when a Leyden jar is discharged, and he and Dr John Bevis (1695-1771) suggested coating the jar inside and outside with tinfoil. Watson carried out elaborate experiments to discover how far the electric discharge of the jar could be conveyed along metallic wires and was able to accomplish it for a distance of 2 m., making the important observation that the electricity appeared to be transmitted instantaneously.

Franklin's Researches.—Benjamin Franklin (1706-1790) was one of the great pioneers of electrical science, and made the ever-memorable experimental identification of lightning and electric spark. He argued that electricity is not created by friction, but merely collected from its state of diffusion through other matter by which it is attracted. He asserted that the glass globe, when rubbed, attracted the electrical fire, and took it from the rubber, the same globe being disposed, when the friction ceases, to give out its electricity to any body which has less. In the case of the charged Leyden jar, he asserted that the inner coating of tinfoil had received more than its ordinary quantity of electricity, and was therefore electrified positively, or plus, while the outer coating of tinfoil having had its ordinary quantity of electricity diminished, was electrified negatively, or minus. Hence the cause of the shock and spark when the jar is discharged, or when the superabundant or plus electricity of the inside is transferred by a conducting body to the defective or minus electricity of the outside. This theory of the Leyden phial Franklin supported very ingeniously by showing that the outside and the inside coating possessed electricities of opposite sign, and that, in charging it, exactly as much electricity is added on one side as is subtracted from the other. The abundant discharge of electricity by points was observed by Franklin is his earliest experiments, and also the power of points to conduct it copiously from an electrified body. Hence he was furnished with a simple method of collecting electricity from other bodies, and he was enabled to perform those remarkable experiments which are chiefly connected with his name. Hawksbee, Wall and J. A. Nollet (1700–1770) had successively suggested the identity of lightning and the electric spark, and of thunder and the snap of the spark. Previously to the year 1750, Franklin drew up a statement, in which he showed that all the general phenomena and effects which were produced by electricity had their counterparts in lightning After waiting some time for the erection of a spire at Philadelphia, by means of which he hoped to bring down the electricity of a thunderstorm, he conceived the idea of sending up a kite among thunder-clouds. With this view he made a small cross of two small light strips of cedar, the arms being sufficiently long to reach to the four corners of a large thin silk handkerchief when extended. The corners of the handkerchief were tied to the extremities of the cross, and when the body of the kite was thus formed, a tail, loop and string were added to it. The body was made of silk to enable it to bear the violence and wet of a thunderstorm. A very sharp pointed wire was fixed at the top of the upright stick of the cross, so as to rise a foot or more above the wood. A silk ribbon was tied to the end of the twine next the hand, and a key suspended at the junction of the twine and silk. In company with his son, Franklin raised the kite like a common one, in the first thunderstorm, which happened in the month of June 1752. To keep the silk ribbon dry, he stood within a door, taking care that the twine did not touch the frame of the door; and when the thunder-clouds came over the kite he watched the state of the string. A cloud passed without any electrical indications, and he began to despair of success. At last, however, he saw the loose filaments of the twine standing out every way, and he found them to be attracted by the approach of his finger. The suspended key gave a spark on the application of his knuckle, and when the string had become wet with the rain the electricity became abundant. A Leyden jar was charged at the key, and by the electric fire thus obtained spirits were inflamed, and many other experiments performed which had been formerly made by excited electrics. In subsequent trials with another apparatus, he found that the clouds were sometimes positively and sometimes negatively electrified, and so demonstrated the perfect identity of lightning and electricity. Having thus succeeded in drawing the electric fire from the clouds, Franklin conceived the idea of protecting buildings from lightning by erecting on their highest parts pointed iron wires or conductors communicating with the ground. The electricity of a hovering or a passing cloud would thus be carried off slowly and silently; and if the cloud was highly charged, the lightning would strike in preference the elevated conductors.[1] The most important of Franklin's electrical writings are his *Experiments and Observations on Electricity made at Philadelphia*, 1751–1754; his *Letters on Electricity*, and various memoirs and letters in the *Phil. Trans* from 1756 to 1760.

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[1] Gilbert's work, *On the Magnet, Magnetic Bodies and the Great Magnet, the Earth*, has been translated from the rare folio Latin edition of 1600, but otherwise reproduced in its original form by the chief members of the Gilbert Club of England, with a series of valuable notes by Prof. S. P. Thompson (London, 1900). See also *The Electrician*, February 21, 1902.

[2] See *The Intellectual Rise in Electricity*, ch. x., by Park Benjamin (London, 1895).

About the same time that Franklin was making his kite experiment in America, T. F Dalibard (1703–1779) and others in France had erected a long iron rod at Marli, and obtained results agreeing with those of Franklin. Similar investigations were pursued by many others, among whom Father G. B. Beccaria (1716–1781) deserves especial mention. John Canton (1718–1772) made the important contribution to knowledge that electricity of either sign could be produced on nearly any body by friction with appropriate substances, and that a rod of glass roughened on one half was excited negatively in the rough part and positively in the smooth part by friction with the same rubber. Canton first suggested the use of an amalgam of mercury and tin for use with glass cylinder electrical machines to improve their action. His most important discovery, however, was that of electrostatic induction, the fact that one electrified body can produce charges of electricity upon another insulated body, and that when this last is touched it is left electrified with a charge of opposite sign to that of the inducing charge (*Phil. Trans.*, 1753–1754). We shall make mention lower down of Canton's contributions to electrical theory. Robert Symmer (d. 1763) showed that quite small differences determined the sign of the electrification that was generated by the friction of two bodies one against the other. Thus wearing a black and a white silk stocking one over the other, he found they were electrified oppositely when rubbed and drawn off, and that such a rubbed silk stocking when deposited in a Leyden jar gave up its electrification to the jar (*Phil. Trans.*, 1759). Ebenezer Kinnersley (1711–1778) of Philadelphia made useful observations on the elongation and fusion of iron wires by electrical discharges (*Phil. Trans.*, 1763). A contemporary of Canton and co-discoverer with him of the facts of electrostatic induction was the Swede, Johann Karl Wilcke (1732–1796), then resident in Germany, who in 1762 published an account of experiments in which a metal plate held above the upper surface of a glass table was subjected to the action of a charge on an electrified metal plate held below the glass (*Kon. Schwedische Akad. Abhandl.*, 1762, 24, p. 213).

Pyro-electricity.—The subject of pyro-electricity, or the power possessed by some minerals of becoming electrified when merely heated, and of exhibiting positive and negative electricity, now began to attract notice. It is possible that the *lyncurium* of the ancients, which according to Theophrastus attracted light bodies, was tourmaline, a mineral found in Ceylon, which had been christened by the Dutch with the name of *aschentrikker*, or the attractor of ashes. In 1717 Louis Lémery exhibited to the Paris Academy of Sciences a stone from Ceylon which attracted light bodies; and Linnaeus in mentioning his experiments gives the stone the name of *lapis electricus*. Giovanni Caraffa, duca di Noja (1715–1768), was led in 1758 to purchase some of the stones called tourmaline in Holland, and, assisted by L. J. M. Daubenton and Michel Adanson, he made a series of experiments with them, a description of which he gave in a letter to G. L. L. Buffon in 1759. The subject, however, had already engaged the attention of the German philosopher, F. U. T. Aepinus, who published an account of them in 1756. Hitherto nothing had been said respecting the necessity of heat to excite the tourmaline; but it was shown by Aepinus that a temperature between 99½° and 212° Fahr. was requisite for the development of its attractive powers. Benjamin Wilson (*Phil. Trans.*, 1763, &c.), J. Priestley, and Canton continued the investigation, but it was reserved for the Abbé Haüy to throw a clear light on this curious branch of the science (*Traité de minéralogie*, 1801). He found that the electricity of the tourmaline decreased rapidly from the summits or poles towards the middle of the crystal, where it was imperceptible; and he discovered that if a tourmaline is broken into any number of fragments, each fragment, when excited, has two opposite poles. Haüy discovered the same property in the Siberian and Brazilian topaz, borate of magnesia, mesotype, prehnite, sphene and calamine. He also found that the polarity which minerals receive from heat has a relation to the secondary forms of their crystals—the tourmaline, for example, having its resinous pole at the summit of the crystal which has three faces. In the other pyro-electric crystals above mentioned, Haüy detected the same deviation from the rules of symmetry in their secondary crystals which occurs in tourmaline. C. P. Brard (1788–1838) discovered that pyro-electricity was a property of axinite; and it was afterwards detected in other minerals. In repeating and extending the experiments of Haüy much later, Sir David Brewster discovered that various artificial salts were pyro-electric, and he mentions the tartrates of potash and soda and tartaric acid as exhibiting this property in a very strong degree. He also made many experiments with the tourmaline when cut into thin slices, and reduced to the finest powder, in which state each particle preserved its pyro-electricity, and he showed that scolezite and mesolite, even when deprived of their water of crystallization and reduced to powder, retain their property of becoming electrical by heat. When this white powder is heated and stirred about by any substance whatever, it collects in masses like new-fallen snow, and adheres to the body with which it is stirred.

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[1] See Sir Oliver Lodge, "Lightning, Lightning Conductors and Lightning Protectors," *Journ Inst. Elec. Eng.* (1889), 18, p. 386, and the discussion on the subject in the same volume; also the book by the same author on *Lightning Conductors and Lightning Guards* (London, 1892).

For Sir David Brewster's work on pyro-electricity, see *Trans. Roy. Soc. Edin.*, 1845, also *Phil. Mag.*, Dec. 1847. The reader will also find a full discussion on the subject in the *Treatise on Electricity*, by A. de la Rive, translated by C. V. Walker (London, 1856), vol. ii. part v. ch. i.

Animal electricity.—The observation that certain animals could give shocks resembling the shock of a Leyden jar induced a closer examination of these powers. The ancients were acquainted with the benumbing power of the torpedo-fish, but it was not till 1676 that modern naturalists had their attention again drawn to the fact. E. Bancroft was the first person who distinctly suspected that the effects of the torpedo were electrical. In 1773 John Walsh (d. 1795) and Jan Ingenhousz (1730–1799) proved by many curious experiments that the shock of the torpedo was an electrical one (*Phil. Trans.*, 1773–1775), and John Hunter (*id.* 1773, 1775) examined and described the anatomical structure of its electrical organs. A. von Humboldt and Gay-Lussac (*Ann. Chim.*, 1805), and Etienne Geoffroy Saint-Hilaire (*Gilb. Ann.*, 1803) pursued the subject with success; and Henry Cavendish (*Phil. Trans.*, 1776) constructed an artificial torpedo, by which he imitated the actions of the living animal. The subject was also investigated (*Phil. Trans.*, 1812, 1817) by Dr T. J. Todd (1789–1840), Sir Humphry Davy (*id.* 1829), John Davy (*id.* 1832, 1834, 1841) and Faraday (*Exp. Res.*, vol. ii.). The power of giving electric shocks has been discovered also in the *Gymnotus electricus* (electric eel), the *Malapterurus electricus*, the *Trichiurus electricus*, and the *Tetraodon electricus*. The most interesting and the best known of these singular fishes is the *Gymnotus* or Surinam eel. Humboldt gives a very graphic account of the combats which are carried on in South America between the gymnoti and the wild horses in the vicinity of Calabozo.

Cavendish's Researches.—The work of Henry Cavendish (1731–1810) entitles him to a high place in the list of electrical investigators. A considerable part of Cavendish's work was rescued from oblivion in 1879 and placed in an easily accessible form by Professor Clerk Maxwell, who edited the original manuscripts in the possession of the duke of Devonshire.[1] Amongst Cavendish's important contributions were his exact measurements of electrical capacity. The leading idea which distinguishes his work from that of his predecessors was his use of the phrase "degree of electrification" with a clear scientific definition which shows it to be equivalent in meaning to the modern term "electric potential." Cavendish compared the capacity of different bodies with those of conducting spheres of known diameter and states these capacities in "globular inches," a globular inch being the capacity of a sphere 1 in. in diameter. Hence his measurements are all directly comparable with modern electrostatic measurements in which the unit of capacity is that of a sphere 1 centimetre in radius. Cavendish measured the capacity of disks and condensers of various forms, and proved that the capacity of a Leyden pane is proportional to the surface of the tinfoil and inversely as the thickness of the glass. In connexion with this subject he anticipated one of Faraday's greatest discoveries, namely, the effect of the dielectric or insulator upon the capacity of a condenser formed with it, in other words, made the discovery of specific inductive capacity (see *Electrical Researches*, p. 183). He made many measurements of the electric conductivity of different solids and liquids, by comparing the intensity of the electric shock taken through his body and various conductors. He seems in this way to have educated in himself a very precise "electrical sense," making use of his own nervous system as a kind of physiological galvanometer. One of the most important investigations he made in this way was to find out, as he expressed it, "what power of the velocity the resistance is proportional to." Cavendish meant by the term "velocity" what we now call the current, and by "resistance" the electromotive force which maintains the current. By various experiments with liquids in tubes he found this power was nearly unity. This result thus obtained by Cavendish in January 1781, that the current varies in direct proportion to the electromotive force, was really an anticipation of the fundamental law of electric flow, discovered independently by G. S. Ohm in 1827, and since known as Ohm's Law. Cavendish also enunciated in 1776 all the laws of division of electric current between circuits in parallel, although they are generally supposed to have been first given by Sir C. Wheatstone. Another of his great investigations was the determination of the law according to which electric force varies with the distance. Starting from the fact that if an electrified globe, placed within two hemispheres which fit over it without touching, is brought in contact with these hemispheres, it gives up the whole of its charge to them—in other words, that the charge on an electrified body is wholly on the surface—he was able to deduce by most ingenious reasoning the law that electric force varies inversely as the square of the distance. The accuracy of his measurement, by which he established within 2% the above law, was only limited by the sensibility, or rather insensibility, of the pith ball electrometer, which was his only means of detecting the electric charge.[2] In the accuracy of his quantitative measurements and the range of his researches and his combination of mathematical and physical knowledge, Cavendish may not inaptly be described as the Kelvin of the 18th century. Nothing but his curious indifference to the publication of his work prevented him from securing earlier recognition for it.

Coulomb's Work.—Contemporary with Cavendish was C. A. Coulomb (1736–1806), who in France addressed himself to the same kind of exact quantitative work as Cavendish in England. Coulomb has made his name for ever famous by his invention and application of his torsion balance to the experimental verification of the fundamental law of electric attraction, in which, however, he was anticipated by Cavendish, namely, that the force of attraction between two small electrified spherical bodies varies as the product of their charges and inversely as the square of the distance of their centres. Coulomb's work received better publication than Cavendish's at the time of its accomplishment, and provided a basis on which mathematicians could operate. Accordingly the close of the 18th century drew into the arena of electrical investigation on its mathematical side P. S. Laplace, J. B. Biot, and above all, S. D. Poisson. Adopting the hypothesis of two fluids, Coulomb investigated experimentally and theoretically the distribution of electricity on the surface of bodies by means of his proof plane. He determined the law of distribution between two conducting bodies in contact; and measured with his proof plane the density of the electricity at different points of two spheres in contact, and enunciated an important law. He ascertained the distribution of electricity among several spheres (whether equal or unequal) placed in contact in a straight line; and he measured the distribution of electricity on the surface of a cylinder, and its distribution between a sphere and cylinder of different lengths but of the same diameter. His experiments on the dissipation of electricity possess also a high value. He found that the momentary dissipation was proportional to the degree of electrification at the time, and that, when the charge was moderate, its dissipation was not altered in bodies of different kinds or shapes. The temperature and pressure of the atmosphere did not produce any sensible change; but he concluded that the dissipation was nearly proportional to the cube of the quantity of moisture in the air.[1] In examining the dissipation which takes place along imperfectly insulating substances, he found that a thread of gum-lac was the most perfect of all insulators; that it insulated ten times as well as a dry silk thread; and that a silk thread covered with fine sealing-wax insulated as powerfully as gum-lac when it had four times its length. He found also that the dissipation of electricity along insulators was chiefly owing to adhering moisture, but in some measure also to a slight conducting power. For his memoirs see *Mém. de math. et phys. de l'acad. de sc.*, 1785, &c.

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[1] *The Electrical Researches of the Hon. Henry Cavendish 1771–1781*, edited from the original manuscripts by J. Clerk Maxwell, F.R.S. (Cambridge, 1879).

[2] In 1878 Clerk Maxwell repeated Cavendish's experiments with improved apparatus and the employment of a Kelvin quadrant electrometer as a means of detecting the absence of charge on the inner conductor after it had been connected to the outer case, and was thus able to show that if the law of electric attraction varies inversely as the nth power of the distance, then the exponent n must have a value of $2 \pm \frac{1}{21600}$. See Cavendish's *Electrical Researches* p. 419.

SECOND PERIOD.—We now enter upon the second period of electrical research inaugurated by the epoch-making discovery of Alessandro Volta (1745–1827). L. Galvani had made in 1790 his historic observations on the muscular contraction produced in the bodies of recently killed frogs when an electrical machine was being worked in the same room, and described them in 1791 (*De viribus electricitatis in motu musculari commentarius*, Bologna, 1791). Volta followed up these observations with rare philosophic insight and experimental skill. He showed that all conductors liquid and solid might be divided into two classes which he called respectively conductors of the first and of the second class, the first embracing metals and carbon in its conducting form, and the second class, water, aqueous solutions of various kinds, and generally those now called electrolytes. In the case of conductors of the first class he proved by the use of the condensing electroscope, aided probably by some form of multiplier or doubler, that a difference of potential (see ELECTROSTATICS) was created by the mere contact of two such conductors, one of them being positively electrified and the other negatively. Volta showed, however, that if a series of bodies of the first class, such as disks of various metals, are placed in contact, the potential difference between the first and the last is just the same as if they are immediately in contact. There is no accumulation of potential. If, however, pairs of metallic disks, made, say, of zinc and copper, are alternated with disks of cloth wetted with a conductor of the second class, such, for instance, as dilute acid or any electrolyte, then the effect of the feeble potential difference between one pair of copper and zinc disks is added to that of the potential difference between the next pair, and thus by a sufficiently long series of pairs any required difference of potential can be accumulated.

The Voltaic Pile.—This led him about 1799 to devise his famous voltaic pile consisting of disks of copper and zinc or other metals with wet cloth placed between the pairs. Numerous examples of Volta's original piles at one time existed in Italy, and were collected together for an exhibition held at Como in 1899, but were unfortunately destroyed by a disastrous fire on the 8th of July 1899. Volta's description of his pile was communicated in a letter to Sir Joseph Banks, president of the Royal Society of London, on the 20th of March 1800, and was printed in the *Phil. Trans.*, vol. 90, pt 1, p. 405. It was then found that when the end plates of Volta's pile were connected to an electroscope the leaves diverged either with positive or negative electricity. Volta also gave his pile another form, the *couronne des tasses* (crown of cups), in which connected strips of copper and zinc were used to bridge between cups of water or dilute acid. Volta then proved that all metals could be arranged in an electromotive series such that each became positive when placed in contact with the one next below it in the series. The origin of the electromotive force in the pile has been much discussed, and Volta's discoveries gave rise to one of the historic controversies of science. Volta maintained that the mere contact of metals was sufficient to produce the electrical difference of the end plates of the pile. The discovery that chemical action was involved in the process led to the advancement of the chemical theory of the pile and this was strengthened by the growing insight into the principle of the conservation of energy. In 1851 Lord Kelvin (Sir W. Thomson), by the use of his then newly-invented electrometer, was able to confirm Volta's observations on contact electricity by irrefutable evidence, but the contact theory of the voltaic pile was then placed on a basis consistent with the principle of the conservation of energy. A. A. de la Rive and Faraday were ardent supporters of the chemical theory of the pile, and even at the present time opinions of physicists can hardly be said to be in entire accordance as to the source of the electromotive force in a voltaic couple or pile.[2]

Improvements in the form of the voltaic pile were almost immediately made by W. Cruickshank (1745–1800), Dr W. H. Wollaston and Sir H. Davy, and these, together with other eminent continental chemists, such as A. F. de Fourcroy, L. J. Thénard and J. W. Ritter (1776–1810), ardently prosecuted research with the new instrument. One of the first discoveries made with it was its power to electrolyse or chemically decompose certain solutions. William Nicholson (1753–1815) and Sir Anthony Carlisle (1768–1840) in 1800 constructed a pile of silver and zinc plates, and placing the terminal wires in water noticed the evolution from these wires of bubbles of gas, which they proved to be oxygen and hydrogen. These two gases, as Cavendish and James Watt had shown in 1784, were actually the constituents of water. From that date it was clearly recognized that a fresh implement of great power had been given to the chemist. Large voltaic piles were then constructed by Andrew Crosse (1784–1855) and Sir H. Davy, and improvements initiated by Wollaston and Robert Hare (1781–1858) of Philadelphia. In 1806 Davy communicated to the Royal Society of London a celebrated paper on some "Chemical Agencies of Electricity," and after providing himself at the Royal Institution of London with a battery of several hundred cells, he announced in 1807 his great discovery of the electrolytic decomposition of the alkalis, potash and soda, obtaining therefrom the metals potassium and sodium. In July 1808 Davy laid a request before the managers of the Royal Institution that they would set on foot a subscription for the purchase of a specially large voltaic battery; as a result he was provided with one of 2000 pairs of plates, and the first experiment performed with it was the production of the electric arc light between carbon poles. Davy followed up his initial work with a long and brilliant series of electrochemical investigations described for the most part in the *Phil. Trans.* of the Royal Society.

Magnetic Action of Electric Current.—Noticing an analogy between the polarity of the voltaic pile and that of the magnet, philosophers had long been anxious to discover a relation between the two, but twenty years elapsed after the invention of the pile before Hans Christian Oersted (1777–1851), professor of natural philosophy in the university of Copenhagen, made in 1819 the discovery which has immortalized his name. In the *Annals of Philosophy* (1820, 16, p. 273) is to be found an English translation of Oersted's original Latin essay (entitled "Experiments on the Effect of a Current of Electricity on the Magnetic Needle"), dated the 21st of July 1820, describing his discovery. In it Oersted describes the action he considers is taking place around

[1] Modern researches have shown that the loss of charge is in fact dependent upon the ionization of the air, and that, provided the atmospheric moisture is prevented from condensing on the insulating supports, water vapour in the air does not *per se* bestow on it conductance for electricity.

[2] Faraday discussed the chemical theory of the pile and arguments in support of it in the 8th and 16th series of his *Experimental Researches on Electricity*. De la Rive reviews the subject in his large *Treatise on Electricity and Magnetism*, vol. ii. ch. iii. The writer made a contribution to the discussion in 1874 in a paper on "The Contact Theory of the Galvanic Cell," *Phil. Mag.*, 1874, 47, p. 401. Sir Oliver Lodge reviewed the whole position in a paper in 1885. "On the Seat of the Electromotive Force in a Voltaic Cell," *Journ. Inst. Elec. Eng.*, 1885, 14, p. 186.

the conductor joining the extremities of the pile; he speaks of it as the electric conflict, and says: "It is sufficiently evident that the electric conflict is not confined to the conductor, but is dispersed pretty widely in the circumjacent space. We may likewise conclude that this conflict performs circles round the wire, for without this condition it seems impossible that one part of the wire when placed below the magnetic needle should drive its pole to the east, and when placed above it, to the west." Oersted's important discovery was the fact that when a wire joining the end plates of a voltaic pile is held near a pivoted magnet or compass needle, the latter is deflected and places itself more or less transversely to the wire, the direction depending upon whether the wire is above or below the needle, and on the manner in which the copper or zinc ends of the pile are connected to it. It is clear, moreover, that Oersted clearly recognized the existence of what is now called the magnetic field round the conductor. This discovery of Oersted, like that of Volta, stimulated philosophical investigation in a high degree.

Electrodynamics.—On the 2nd of October 1820, A. M. Ampère presented to the French Academy of Sciences an important memoir,[1] in which he summed up the results of his own and D. F. J. Arago's previous investigations in the new science of electromagnetism, and crowned that labour by the announcement of his great discovery of the dynamical action between conductors conveying the electric currents. Ampère in this paper gave an account of his discovery that conductors conveying electric currents exercise a mutual attraction or repulsion on one another, currents flowing in the same direction in parallel conductors attracting, and those in opposite directions repelling. Respecting this achievement when developed in its experimental and mathematical completeness, Clerk Maxwell says that it was "perfect in form and unassailable in accuracy." By a series of well-chosen experiments Ampère established the laws of this mutual action, and not only explained observed facts by a brilliant train of mathematical analysis, but predicted others subsequently experimentally realized. These investigations led him to the announcement of the fundamental law of action between elements of current, or currents in infinitely short lengths of linear conductors, upon one another at a distance; summed up in compact expression this law states that the action is proportional to the product of the current strengths of the two elements, and the lengths of the two elements, and inversely proportional to the square of the distance between the two elements, and also directly proportional to a function of the angles which the line joining the elements makes with the directions of the two elements respectively. Nothing is more remarkable in the history of discovery than the manner in which Ampère seized upon the right clue which enabled him to disentangle the complicated phenomena of electrodynamics and to deduce them all as a consequence of one simple fundamental law, which occupies in electrodynamics the position of the Newtonian law of gravitation in physical astronomy.

In 1821 Michael Faraday (1791–1867), who was destined later on to do so much for the science of electricity, discovered electromagnetic rotation, having succeeded in causing a wire conveying a voltaic current to rotate continuously round the pole of a permanent magnet.[2] This experiment was repeated in a variety of forms by A. A. De la Rive, Peter Barlow (1776–1862), William Ritchie (1790–1837), William Sturgeon (1783–1850), and others, and Davy (*Phil Trans.*, 1823) showed that when two wires connected with the pole of a battery were dipped into a cup of mercury placed on the pole of a powerful magnet, the fluid rotated in opposite directions about the two electrodes.

Electromagnetism.—In 1820 Arago (*Ann. Chim. Phys.*, 1820, 15, p. 94) and Davy (*Annals of Philosophy*, 1821) discovered independently the power of the electric current to magnetize iron and steel. Félix Savary (1797–1841) made some very curious observations in 1827 on the magnetization of steel needles placed at different distances from a wire conveying the discharge of a Leyden jar (*Ann. Chim. Phys.*, 1827, 34) W Sturgeon in 1824 wound a copper wire round a bar of iron bent in the shape of a horseshoe, and passing a voltaic current through the wire showed that the iron became powerfully magnetized as long as the connexion with the pile was maintained (*Trans. Soc. Arts*, 1825). These researches gave us the electromagnet, almost as potent an instrument of research and invention as the pile itself (see ELECTROMAGNETISM).

Ampère had already previously shown that a spiral conductor or solenoid when traversed by an electric current possesses magnetic polarity, and that two such solenoids act upon one another when traversed by electric currents as if they were magnets. Joseph Henry, in the United States, first suggested the construction of what were then called intensity electromagnets, by winding upon a horseshoe-shaped piece of soft iron many superimposed windings of copper wire, insulated by covering it with silk or cotton, and then sending through the coils the current from a voltaic battery. The dependence of the intensity of magnetization on the strength of the current was subsequently investigated (*Pogg. Ann. Phys.*, 1839, 47) by H. F. E. Lenz (1804–1865) and M. H. von Jacobi (1801–1874). J. P. Joule found that magnetization did not increase proportionately with the current, but reached a maximum (*Sturgeon's Annals of Electricity*, 1839, 4). Further investigations on this subject were carried on subsequently by W. E. Weber (1804–1891), J. H. J. Müller (1809–1875), C. J. Dub (1817–1873), G. H. Wiedemann (1826–1899), and others, and in modern times by H. A. Rowland (1848–1901), Shelford Bidwell (b. 1848), John Hopkinson (1849–1898), J. A. Ewing (b. 1855) and many others. Electric magnets of great power were soon constructed in this manner by Sturgeon, Joule, Henry, Faraday and Brewster. Oersted's discovery in 1819 was indeed epoch-making in the degree to which it stimulated other research. It led at once to the construction of the galvanometer as a means of detecting and measuring the electric current in a conductor. In 1820 J. S. C. Schweigger (1779–1857) with his "multiplier" made an advance upon Oersted's discovery, by winding the wire conveying the electric current many times round the pivoted magnetic needle and thus increasing the deflection; and L. Nobili (1784–1835) in 1825 conceived the ingenious idea of neutralizing the directive effect of the earth's magnetism by employing a pair of magnetized steel needles fixed to one axis, but with their magnetic poles pointing in opposite directions. Hence followed the astatic multiplying galvanometer.

Electrodynamic Rotation.—The study of the relation between the magnet and the circuit conveying an electric current then led Arago to the discovery of the "magnetism of rotation." He found that a vibrating magnetic compass needle came to rest sooner when placed over a plate of copper than otherwise, and also that a plate of copper rotating under a suspended magnet tended to drag the magnet in the same direction. The matter was investigated by Charles Babbage, Sir J. F. W. Herschel, Peter Barlow and others, but did not receive a final explanation until after the discovery of electromagnetic induction by Faraday in 1831. Ampère's investigations had led electricians to see that the force acting upon a magnetic pole due to a current in a neighbouring conductor was such as to tend to cause the pole to travel round the conductor. Much ingenuity had, however, to be expended before a method was found of exhibiting such a rotation. Faraday first succeeded by the simple but ingenious device of using a light magnetic needle tethered flexibly to the bottom of a cup containing mercury so that one pole of the magnet was just above the surface of the mercury On bringing down on to the mercury surface a wire conveying an electric current, and allowing the current to pass through the mercury and out at the bottom, the magnetic pole at once began to rotate round the wire (*Exper Res.*, 1822, 2, p. 148). Faraday and others then discovered, as already mentioned, means to make the conductor conveying the current rotate round a

[1] "Mémoire sur la théorie mathematique des phénomènes électrodynamiques," *Mémoires de l'institut*, 1820, 6; see also *Ann. de Chim.*, 1820, 15

[2] See M Faraday, "On some new Electro-Magnetical Motions and on the Theory of Magnetism," *Quarterly Journal of Science*, 1822, 12, p. 74; or *Experimental Researches on Electricity*, vol. ii. p. 127.

magnetic pole, and Ampère showed that a magnet could be made to rotate on its own axis when a current was passed through it. The difficulty in this case consisted in discovering means by which the current could be passed through one half of the magnet without passing it through the other half. This, however, was overcome by sending the current out at the centre of the magnet by means of a short length of wire dipping into an annular groove containing mercury. Barlow, Sturgeon and others then showed that a copper disk could be made to rotate between the poles of a horseshoe magnet when a current was passed through the disk from the centre to the circumference, the disk being rendered at the same time freely movable by making a contact with the circumference by means of a mercury trough. These experiments furnished the first elementary forms of electric motor, since it was then seen that rotatory motion could be produced in masses of metal by the mutual action of conductors conveying electric current and magnetic fields. By his discovery of thermo-electricity in 1822 (*Pogg. Ann. Phys.*, 6), T. J. Seebeck (1770–1831) opened up a new region of research (see THERMO-ELECTRICITY). James Cumming (1777–1861) in 1823 (*Annals of Philosophy*, 1823) found that the thermo-electric series varied with the temperature, and J. C. A. Peltier (1785–1845) in 1834 discovered that a current passed across the junction of two metals either generated or absorbed heat.

Ohm's Law.—In 1827 Dr G. S. Ohm (1787–1854) rendered a great service to electrical science by his mathematical investigation of the voltaic circuit, and publication of his paper, *Die galvanische Kette mathematisch bearbeitet.* Before his time, ideas on the measurable quantities with which we are concerned in an electric circuit were extremely vague. Ohm introduced the clear idea of current strength as an effect produced by electromotive force acting as a cause in a circuit having resistance as its quality, and showed that the current was directly proportional to the electromotive force and inversely as the resistance. Ohm's law, as it is called, was based upon an analogy with the flow of heat in a circuit, discussed by Fourier. Ohm introduced the definite conception of the distribution along the circuit of "electroscopic force" or tension (*Spannung*), corresponding to the modern term potential. Ohm verified his law by the aid of thermo-electric piles as sources of electromotive force, and Davy, C. S. M. Pouillet (1791–1868), A. C. Becquerel (1788–1878), G. T. Fechner (1801–1887), R. H. A. Kohlrausch (1809–1858) and others laboured at its confirmation. In more recent times, 1876, it was rigorously tested by G. Chrystal (b. 1851) at Clerk Maxwell's instigation (see *Brit. Assoc. Report*, 1876, p. 36), and although at its original enunciation its meaning was not at first fully apprehended, it soon took its place as the expression of the fundamental law of electrokinetics.

Induction of Electric Currents.—In 1831 Faraday began the investigations on electromagnetic induction which proved more fertile in far-reaching practical consequences than any of those which even his genius gave to the world. These advances all centre round his supreme discovery of the induction of electric currents. Fully familiar with the fact that an electric charge upon one conductor could produce a charge of opposite sign upon a neighbouring conductor, Faraday asked himself whether an electric current passing through a conductor could not in any like manner induce an electric current in some neighbouring conductor. His first experiments on this subject were made in the month of November 1825, but it was not until the 29th of August 1831 that he attained success. On that date he had provided himself with an iron ring, over which he had wound two coils of insulated copper wire. One of these coils was connected with the voltaic battery and the other with the galvanometer. He found that at the moment the current in the battery circuit was started or stopped, transitory currents appeared in the galvanometer circuit in opposite directions. In ten days of brilliant investigation, guided by clear insight from the very first into the meaning of the phenomena concerned, he established experimentally the fact that a current may be induced in a conducting circuit simply by the variation in a magnetic field, the lines of force of which are linked with that circuit. The whole of Faraday's investigations on this subject can be summed up in the single statement that if a conducting circuit is placed in a magnetic field, and if either by variation of the field or by movement or variation of the form of the circuit the total magnetic flux linked with the circuit is varied, an electromotive force is set up in that circuit which at any instant is measured by the rate at which the total flux linked with the circuit is changing.

Amongst the memorable achievements of the ten days which Faraday devoted to this investigation was the discovery that a current could be induced in a conducting wire simply by moving it in the neighbourhood of a magnet. One form which this experiment took was that of rotating a copper disk between the poles of a powerful electric magnet. He then found that a conductor, the ends of which were connected respectively with the centre and edge of the disk, was traversed by an electric current. This important fact laid the foundation for all subsequent inventions which finally led to the production of electromagnetic or dynamo-electric machines.

THIRD PERIOD.—With this supremely important discovery of Faraday's we enter upon the third period of electrical research, in which that philosopher himself was the leading figure. He not only collected the facts concerning electromagnetic induction so industriously that nothing of importance remained for future discovery, and embraced them all in one law of exquisite simplicity, but he introduced his famous conception of lines of force which changed entirely the mode of regarding electrical phenomena. The French mathematicians, Coulomb, Biot, Poisson and Ampère, had been content to accept the fact that electric charges or currents in conductors could exert forces on other charges or conductors at a distance without inquiring into the means by which this action at a distance was produced. Faraday's mind, however, revolted against this notion; he felt intuitively that these distance actions must be the result of unseen operations in the interposed medium. Accordingly when he sprinkled iron filings on a card held over a magnet and revealed the curvilinear system of lines of force (see MAGNETISM), he regarded these fragments of iron as simple indicators of a physical state in the space already in existence round the magnet. To him a magnet was not simply a bar of steel; it was the core and origin of a system of lines of magnetic force attached to it and moving with it. Similarly he came to see an electrified body as a centre of a system of lines of electrostatic force. All the space round magnets, currents and electric charges was therefore to Faraday the seat of corresponding lines of magnetic or electric force. He proved by systematic experiments that the electromotive forces set up in conductors by their motions in magnetic fields or by the induction of other currents in the field were due to the secondary conductor *cutting* lines of magnetic force. He invented the term "electrotonic state" to signify the total magnetic flux due to a conductor conveying a current, which was linked with any secondary circuit in the field or even with itself.

Faraday's Researches.—Space compels us to limit our account of the scientific work done by Faraday in the succeeding twenty years, in elucidating electrical phenomena and adding to the knowledge thereon, to the very briefest mention. We must refer the reader for further information to his monumental work entitled *Experimental Researches on Electricity*, in three volumes, reprinted from the *Phil. Trans.* between 1831 and 1851. Faraday divided these researches into various series. The 1st and 2nd concern the discovery of magneto-electric induction already mentioned. The 3rd series (1833) he devoted to discussion of the identity of electricity derived from various sources, frictional, voltaic, animal and thermal, and he proved by rigorous experiments the identity and similarity in properties of the electricity generated by these various methods. The 5th series (1833) is occupied with his electrochemical researches. In the 7th series (1834) he defines a number of new terms, such as electrolyte, electrolysis, anode and cathode, &c., in connexion with electrolytic phenomena, which were immediately adopted into the vocabulary of science. His most important contribution at this date was the invention of the voltameter and his enunciation of the laws of electrolysis. The voltameter provided a means of measuring quantity of electricity, and in the hands of Faraday and his successors became an appliance of fundamental importance. The 8th series is occupied with a discussion of the theory of the voltaic pile, in which Faraday accumulates evidence to prove that the source of the energy of the pile must be chemical. He returns also to this subject in the 16th series. In the 9th series (1834) he announced the discovery of the important property of electric conductors, since called their self-induction or inductance, a discovery in which, however, he was anticipated by Joseph Henry in the United States. The 11th series (1837) deals with electrostatic induction and the statement of the important fact of the specific inductive capacity of insulators or dielectrics. This discovery was made in November 1837 when Faraday had no knowledge of Cavendish's previous researches into this matter. The 19th series (1845) contains an account of his brilliant discovery of the rotation of the plane of polarized light by transparent dielectrics placed in a magnetic field, a relation which established for the first time a practical connexion between the phenomena of electricity and light. The 20th series (1845) contains an account of his researches on the universal action of magnetism and diamagnetic bodies. The 22nd series (1848) is occupied with the discussion of magnetocrystallic force and the abnormal behaviour of various crystals in a magnetic field. In the 25th series (1850) he made known his discovery of the magnetic character of oxygen gas, and the important principle that the terms paramagnetic and diamagnetic are relative. In the 26th series (1850) he returned to a discussion of magnetic lines of force, and illuminated the whole subject of the magnetic circuit by his transcendent insight into the intricate phenomena concerned. In 1855 he brought these researches to a conclusion by a general article on magnetic philosophy, having placed the whole subject of magnetism and electromagnetism on an entirely novel and solid basis. In addition to this he provided the means for studying the phenomena not only qualitatively, but also quantitatively, by the profoundly ingenious instruments he invented for that purpose.

Electrical Measurement.—Faraday's ideas thus pressed upon electricians the necessity for the quantitative measurement of electrical phenomena.[1] It has been already mentioned that Schweigger invented in 1820 the "multiplier," and Nobili in 1825 the astatic galvanometer. C. S. M. Pouillet in 1837 contributed the sine and tangent compass, and W. E. Weber effected great improvements in them and in the construction and use of galvanometers. In 1849 H. von Helmholtz devised a tangent galvanometer with two coils. The measurement of electric resistance then engaged the attention of electricians. By his Memoirs in the *Phil. Trans.* in 1843, Sir Charles Wheatstone gave a great impulse to this study. He invented the rheostat and improved the resistance balance, invented by S. H. Christie (1784–1865) in 1833, and subsequently called the Wheatstone Bridge. (See his *Scientific Papers*, published by the Physical Society of London, p. 129.) Weber about this date invented the electrodynamometer, and applied the mirror and scale method of reading deflections, and in co-operation with C. F. Gauss introduced a system of absolute measurement of electric and magnetic phenomena. In 1846 Weber proceeded with improved apparatus to test Ampère's laws of electrodynamics. In 1845 H. G. Grassmann (1809–1877) published (*Pogg. Ann.* vol. 64) his "Neue Theorie der Electrodynamik," in which he gave an elementary law differing from that of Ampère but leading to the same results for closed circuits. In the same year F. E. Neumann published another law. In 1846 Weber announced his famous hypothesis concerning the connexion of electrostatic and electrodynamic phenomena. The work of Neumann and Weber had been stimulated by that of H. F. E. Lenz (1804–1865), whose researches (*Pogg. Ann.*, 1834, 31; 1835, 34) among other results led him to the statement of the law by means of which the direction of the induced current can be predicted from the theory of Ampère, the rule being that the direction of the induced current is always such that its electrodynamic action tends to oppose the motion which produces it.

Neumann in 1845 did for electromagnetic induction what Ampere did for electrodynamics, basing his researches upon the experimental laws of Lenz. He discovered a function, which has been called the potential of one circuit on another, from which he deduced a theory of induction, completely in accordance with experiment. Weber at the same time deduced the mathematical laws of induction from his elementary law of electrical action, and with his improved instruments arrived at accurate verifications of the law of induction which by this time had been developed mathematically by Neumann and himself. In 1849 G. R. Kirchhoff determined experimentally in a certain case the absolute value of the current induced by one circuit in another, and in the same year Erik Edland (1819–1888) made a series of careful experiments on the induction of electric currents which further established received theories. These labours laid the foundation on which was subsequently erected a complete system for the absolute measurement of electric and magnetic quantities, referring them all to the fundamental units of mass, length and time. Helmholtz gave at the same time a mathematical theory of induced currents and a valuable series of experiments in support of them (*Pogg. Ann.*, 1851). This great investigator and luminous expositor just before that time had published his celebrated essay, *Die Erhaltung der Kraft* ("The Conservation of Energy"), which brought to a focus ideas which had been accumulating in consequence of the work of J. P. Joule, J. R. von Mayer and others, on the transformation of various forms of physical energy, and in particular the mechanical equivalent of heat. Helmholtz brought to bear upon the subject not only the most profound mathematical attainments, but immense experimental skill, and his work in connexion with this subject is classical.

Lord Kelvin's Work.—About 1842 Lord Kelvin (then William Thomson) began that long career of theoretical and practical discovery and invention in electrical science which revolutionized every department of pure and applied electricity. His early contributions to electrostatics and electrometry are to be found described in his *Reprint of Papers on Electrostatics and Magnetism* (1872), and his later work in his collected *Mathematical and Physical Papers*. By his studies in electrostatics, his elegant method of electrical images, his development of the theory of potential and application of the principle of conservation of energy, as well as by his inventions in connexion with electrometry, he laid the foundations of our modern knowledge of electrostatics. His work on the electrodynamic qualities of metals, thermo-electricity, and his contributions to galvanometry, were not less massive and profound. From 1842 onwards to the end of the 19th century, he was one of the great master workers in the field of electrical discovery and research.[2] In 1853 he published a paper "On Transient Electric Currents" (*Phil. Mag.*, 1853 [4], 5, p. 393), in which he applied the principle of the conservation of energy to the discharge of a Leyden jar. He added definiteness to the idea of the self-induction or inductance of an electric circuit, and gave a mathematical expression for the current flowing out of a Leyden jar during its discharge. He confirmed an opinion already previously expressed by Helmholtz and by Henry, that in some circumstances this discharge is oscillatory in nature, consisting of an alternating electric current of high frequency. These theoretical predictions were confirmed and others, subsequently, by the work of B. W. Feddersen (b. 1832), C. A. Paalzow (b. 1823), and it was then seen that the familiar phenomena of the discharge of a Leyden jar provided the means of generating electric oscillations of very high frequency.

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[1] Amongst the most important of Faraday's quantitative researches must be included the ingenious and convincing proofs he provided that the production of any quantity of electricity of one sign is always accompanied by the production of an equal quantity of electricity of the opposite sign. See *Experimental Researches on Electricity*, vol. i. § 1177.

[2] In this connexion the work of George Green (1793–1841) must not be forgotten. Green's *Essay on the Application of Mathematical Analysis to the Theories of Electricity and Magnetism*, published in 1828, contains the first exposition of the theory of potential. An important theorem contained in it is known as Green's theorem, and is of great value.

Telegraphy.—Turning to practical applications of electricity, we may note that electric telegraphy took its rise in 1820, beginning with a suggestion of Ampère immediately after Oersted's discovery. It was established by the work of Weber and Gauss at Göttingen in 1836, and that of C. A. Steinheil (1801–1870) of Munich, Sir W. F. Cooke (1806–1879) and Sir C. Wheatstone in England, Joseph Henry and S. F. B. Morse (1791–1872) in the United States in 1837. In 1845 submarine telegraphy was inaugurated by the laying of an insulated conductor across the English Channel by the brothers Brett, and their temporary success was followed by the laying in 1851 of a permanent Dover-Calais cable by T. R. Crampton. In 1856 the project for an Atlantic submarine cable took shape and the Atlantic Telegraph Company was formed with a capital of £350,000, with Sir Charles Bright as engineer-in-chief and E. O. W. Whitehouse as electrician. The phenomena connected with the propagation of electric signals by underground insulated wires had already engaged the attention of Faraday in 1854, who pointed out the Leyden-jar-like action of an insulated subterranean wire. Scientific and practical questions connected with the possibility of laying an Atlantic submarine cable then began to be discussed, and Lord Kelvin was foremost in developing true scientific knowledge on this subject, and in the invention of appliances for utilizing it. One of his earliest and most useful contributions (in 1858) was the invention of the mirror galvanometer. Abandoning the long and somewhat heavy magnetic needles that had been used up to that date in galvanometers, he attached to the back of a very small mirror made of microscopic glass a fragment of magnetized watch-spring, and suspended the mirror and needle by means of a cocoon fibre in the centre of a coil of insulated wire. By this simple device he provided a means of measuring small electric currents far in advance of anything yet accomplished, and this instrument proved not only most useful in pure scientific researches, but at the same time was of the utmost value in connexion with submarine telegraphy. The history of the initial failures and final success in laying the Atlantic cable has been well told by Mr. Charles Bright (see *The Story of the Atlantic Cable*, London, 1903).[1] The first cable laid in 1857 broke on the 11th of August during laying. The second attempt in 1858 was successful, but the cable completed on the 5th of August 1858 broke down on the 20th of October 1858, after 732 messages had passed through it. The third cable laid in 1865 was lost on the 2nd of August 1865, but in 1866 a final success was attained and the 1865 cable also recovered and completed. Lord Kelvin's mirror galvanometer was first used in receiving signals through the short-lived 1858 cable. In 1867 he invented his beautiful siphon-recorder for receiving and recording the signals through long cables. Later, in conjunction with Prof. Fleeming Jenkin, he devised his automatic curb sender, an appliance for sending signals by means of punched telegraphic paper tape. Lord Kelvin's contributions to the science of exact electric measurement[2] were enormous. His ampere-balances, voltmeters and electrometers, and double bridge, are elsewhere described in detail (see Amperemeter; Electrometer, and Wheatstone's Bridge).

Dynamo.—The work of Faraday from 1831 to 1851 stimulated and originated an immense mass of scientific research, but at the same time practical inventors had not been slow to perceive that it was capable of purely technical application. Faraday's copper disk rotated between the poles of a magnet, and producing thereby an electric current, became the parent of innumerable machines in which mechanical energy was directly converted into the energy of electric currents. Of these machines, originally called magneto-electric machines, one of the first was devised in 1832 by H. Pixii. It consisted of a fixed horseshoe armature wound over with insulated copper wire in front of which revolved about a vertical axis a horseshoe magnet. Pixii, who invented the split tube commutator for converting the alternating current so produced into a continuous current in the external circuit, was followed by J. Saxton, E. M. Clarke, and many others in the development of the above-described magneto-electric machine. In 1857 E. W. Siemens effected a great improvement by inventing a shuttle armature and improving the shape of the field magnet. Subsequently similar machines with electromagnets were introduced by Henry Wilde (*b.* 1833), Siemens, Wheatstone, W. Ladd and others, and the principle of self-excitation was suggested by Wilde, C. F. Varley (1828–1883), Siemens and Wheatstone (see Dynamo). These machines about 1866 and 1867 began to be constructed on a commercial scale and were employed in the production of the electric light. The discovery of electric-current induction also led to the production of the induction coil (*q.v.*), improved and brought to its present perfection by W. Sturgeon, E. R. Ritchie, N. J. Callan, H. D. Rühmkorff (1803–1877), A. H. L. Fizeau, and more recently by A. Apps and modern inventors. About the same time Fizeau and J. B. L. Foucault devoted attention to the invention of automatic apparatus for the production of Davy's electric arc (see Lighting: *Electric*), and these appliances in conjunction with magneto-electric machines were soon employed in lighthouse work. With the advent of large magneto-electric machines the era of electrotechnics was fairly entered, and this period, which may be said to terminate about 1867 to 1869, was consummated by the theoretical work of Clerk Maxwell.

Maxwell's Researches.—James Clerk Maxwell (1831–1879) entered on his electrical studies with a desire to ascertain if the ideas of Faraday, so different from those of Poisson and the French mathematicians, could be made the foundation of a mathematical method and brought under the power of analysis.[3] Maxwell started with the conception that all electric and magnetic phenomena are due to effects taking place in the dielectric or in the ether if the space be vacuous. The phenomena of light had compelled physicists to postulate a space-filling medium, to which the name ether had been given, and Henry and Faraday had long previously suggested the idea of an electromagnetic medium. The vibrations of this medium constitute the agency called light. Maxwell saw that it was unphilosophical to assume a multiplicity of ethers or media until it had been proved that one would not fulfil all the requirements. He formulated the conception, therefore, of electric charge as consisting in a displacement taking place in the dielectric or electromagnetic medium (see Electrostatics). Maxwell never committed himself to a precise definition of the physical nature of electric displacement, but considered it as defining that which Faraday had called the polarization in the insulator, or, what is equivalent, the number of lines of electrostatic force passing normally through a unit of area in the dielectric. A second fundamental conception of Maxwell was that the electric displacement whilst it is changing is in effect an electric current, and creates, therefore, magnetic force. The total current at any point in a dielectric must be considered as made up of two parts: first, the true conduction current, if it exists; and second, the rate of change of dielectric displacement. The fundamental fact connecting electric currents and magnetic fields is that the line integral of magnetic force taken once round a conductor conveying an electric current is equal to 4π-times the surface integral of the current density, or to 4π-times the total current flowing through the closed line round which the integral is taken (see Electrokinetics). A second relation connecting magnetic and electric force is based upon Faraday's fundamental law of induction, that the rate of change of the total magnetic flux linked with a conductor is a measure of the electromotive force created in it (see Electrokinetics). Maxwell also introduced in this connexion the notion of the vector potential. Coupling together these ideas he was finally enabled to prove that the propagation of electric and magnetic force takes place through space with a certain velocity determined by the dielectric constant and the magnetic permeability of the medium. To take a simple instance, if we consider an electric current as flowing in a conductor it is, as Oersted discovered, surrounded by closed lines of magnetic force. If we imagine the current in the conductor to be instantaneously reversed in direction, the magnetic force surrounding it would not be instantly reversed everywhere in direction, but the reversal would be propagated outwards through space with a certain velocity which Maxwell showed was inversely as the square root of the product of the magnetic permeability and the dielectric constant or specific inductive capacity of the medium.

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[1] See also his *Submarine Telegraphs* (London, 1898).

[2] The quantitative study of electrical phenomena has been enormously assisted by the establishment of the absolute system of electrical measurement due originally to Gauss and Weber. The British Association for the advancement of science appointed in 1861 a committee on electrical units, which made its first report in 1862 and has existed ever since. In this work Lord Kelvin took a leading part. The popularization of the system was greatly assisted by the publication by Prof. J. D. Everett of *The C.G.S. System of Units* (London, 1891).

[3] The first paper in which Maxwell began to translate Faraday's conceptions into mathematical language was "On Faraday's Lines of Force," read to the Cambridge Philosophical Society on the 10th of December 1855 and the 11th of February 1856. See Maxwell's *Collected Scientific Papers*, i. 155.

These great results were announced by him for the first time in a paper presented in 1864 to the Royal Society of London and printed in the *Phil. Trans.* for 1865, entitled "A Dynamical Theory of the Electromagnetic Field." Maxwell showed in this paper that the velocity of propagation of an electromagnetic impulse through space could also be determined by certain experimental methods which consisted in measuring the same electric quantity, capacity, resistance or potential in two ways. W. E. Weber had already laid the foundations of the absolute system of electric and magnetic measurement, and proved that a quantity of electricity could be measured either by the force it exercises upon another static or stationary quantity of electricity, or magnetically by the force this quantity of electricity exercises upon a magnetic pole when flowing through a neighbouring conductor. The two systems of measurement were called respectively the electrostatic and the electromagnetic systems (see Units, Physical). Maxwell suggested new methods for the determination of this ratio of the electrostatic to the electromagnetic units, and by experiments of great ingenuity was able to show that this ratio, which is also that of the velocity of the propagation of an electromagnetic impulse through space, is identical with that of light. This great fact once ascertained, it became clear that the notion that electric phenomena are affections of the luminiferous ether was no longer a mere speculation but a scientific theory capable of verification. An immediate deduction from Maxwell's theory was that in transparent dielectrics, the dielectric constant or specific inductive capacity should be numerically equal to the square of the refractive index for very long electric waves. At the time when Maxwell developed his theory the dielectric constants of only a few transparent insulators were known and these were for the most part measured with steady or unidirectional electromotive force. The only refractive indices which had been measured were the optical refractive indices of a number of transparent substances. Maxwell made a comparison between the optical refractive index and the dielectric constant of paraffin wax, and the approximation between the numerical values of the square of the first and that of the last was sufficient to show that there was a basis for further work. Maxwell's electric and magnetic ideas were gathered together in a great mathematical treatise on electricity and magnetism which was published in 1873.[1] This book stimulated in a most remarkable degree theoretical and practical research into the phenomena of electricity and magnetism. Experimental methods were devised for the further exact measurements of the electromagnetic velocity and numerous determinations of the dielectric constants of various solids, liquids and gases, and comparisons of these with the corresponding optical refractive indices were conducted. This early work indicated that whilst there were a number of cases in which the square of optical refractive index for long waves and the dielectric constant of the same substance were sufficiently close to afford an apparent confirmation of Maxwell's theory, yet in other cases there were considerable divergencies. L. Boltzmann (1844–1907) made a large number of determinations for solids and for gases, and the dielectric constants of many solid and liquid substances were determined by N. N. Schiller (b. 1848), P. A. Silow (b. 1850), J. Hopkinson and others. The accumulating determinations of the numerical value of the electromagnetic velocity (v) from the earliest made by Lord Kelvin (Sir W. Thomson) with the aid of King and McKichan, or those of Clerk Maxwell, W. E. Ayrton and J. Perry, to more recent ones by J. J. Thomson, F. Himstedt, H. A. Rowland, E. B. Rosa, J. S. H. Pellat and H. A. Abraham, showed it to be very close to the best determinations of the velocity of light (see Units, Physical). On the other hand, the divergence in some cases between the square of the optical refractive index and the dielectric constant was very marked. Hence although Maxwell's theory of electrical action when first propounded found many adherents in Great Britain, it did not so much dominate opinion on the continent of Europe.

Fourth Period.—With the publication of Clerk Maxwell's treatise in 1873, we enter fully upon the fourth and modern period of electrical research. On the technical side the invention of a new form of armature for dynamo electric machines by Z. T. Gramme (1826–1901) inaugurated a departure from which we may date modern electrical engineering. It will be convenient to deal with technical development first.

Technical Development.—As far back as 1841 large magneto-electric machines driven by steam power had been constructed, and in 1856 F. H. Holmes had made a magneto machine with multiple permanent magnets which was installed in 1862 in Dungeness lighthouse. Further progress was made in 1867 when H. Wilde introduced the use of electromagnets for the field magnets. In 1860 Dr Antonio Pacinotti invented what is now called the toothed ring winding for armatures and described it in an Italian journal, but it attracted little notice until reinvented in 1870 by Gramme. In this new form of bobbin, the armature consisted of a ring of iron wire wound over with an endless coil of wire and connected to a commutator consisting of copper bars insulated from one another. Gramme dynamos were then soon made on the self-exciting principle. In 1873 at Vienna the fact was discovered that a dynamo machine of the Gramme type could also act as an electric motor and was set in rotation when a current was passed into it from another similar machine. Henceforth the electric transmission of power came within the possibilities of engineering.

Electric Lighting.—In 1876, Paul Jablochkov (1847–1894), a Russian officer, passing through Paris, invented his famous electric candle, consisting of two rods of carbon placed side by side and separated from one another by an insulating material. This invention in conjunction with an alternating current dynamo provided a new and simple form of electric arc lighting. Two years afterwards C. F. Brush, in the United States, produced another efficient form of dynamo and electric arc lamp suitable for working in series (see Lighting: *Electric*), and these inventions of Brush and Jablochkov inaugurated commercial arc lighting. The so-called subdivision of electric light by incandescent lighting lamps then engaged attention. E. A. King in 1845 and W. E. Staite in 1848 had made incandescent electric lamps of an elementary form, and T. A. Edison in 1878 again attacked the problem of producing light by the incandescence of platinum. It had by that time become clear that the most suitable material for an incandescent lamp was carbon contained in a good vacuum, and St G. Lane Fox and Sir J. W. Swan in England, and T. A. Edison in the United States, were engaged in struggling with the difficulties of producing a suitable carbon incandescence electric lamp. Edison constructed in 1879 a successful lamp of this type consisting of a vessel wholly of glass containing a carbon filament made by carbonizing paper or some other carbonizable material, the vessel being exhausted and the current led into the filament through platinum wires.

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[1] *A Treatise on Electricity and Magnetism* (2 vols.), by James Clerk Maxwell, sometime professor of experimental physics in the university of Cambridge. A second edition was edited by Sir W. D. Niven in 1881 and a third by Prof. Sir J. J. Thomson in 1891.

In 1879 and 1880, Edison in the United States, and Swan in conjunction with C. H. Stearn in England, succeeded in completely solving the practical problems. From and after that date incandescent electric lighting became commercially possible, and was brought to public notice chiefly by an electrical exhibition held at the Crystal Palace, near London, in 1882. Edison, moreover, as well as Lane-Fox, had realized the idea of a public electric supply station, and the former proceeded to establish in Pearl Street, New York, in 1881, the first public electric supply station. A similar station in England was opened in the basement of a house in Holborn Viaduct, London, in March 1882. Edison, with copious ingenuity, devised electric meters, electric mains, lamp fittings and generators complete for the purpose. In 1881 C. A. Faure made an important improvement in the lead secondary battery which G. Planté (1834–1889) had invented in 1859, and storage batteries then began to be developed as commercial appliances by Faure, Swan, J. S. Sellon and many others (see ACCUMULATOR). In 1882, numerous electric lighting companies were formed for the conduct of public and private lighting, but an electric lighting act passed in that year greatly hindered commercial progress in Great Britain. Nevertheless the delay was utilized in the completion of inventions necessary for the safe and economical distribution of electric current for the purpose of electric lighting.

Telephone.—Going back a few years we find the technical applications of electrical invention had developed themselves in other directions. Alexander Graham Bell in 1876 invented the speaking telephone (*q.v.*), and Edison and Elisha Gray in the United States followed almost immediately with other telephonic inventions for electrically transmitting speech. About the same time D. E. Hughes in England invented the microphone. In 1879 telephone exchanges began to be developed in the United States, Great Britain and other countries.

Electric Power.—Following on the discovery in 1873 of the reversible action of the dynamo and its use as a motor, efforts began to be made to apply this knowledge to transmission of power, and S. D. Field, T. A. Edison, Leo Daft, E. M. Bentley and W. H. Knight, F. J. Sprague, C. J. Van Depoele and others between 1880 and 1884 were the pioneers of electric traction. One of the earliest electric tram cars was exhibited by E. W. and W. Siemens in Paris in 1881. In 1883 Lucien Gaulard, following a line of thought opened by Jablochkov, proposed to employ high pressure alternating currents for electric distributions over wide areas by means of transformers. His ideas were improved by Carl Zipernowsky and O. T. Bláthy in Hungary and by S. Z. de Ferranti in England, and the alternating current transformer (see TRANSFORMERS) came into existence. Polyphase alternators were first exhibited at the Frankfort electrical exhibition in 1891, developed as a consequence of scientific researches by Galileo Ferraris (1847–1897), Nikola Tesla, M. O. von Dolivo-Dobrowolsky and C. E. L. Brown, and long distance transmission of electrical power by polyphase electrical currents (see POWER TRANSMISSION: *Electric*) was exhibited in operation at Frankfort in 1891. Meanwhile the early continuous current dynamos devised by Gramme, Siemens and others had been vastly improved in scientific principle and practical construction by the labours of Siemens, J. Hopkinson, R. E. B. Crompton, Elihu Thomson, Rudolf Eickemeyer, Thomas Parker and others, and the theory of the action of the dynamo had been closely studied by J. and E. Hopkinson, G. Kapp, S. P. Thompson, C. P. Steinmetz and J. Swinburne, and great improvements made in the alternating current dynamo by W. M. Mordey, S. Z. de Ferranti and Messrs Ganz of Budapest. Thus in twenty years from the invention of the Gramme dynamo, electrical engineering had developed from small beginnings into a vast industry. The amendment, in 1888, of the Electric Lighting Act of 1882, before long caused a huge development of public electric lighting in Great Britain. By the end of the 19th century every large city in Europe and in North and South America was provided with a public electric supply for the purposes of electric lighting. The various improvements in electric illuminants, such as the Nernst oxide lamp, the tantalum and osmium incandescent lamps, and improved forms of arc lamp, enclosed, inverted and flame arcs, are described under LIGHTING: *Electric.*

Between 1890 and 1900, electric traction advanced rapidly in the United States of America but more slowly in England. In 1902 the success of deep tube electric railways in Great Britain was assured, and in 1904 main line railways began to abandon, at least experimentally, the steam locomotive and substitute for it the electric transmission of power. Long distance electrical transmission had been before that time exemplified in the great scheme of utilizing the falls of Niagara. The first projects were discussed in 1891 and 1892 and completed practically some ten years later. In this scheme large turbines were placed at the bottom of hydraulic fall tubes 150 ft. deep, the turbines being coupled by long shafts with 5000 H.P. alternating current dynamos on the surface. By these electric current was generated and transmitted to towns and factories around, being sent overhead as far as Buffalo, a distance of 18 m. At the end of the 19th century electrochemical industries began to be developed which depended on the possession of cheap electric energy. The production of aluminium in Switzerland and Scotland, carborundum and calcium carbide in the United States, and soda by the Castner-Kellner process, began to be conducted on an immense scale. The early work of Sir W. Siemens on the electric furnace was continued and greatly extended by Henri Moissan and others on its scientific side, and electro-chemistry took its place as one of the most promising departments of technical research and invention. It was stimulated and assisted by improvements in the construction of large dynamos and increased knowledge concerning the control of powerful electric currents.

In the early part of the 20th century the distribution in bulk of electric energy for power purposes in Great Britain began to assume important proportions. It was seen to be uneconomical for each city and town to manufacture its own supply since, owing to the intermittent nature of the demand for current for lighting, the price had to be kept up to 4d. and 6d. per unit. It was found that by the manufacture in bulk, even by steam engines, at primary centres the cost could be considerably reduced, and in numerous districts in England large power stations began to be erected between 1903 and 1905 for the supply of current for power purposes. This involved almost a revolution in the nature of the tools used, and in the methods of working, and may ultimately even greatly affect the factory system and the concentration of population in large towns which was brought about in the early part of the 19th century by the invention of the steam engine.

Development of Electric Theory.

Turning now to the theory of electricity, we may note the equally remarkable progress made in 300 years in scientific insight into the nature of the agency which has so recast the face of human society. There is no need to dwell upon the early crude theories of the action of amber and lodestone. In a true scientific sense no hypothesis was possible, because few facts had been accumulated. The discoveries of Stephen Gray and C. F. de C. du Fay on the conductivity of some bodies for the electric agency and the dual character of electrification gave rise to the first notions of electricity as an imponderable fluid, or non-gravitative subtile matter, of a more refined and penetrating kind than ordinary liquids and gases. Its duplex character, and the fact that the electricity produced by rubbing glass and vitreous substances was different from that produced by rubbing sealing-wax and resinous substances, seemed to necessitate the assumption of two kinds of electric fluid; hence there arose the conception of *positive* and *negative* electricity, and the two-fluid theory came into existence.

Single-fluid Theory.—The study of the phenomena of the Leyden jar and of the fact that the inside and outside coatings possessed opposite electricities, so that in charging the jar as much positive electricity is added to one side as negative to the other led Franklin about 1750 to suggest a modification called the single fluid theory, in which the two states of electrification were regarded as not the results of two entirely different fluids but of the addition or subtraction of one electric fluid from matter, so that positive electrification was to be looked upon as the result of increase or addition of something to ordinary matter and negative as a subtraction. The positive and negative electrifications of the two coatings of the Leyden jar were therefore to be regarded as the result of a transformation of something called electricity from one coating to the other, by which process a certain measurable quantity became so much less on one side by the same amount by which it became more on the other. A modification of this single fluid theory was put forward by F. U. T. Aepinus which was explained and illustrated in his *Tentamen theoriae electricitatis et magnetismi*, published in St Petersburg in 1759. This theory was founded on the following principles:—(1) the particles of the electric fluid repel each other with a force decreasing as the distance increases; (2) the particles of the electric fluid attract the atoms of all bodies and are attracted by them with a force obeying the same law; (3) the electric fluid exists in the pores of all bodies, and while it moves without any obstruction in conductors such as metals, water, &c., it moves with extreme difficulty in so-called non-conductors such as glass, resin, &c.; (4) electrical phenomena are produced either by the transference of the electric fluid of a body containing more to one containing less, or from its attraction and repulsion when no transference takes place. Electric attractions and repulsions were, however, regarded as differential actions in which the mutual repulsion of the particles of electricity operated, so to speak, in antagonism to the mutual attraction of particles of matter for one another and of particles of electricity for matter. Independently of Aepinus, Henry Cavendish put forward a single-fluid theory of electricity (*Phil. Trans.*, 1771, 61, p. 584), in which he considered it in more precise detail.

Two-fluid Theory.—In the elucidation of electrical phenomena, however, towards the end of the 18th century, a modification of the two-fluid theory seems to have been generally preferred. The notion then formed of the nature of electrification was something as follows:—All bodies were assumed to contain a certain quantity of a so-called neutral fluid made up of equal quantities of positive and negative electricity, which when in this state of combination neutralized one another's properties. The neutral fluid could, however, be divided up or separated into its two constituents, and these could be accumulated on separate conductors or non-conductors. This view followed from the discovery of the facts of electric induction of J. Canton (1753, 1754). When, for instance, a positively electrified body was found to induce upon another insulated conductor a charge of negative electricity on the side nearest to it, and a charge of positive electricity on the side farthest from it, this was explained by saying that the particles of each of the two electric fluids repelled one another but attracted those of the positive fluid. Hence the operation of the positive charge upon the neutral fluid was to draw towards the positive the negative constituent of the neutral charge and repel to the distant parts of the conductor the positive constituent.

C. A. Coulomb experimentally proved that the law of attraction and repulsion of simple electrified bodies was that the force between them varied inversely as the square of the distance and thus gave mathematical definiteness to the two-fluid hypothesis. It was then assumed that each of the two constituents of the neutral fluid had an atomic structure and that the so-called particles of one of the electric fluids, say positive, repelled similar particles with a force varying inversely as a square of the distance and attracted those of the opposite fluid according to the same law. This fact and hypothesis brought electrical phenomena within the domain of mathematical analysis and, as already mentioned, Laplace, Biot, Poisson, G. A. A. Plana (1781–1846), and later Robert Murphy (1806–1843), made them the subject of their investigations on the mode in which electricity distributes itself on conductors when in equilibrium.

Faraday's Views.—The two-fluid theory may be said to have held the field until the time when Faraday began his researches on electricity. After he had educated himself by the study of the phenomena of lines of magnetic force in his discoveries on electromagnetic induction, he applied the same conception to electrostatic phenomena, and thus created the notion of lines of electrostatic force and of the important function of the dielectric or non-conductor in sustaining them. Faraday's notion as to the nature of electrification, therefore, about the middle of the 19th century came to be something as follows:—He considered that the so-called charge of electricity on a conductor was in reality nothing on the conductor or in the conductor itself, but consisted in a state of strain or polarization, or a physical change of some kind in the particles of the dielectric surrounding the conductor, and that it was this physical state in the dielectric which constituted electrification. Since Faraday was well aware that even a good vacuum can act as a dielectric, he recognized that the state he called dielectric polarization could not be wholly dependent upon the presence of gravitative matter, but that there must be an electromagnetic medium of a supermaterial nature. In the 13th series of his *Experimental Researches on Electricity* he discussed the relation of a vacuum to electricity. Furthermore his electrochemical investigations, and particularly his discovery of the important law of electrolysis, that the movement of a certain quantity of electricity through an electrolyte is always accompanied by the transfer of a certain definite quantity of matter from one electrode to another and the liberation at these electrodes of an equivalent weight of the ions, gave foundation for the idea of a definite atomic charge of electricity. In fact, long previously to Faraday's electrochemical researches, Sir H. Davy and J. J. Berzelius early in the 19th century had advanced the hypothesis that chemical combination was due to electric attractions between the electric charges carried by chemical atoms. The notion, however, that electricity is atomic in structure was definitely put forward by Hermann von Helmholtz in a well-known Faraday lecture. Helmholtz says: "If we accept the hypothesis that elementary substances are composed of atoms, we cannot well avoid concluding that electricity also is divided into elementary portions which behave like atoms of electricity."[1] Clerk Maxwell had already used in 1873 the phrase, "a molecule of electricity."[2] Towards the end of the third quarter of the 19th century it therefore became clear that electricity, whatever be its nature, was associated with atoms of matter in the form of exact multiples of an indivisible minimum electric charge which may be considered to be "Nature's unit of electricity." This ultimate unit of electric quantity Professor Johnstone Stoney called an *electron*.[3] The formulation of electrical theory as far as regards operations in space free from matter was immensely assisted by Maxwell's mathematical theory. Oliver Heaviside after 1880 rendered much assistance by reducing Maxwell's mathematical analysis to more compact form and by introducing greater precision into terminology (see his *Electrical Papers*, 1892). This is perhaps the place to refer also to the great services of Lord Rayleigh to electrical science. Succeeding Maxwell as Cavendish professor of physics at Cambridge in 1880, he soon devoted himself especially to the exact redetermination of the practical electrical units in absolute measure. He followed up the early work of the British Association Committee on electrical units by a fresh determination of the ohm in absolute measure, and in conjunction with other work on the electrochemical equivalent of silver and the absolute electromotive force of the Clark cell may be said to have placed exact electrical measurement on a new basis. He also made great additions to the theory of alternating electric currents, and provided fresh appliances for other electrical measurements (see his *Collected Scientific Papers*, Cambridge, 1900).

Electro-optics.—For a long time Faraday's observation on the rotation of the plane of polarized light by heavy glass in a magnetic field remained an isolated fact in electro-optics. Then M. E. Verdet (1824–1860) made a study of the subject and discovered that a solution of ferric perchloride in methyl alcohol rotated the plane of polarization in an opposite direction to heavy glass (*Ann. Chim. Phys.*, 1854, 41, p. 370; 1855, 43, p. 37; *Com. Rend.*, 1854, 39, p. 548). Later A. A. E. E. Kundt prepared metallic films of iron, nickel and cobalt, and obtained powerful negative optical rotation with them (*Wied. Ann.*, 1884, 23, p. 228; 1886, 27, p. 191). John Kerr (1824–1907) discovered that a similar effect was produced when plane polarized light was reflected from the pole of a powerful magnet (*Phil. Mag.*, 1877, [5], 3, p. 321, and 1878, 5, p. 161). Lord Kelvin showed that Faraday's discovery demonstrated that some form of rotation was taking place along lines of magnetic force when passing through a medium.[1] Many observers have given attention to the exact determination of Verdet's constant of rotation for standard substances, *e.g.* Lord Rayleigh for carbon bisulphide,[2] and Sir W. H. Perkin for an immense range of inorganic and organic bodies.[3] Kerr also discovered that when certain homogeneous dielectrics were submitted to electric strain, they became birefringent (*Phil. Mag.*, 1875, 50, pp. 337 and 446). The theory of electro-optics received great attention from Kelvin, Maxwell, Rayleigh, G. F. Fitzgerald, A. Righi and P. K. L. Drude, and experimental contributions from innumerable workers, such as F. T. Trouton, O. J. Lodge and J. L. Howard, and many others.

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[1] H. von Helmholtz, "On the Modern Development of Faraday's Conception of Electricity," *Journ. Chem. Soc.*, 1881, 39, p. 277.

[2] See Maxwell's *Electricity and Magnetism*, vol. i. p. 350 (2nd ed., 1881).

[3] "On the Physical Units of Nature," *Phil. Mag.*, 1881, [5], 11, p. 381. Also *Trans. Roy. Soc.* (Dublin, 1891), 4, p. 583.

Electric Waves.—In the decade 1880–1890, the most important advance in electrical physics was, however, that which originated with the astonishing researches of Heinrich Rudolf Hertz (1857–1894). This illustrious investigator was stimulated, by a certain problem brought to his notice by H. von Helmholtz, to undertake investigations which had for their object a demonstration of the truth of Maxwell's principle that a variation in electric displacement was in fact an electric current and had magnetic effects. It is impossible to describe here the details of these elaborate experiments; the reader must be referred to Hertz's own papers, or the English translation of them by Prof. D. E. Jones. Hertz's great discovery was an experimental realization of a suggestion made by G. F. Fitzgerald (1851–1901) in 1883 as to a method of producing electric waves in space. He invented for this purpose a radiator consisting of two metal rods placed in one line, their inner ends being provided with poles nearly touching and their outer ends with metal plates. Such an arrangement constitutes in effect a condenser, and when the two plates respectively are connected to the secondary terminals of an induction coil in operation, the plates are rapidly and alternately charged, and discharged across the spark gap with electrical oscillations (see ELECTROKINETICS). Hertz then devised a wave detecting apparatus called a resonator. This in its simplest form consisted of a ring of wire nearly closed terminating in spark balls very close together, adjustable as to distance by a micrometer screw. He found that when the resonator was placed in certain positions with regard to the oscillator, small sparks were seen between the micrometer balls, and when the oscillator was placed at one end of a room having a sheet of zinc fixed against the wall at the other end, symmetrical positions could be found in the room at which, when the resonator was there placed, either no sparks or else very bright sparks occurred at the poles. These effects, as Hertz showed, indicated the establishment of stationary electric waves in space and the propagation of electric and magnetic force through space with a finite velocity. The other additional phenomena he observed finally contributed an all but conclusive proof of the truth of Maxwell's views. By profoundly ingenious methods Hertz showed that these invisible electric waves could be reflected and refracted like waves of light by mirrors and prisms, and that familiar experiments in optics could be repeated with electric waves which could not affect the eye. Hence there arose a new science of electro-optics, and in all parts of Europe and the United States innumerable investigators took possession of the novel field of research with the greatest delight. O. J. Lodge,[4] A. Righi,[5] J. H. Poincaré,[6] V. F. K. Bjerknes, P. K. L. Drude, J. J. Thomson,[7] John Trowbridge, Max Abraham, and many others, contributed to its elucidation.

In 1892, E. Branly of Paris devised an appliance for detecting these waves which subsequently proved to be of immense importance. He discovered that they had the power of affecting the electric conductivity of materials when in a state of powder, the majority of metallic filings increasing in conductivity. Lodge devised a similar arrangement called a coherer, and E. Rutherford invented a magnetic detector depending on the power of electric oscillations to demagnetize iron or steel. The sum total of all these contributions to electrical knowledge had the effect of establishing Maxwell's principles on a firm basis, but they also led to technical inventions of the very greatest utility. In 1896 G. Marconi applied a modified and improved form of Branly's wave detector in conjunction with a novel form of radiator for the telegraphic transmission of intelligence through space without wires, and he and others developed this new form of telegraphy with the greatest rapidity and success into a startling and most useful means of communicating through space electrically without connecting wires.

Electrolysis.—The study of the transfer of electricity through liquids had meanwhile received much attention. The general facts and laws of electrolysis (*q.v.*) were determined experimentally by Davy and Faraday and confirmed by the researches of J. F. Daniell, R. W. Bunsen and Helmholtz. The modern theory of electrolysis grew up under the hands of R. J. E. Clausius, A. W. Williamson and F. W. G. Kohlrausch, and received a great impetus from the work of Svante Arrhenius, J. H. Van't Hoff, W. Ostwald, H. W. Nernst and many others. The theory of the ionization of salts in solution has raised much discussion amongst chemists, but the general fact is certain that electricity only moves through liquids in association with matter, and simultaneously involves chemical dissociation of molecular groups.

Discharge through Gases.—Many eminent physicists had an instinctive feeling that the study of the passage of electricity through gases would shed much light on the intrinsic nature of electricity. Faraday devoted to a careful examination of the phenomena the XIIIth series of his *Experimental Researches*, and among the older workers in this field must be particularly mentioned J. Plücker, J. W. Hittorf, A. A. de la Rive, J. P. Gassiot, C. F. Varley, and W. Spottiswoode and J. Fletcher Moulton. It has long been known that air and other gases at the pressure of the atmosphere were very perfect insulators, but that when they were rarefied and contained in glass tubes with platinum electrodes sealed through the glass, electricity could be passed through them under sufficient electromotive force and produced a luminous appearance known as the electric glow discharge. The so-called vacuum tubes constructed by H. Geissler (1815–1879) containing air, carbonic acid, hydrogen, &c., under a pressure of one or two millimetres, exhibit beautiful appearances when traversed by the high tension current produced by the secondary circuit of an induction coil. Faraday discovered the existence of a dark space round the negative electrode which is usually known as the "Faraday dark space." De la Rive added much to our knowledge of the subject, and J. Plücker and his disciple J. W. Hittorf examined the phenomena exhibited in so-called high vacua, that is, in exceedingly rarefied gases. C. F. Varley discovered the interesting fact that no current could be sent through the rarefied gas unless a certain minimum potential difference of the electrodes was excited. Sir William Crookes took up in 1872 the study of electric discharge through high vacua, having been led to it by his researches on the radiometer. The particular details of the phenomena observed will be found described in the article CONDUCTION, ELECTRIC (§ III.). The main fact discovered by researches of Plücker, Hittorf and Crookes was that in a vacuum tube containing extremely rarefied air or other gas, a luminous discharge takes place from the negative electrode which proceeds in lines normal to the surface of the negative electrode and renders phosphorescent both the glass envelope and other objects placed in the vacuum tube when it falls upon them. Hittorf made in 1869 the discovery that solid objects could cast shadows or intercept this cathode discharge. The cathode discharge henceforth engaged the attention of many physicists. Varley had advanced tentatively the hypothesis that it consisted in an actual projection of electrified matter from the cathode, and Crookes was led by his researches in 1870, 1871 and 1872 to embrace and confirm this hypothesis in a modified form and announce the existence of a fourth state of matter, which he called radiant matter, demonstrating by many beautiful and convincing experiments that there was an actual projection of material substance of some kind possessing inertia from the surface of the cathode. German physicists such as E. Goldstein were inclined to take another view. Sir J. J. Thomson, the successor of Maxwell and Lord Rayleigh in the Cavendish chair of physics in the university of Cambridge, began about the year 1899 a remarkable series of investigations on the cathode discharge, which finally enabled him to make a measurement of the ratio of the electric charge to the mass of the particles of matter projected from the cathode, and to show that this electric charge was identical with the atomic electric charge carried by a hydrogen ion in the act of electrolysis, but that the mass of the cathode particles, or "corpuscles" as he called them, was far less, viz. about $\frac{1}{1000}$th part of the mass of a hydrogen atom.[1] The subject was pursued by Thomson and the Cambridge physicists with great mathematical and experimental ability, and finally the conclusion was reached that in a high vacuum tube the electric charge is carried by particles which have a mass only a fraction, as above mentioned, of that of the hydrogen atom, but which carry a charge equal to the unit electric charge of the hydrogen ion as found by electrochemical researches.[2] P. E. A. Lenard made in 1894 (*Wied. Ann. Phys.*, 51, p. 225) the discovery that these cathode particles or corpuscles could pass through a window of thin sheet aluminium placed in the wall of the vacuum tube and give rise to a class of radiation called the Lenard rays. W. C. Röntgen of Munich made in 1896 his remarkable discovery of the so-called X or Röntgen rays, a class of radiation produced by the impact of the cathode particles against an impervious metallic screen or anticathode placed in the vacuum tube. The study of Röntgen rays was ardently pursued by the principal physicists in Europe during the years 1897 and 1898 and subsequently. The principal property of these Röntgen rays which attracted public attention was their power of passing through many solid bodies and affecting a photographic plate. Hence some substances were opaque to them and others transparent. The astonishing feat of photographing the bones of the living animal within the tissues soon rendered the Röntgen rays indispensable in surgery and directed an army of investigators to their study.

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[1] See Sir W. Thomson, *Proc. Roy. Soc. Lond.*, 1856, 8, p. 152; or Maxwell, *Elect. and Mag.*, vol. ii. p. 831.

[2] See Lord Rayleigh, *Proc. Roy. Soc. Lond.*, 1884, 37, p. 146; Gordon, *Phil. Trans.*, 1877, 167, p. 1; H Becquerel, *Ann. Chim. Phys.*, 1882, [3], 27, p. 312.

[3] Perkin's Papers are to be found in the *Journ. Chem. Soc. Lond.*, 1884, p. 421; 1886, p. 177; 1888, p. 561; 1889, p. 680; 1891, p. 981; 1892, p. 800; 1893, p. 75.

[4] *The Work of Hertz* (London, 1894).

[5] *L'Ottica delle oscillazioni elettriche* (Bologna, 1897).

[6] *Les Oscillations électriques* (Paris, 1894).

[7] *Recent Researches in Electricity and Magnetism* (Oxford, 1892).

Radioactivity.—One outcome of all this was the discovery by H. Becquerel in 1896 that minerals containing uranium, and particularly the mineral known as pitchblende, had the power of affecting sensitive photographic plates enclosed in a black paper envelope when the mineral was placed on the outside, as well as of discharging a charged electroscope (*Com. Rend.*, 1896, 122, p. 420). This research opened a way of approach to the phenomena of radioactivity, and the history of the steps by which P. Curie and Madame Curie were finally led to the discovery of radium is one of the most fascinating chapters in the history of science. The study of radium and radioactivity (see RADIOACTIVITY) led before long to the further remarkable knowledge that these so-called radioactive materials project into surrounding space particles or corpuscles, some of which are identical with those projected from the cathode in a high vacuum tube, together with others of a different nature. The study of radioactivity was pursued with great ability not only by the Curies and A. Debierne, who associated himself with them, in France, but by E. Rutherford and F. Soddy in Canada, and by J. J. Thomson, Sir William Crookes, Sir William Ramsay and others in England.

Electronic Theory.—The final outcome of these investigations was the hypothesis that Thomson's corpuscles or particles composing the cathode discharge in a high vacuum tube must be looked upon as the ultimate constituent of what we call negative electricity; in other words, they are atoms of negative electricity, possessing, however, inertia, and these negative electrons are components at any rate of the chemical atom. Each electron is a point-charge of negative electricity equal to $3{\cdot}9\times10^{-10}$ of an electrostatic unit or to $1{\cdot}3\times10^{-20}$ of an electromagnetic unit, and the ratio of its charge to its mass is nearly 2×10^7 using E.M. units. For the hydrogen atom the ratio of charge to mass as deduced from electrolysis is about 10^4. Hence the mass of an electron is $\frac{1}{2000}$th of that of a hydrogen atom. No one has yet been able to isolate positive electrons, or to give a complete demonstration that the whole inertia of matter is only electric inertia due to what may be called the inductance of the electrons. Prof. Sir J. Larmor developed in a series of very able papers (*Phil. Trans.*, 1894, 185, 1895, 186; 1897, 190), and subsequently in his book *Aether and Matter* (1900), a remarkable hypothesis of the structure of the electron or corpuscle, which he regards as simply a strain centre in the aether or electromagnetic medium, a chemical atom being a collection of positive and negative electrons or strain centres in stable orbital motion round their common centre of mass (see AETHER). J. J. Thomson also developed this hypothesis in a profoundly interesting manner, and we may therefore summarize very briefly the views held on the nature of electricity and matter at the beginning of the 20th century by saying that the term electricity had come to be regarded, in part at least, as a collective name for electrons, which in turn must be considered as constituents of the chemical atom, furthermore as centres of certain lines of self-locked and permanent strain existing in the universal aether or electromagnetic medium. Atoms of matter are composed of congeries of electrons and the inertia of matter is probably therefore only the inertia of the electromagnetic medium.[1] Electric waves are produced wherever electrons are accelerated or retarded, that is, whenever the velocity of an electron is changed or accelerated positively or negatively. In every solid body there is a continual atomic dissociation, the result of which is that mixed up with the atoms of chemical matter composing them we have a greater or less percentage of free electrons. The operation called an electric current consists in a diffusion or movement of these electrons through matter, and this is controlled by laws of diffusion which are similar to those of the diffusion of liquids or gases. Electromotive force is due to a difference in the density of the electronic population in different or identical conducting bodies, and whilst the electrons can move freely through so-called conductors their motion is much more hindered or restricted in non-conductors. Electric charge consists, therefore, in an excess or deficit of negative electrons in a body. In the hands of H. A. Lorentz, P. K. L. Drude, J. J. Thomson, J. Larmor and many others, the electronic hypothesis of matter and of electricity has been developed in great detail and may be said to represent the outcome of modern researches upon electrical phenomena.

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[1] See J. J. Thomson, *Proc. Roy. Inst. Lond.*, 1897, 15, p. 419; also *Phil. Mag.*, 1899, [5], 48, p. 547.

[2] Later results show that the mass of a hydrogen atom is not far from $1{\cdot}3\times10^{-24}$ gramme and that the unit atomic charge or natural unit of electricity is $1{\cdot}3\times10^{-20}$ of an electromagnetic C.G.S. unit. The mass of the electron or corpuscle is $7{\cdot}0\times10^{-28}$ gramme and its diameter is 3×10^{-13} centimetre. The diameter of a chemical atom is of the order of 10^{-8} centimetre.

See H. A. Lorentz, "The Electron Theory," *Elektrotechnische Zeitschrift*, 1905, 26, p. 584; or *Science Abstracts*, 1905, 8, A, p. 603.

[1] See J. J. Thomson, *Electricity and Matter* (London, 1904).

The reader may be referred for an admirable summary of the theories of electricity prior to the advent of the electronic hypothesis to J. J. Thomson's "Report on Electrical Theories" (*Brit. Assoc. Report*, 1885), in which he divides electrical theories enunciated during the 19th century into four classes, and summarizes the opinions and theories of A. M. Ampère, H. G. Grassman, C. F. Gauss, W. E. Weber, G. F. B. Riemann, R. J. E. Clausius, F. E. Neumann and H. von Helmholtz.

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ELECTRICITY SUPPLY. I. *General Principles.*—The improvements made in the dynamo and electric motor between 1870 and 1880 and also in the details of the arc and incandescent electric lamp towards the close of that decade, induced engineers to turn their attention to the question of the private and public supply of electric current for the purpose of lighting and power. T. A. Edison[1] and St G. Lane Fox[2] were among the first to see the possibilities and advantages of public electric supply, and to devise plans for its practical establishment. If a supply of electric current has to be furnished to a building the option exists in many cases of drawing from a public supply or of generating it by a private plant.

Private Plants.—In spite of a great amount of ingenuity devoted to the development of the primary battery and the thermopile, no means of generation of large currents can compete in economy with the dynamo. Hence a private electric generating plant involves the erection of a dynamo which may be driven either by a steam, gas or oil engine, or by power obtained by means of a turbine from a low or high fall of water. It may be either directly coupled to the motor, or driven by a belt; and it may be either a continuous-current machine or an alternator, and if the latter, either single-phase or polyphase. The convenience of being able to employ storage batteries in connexion with a private-supply system is so great that unless power has to be transmitted long distances, the invariable rule is to employ a continuous-current dynamo. Where space is valuable this is always coupled direct to the motor; and if a steam-engine is employed, an enclosed engine is most cleanly and compact. Where coal or heating gas is available, a gas-engine is exceedingly convenient, since it requires little attention. Where coal gas is not available, a Dowson gas-producer can be employed. The oil-engine has been so improved that it is extensively used in combination with a direct-coupled or belt-driven dynamo and thus forms a favourite and easily-managed plant for private electric lighting. Lead storage cells, however, as at present made, when charged by a steam-driven dynamo deteriorate less rapidly than when an oil-engine is employed, the reason being that the charging current is more irregular in the latter case, since the single cylinder oil-engine only makes an impulse every other revolution. In connexion with the generator, it is almost the invariable custom to put down a secondary battery of storage cells, to enable the supply to be given after the engine has stopped. This is necessary, not only as a security for the continuity of supply, but because otherwise the costs of labour in running the engine night and day become excessive. The storage battery gives its supply automatically, but the dynamo and engine require incessant skilled attendance. If the building to be lighted is at some distance from the engine-house the battery should be placed in the basement of the building, and underground or overhead conductors, to convey the charging current, brought to it from the dynamo.

It is usual, in the case of electric lighting installations, to reckon all lamps in their equivalent number of 8 candle power (c.p.) incandescent lamps. In lighting a private house or building, the first thing to be done is to settle the total number of incandescent lamps and their size, whether 32 c.p., 16 c.p. or 8 c.p. Lamps of 5 c.p. can be used with advantage in small bedrooms and passages. Each candle-power in the case of a carbon filament lamp can be taken as equivalent to 3·5 watts, or the 8 c.p. lamp as equal to 30 watts, the 16 c.p. lamp to 60 watts, and so on. In the case of metallic filament lamps about 1·0 or 1·25 watts. Hence if the equivalent of 100 carbon filament 8 c.p. lamps is required in a building the maximum electric power-supply available must be 3000 watts or 3 kilowatts. The next matter to consider is the pressure of supply. If the battery can be in a position near the building to be lighted, it is best to use 100-volt incandescent lamps and enclosed arc lamps, which can be worked singly off the 100-volt circuit. If, however, the lamps are scattered over a wide area, or in separate buildings somewhat far apart, as in a college or hospital, it may be better to select 200 volts as the supply pressure. Arc lamps can then be worked three in series with added resistance. The third step is to select the size of the dynamo unit and the amount of spare plant. It is desirable that there should be at least three dynamos, two of which are capable of taking the whole of the full load, the third being reserved to replace either of the others when required. The total power to be absorbed by the lamps and motors (if any) being given, together with an allowance for extensions, the size of the dynamos can be settled, and the power of the engines required to drive them determined. A good rule to follow is that the indicated horse-power (I.H.P.) of the engine should be double the dynamo full-load output in kilowatts; that is to say, for a 10-kilowatt dynamo an engine should be capable of giving 20 indicated (not nominal) H.P. From the I.H.P. of the engine, if a steam engine, the size of the boiler required for steam production becomes known. For small plants it is safe to reckon that, including water waste, boiler capacity should be provided equal to evaporating 40 lb of water per hour for every I.H.P. of the engine. The locomotive boiler is a convenient form; but where large amounts of steam are required, some modification of the Lancashire boiler or the water-tube boiler is generally adopted. In settling the electromotive force of the dynamo to be employed, attention must be paid to the question of charging secondary cells, if these are used. If a secondary battery is employed in connexion with 100-volt lamps, it is usual to put in 53 or 54 cells. The electromotive force of these cells varies between 2·2 and 1·8 volts as they discharge; hence the above number of cells is sufficient for maintaining the necessary electromotive force. For charging, however, it is necessary to provide 2·5 volts per cell, and the dynamo must therefore have an electromotive force of 135 volts, *plus* any voltage required to overcome the fall of potential in the cable connecting the dynamo with the secondary battery. Supposing this to be 10 volts, it is safe to install dynamos having an electromotive force of 150 volts, since by means of resistance in the field circuits this electromotive force can be lowered to 110 or 115 if it is required at any time to dispense with the battery. The size of the secondary cell will be determined by the nature of the supply to be given after the dynamos have been stopped. It is usual to provide sufficient storage capacity to run all the lamps for three or four hours without assistance from the dynamo.

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[1] British Patent Specification, No. 5306 of 1878, and No. 602 of 1880.

[2] *Ibid.* No. 3988 of 1878.

As an example taken from actual practice, the following figures give the capacity of the plant put down to supply 500 8 c.p. lamps in a hospital. The dynamos were 15-unit machines, having a full-load capacity of 100 amperes at 150 volts, each coupled direct to an engine of 25 H.P.; and a double plant of this description was supplied from two steel locomotive boilers, each capable of evaporating 800 lb of water per hour. One dynamo during the day was used for charging the storage battery of 54 cells; and at night the discharge from the cells, together with the current from one of the dynamos, supplied the lamps until the heaviest part of the load had been taken; after that the current was drawn from the batteries alone. In working such a plant it is necessary to have the means of varying the electromotive force of the dynamo as the charging of the cells proceeds. When they are nearly exhausted, their electromotive force is less than 2 volts; but as the charging proceeds, a counter-electromotive force is gradually built up, and the engineer-in-charge has to raise the voltage of the dynamo in order to maintain a constant charging current. This is effected by having the dynamos designed to give normally the highest E.M.F. required, and then inserting resistance in their field circuits to reduce it as may be necessary. The space and attendance required for an oil-engine plant are much less than for a steam-engine.

Public Supply.—The methods at present in successful operation for public electric supply fall into two broad divisions:—(1) continuous-current systems and (2) alternating-current systems. Continuous-current systems are either low- or high-pressure. In the former the current is generated by dynamos at some pressure less than 500 volts, generally about 460 volts, and is supplied to users at half this pressure by means of a three-wire system (see below) of distribution, with or without the addition of storage batteries.

Low-pressure continuous supply.

The general arrangements of a low-pressure continuous-current town supply station are as follows:—If steam is the motive power selected, it is generated under all the best conditions of economy by a battery of boilers, and supplied to engines which are now almost invariably coupled direct, each to its own dynamo, on one common bedplate; a multipolar dynamo is most usually employed, coupled direct to an enclosed engine. Parsons or Curtis steam turbines (see STEAM-ENGINE) are frequently selected, since experience has shown that the costs of oil and attendance are far less for this type than for the reciprocating engine, whilst the floor space and, therefore, the building cost are greatly reduced. In choosing the size of unit to be adopted, the engineer has need of considerable experience and discretion, and also a full knowledge of the nature of the public demand for electric current. The rule is to choose as large units as possible, consistent with security, because they are proportionately more economical than small ones. The over-all efficiency of a steam dynamo—that is, the ratio between the electrical power output, reckoned say in kilowatts, and the I.H.P. of the engine, reckoned in the same units—is a number which falls rapidly as the load decreases, but at full load may reach some such value as 80 or 85%. It is common to specify the efficiency, as above defined, which must be attained by the plant at full-load, and also the efficiencies at quarter- and half-load which must be reached or exceeded. Hence in the selection of the size of the units the engineer is guided by the consideration that whatever units are in use shall be as nearly as possible fully loaded. If the demand on the station is chiefly for electric lighting, it varies during the hours of the day and night with tolerable regularity. If the output of the station, either in amperes or watts, is represented by the ordinates of a curve, the abscissae of which represent the hours of the day, this load diagram for a supply station with lighting load only, is a curve such as is shown in fig. 1, having a high peak somewhere between 6 and 8 P.M. The area enclosed by this load-diagram compared with the area of the circumscribing rectangle is called the *load-factor* of the station. This varies from day to day during the year, but on the average for a simple lighting load is not generally above 10 or 12%, and may be lower. Thus the total output from the station is only some 10% on an average of that which it would be if the supply were at all times equal to the maximum demand. Roughly speaking, therefore, the total output of an electric supply station, furnishing current chiefly for electric lighting, is at best equal to about two hours' supply during the day at full load. Hence during the greater part of the twenty-four hours a large part of the plant is lying idle. It is usual to provide certain small sets of steam dynamos, called the daylight machines, for supplying the demand during the day and later part of the evening, the remainder of the machines being called into requisition only for a short time. Provision must be made for sufficient reserve of plant, so that the breakdown of one or more sets will not cripple the output of the station.

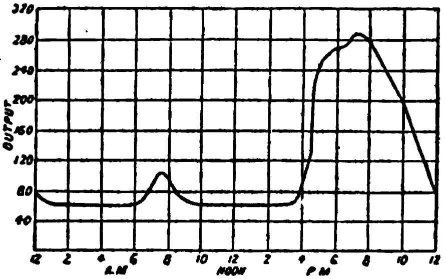


FIG. 1.

Three-wire system.

Assuming current to be supplied at about 460 volts by different and separate steam dynamos, Dy_1, Dy_2 (fig. 2), the machines are connected through proper amperemeters and voltmeters with *omnibus bars*, O_1, O_2, O_3, on a main switchboard, so that any dynamo can be put in connexion or removed. The switchboard is generally divided into three parts—one panel for the connexions of the positive feeders, F_1, with the positive terminals of the generators; one for the negative feeders, F_2, and negative generator terminals; while from the third (or middle-wire panel) proceed an equal number of middle-wire feeders, F_3. These sets of conductors are led out into the district to be supplied with current, and are there connected into a distributing system, consisting of three separate insulated conductors, D_1, D_2, D_3, respectively called the positive, middle and negative distributing mains. The lamps in the houses, H_1, H_2, &c., are connected between the middle and negative, and the middle and positive, mains by smaller supply and service wires. As far as possible the numbers of lamps installed on the two sides of the system are kept equal; but since it is not possible to control the consumption of current, it becomes necessary to provide at the station two small dynamos called the *balancing machines*, B_1, B_2, connected respectively between the middle and positive and the middle and negative omnibus bars. These machines may have their shafts connected together, or they may be driven by separate steam dynamos; their function is to supply the difference in the total current circulating through the whole of the lamps respectively on the two opposite sides of the middle wire. If storage batteries are employed in the station, it is usual to install two complete batteries, S_1, S_2,

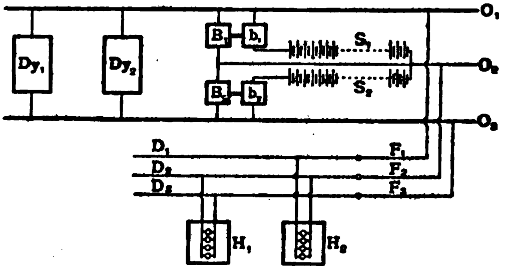
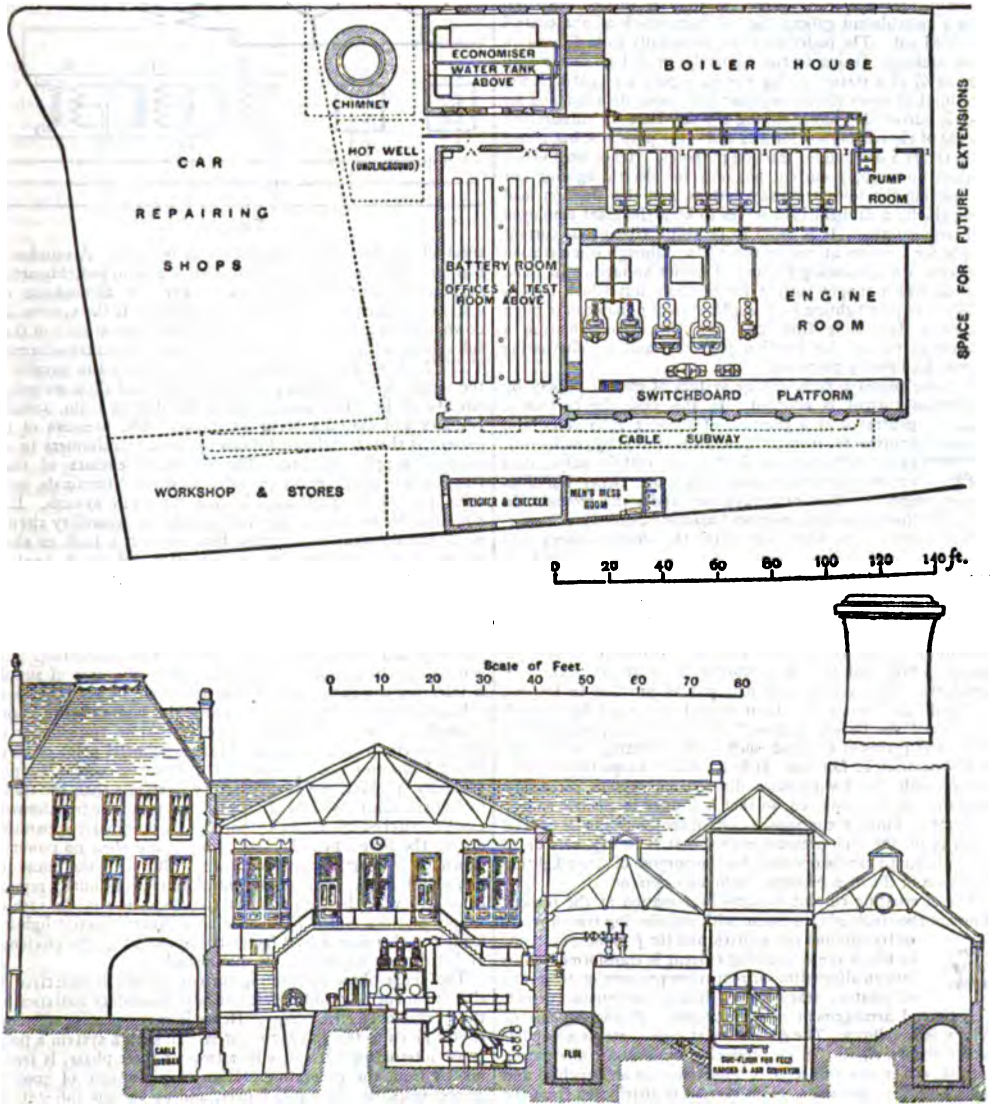


FIG. 2.

which are placed in a separate battery room and connected between the middle omnibus bar and the two outer omnibus bars. The extra electromotive force required to charge these batteries is supplied by two small dynamos b_1, b_2, called *boosters*. It is not unusual to join together the two balancing dynamos and the two boosters on one common bedplate, the shafts being coupled and in line, and to employ the balancing machines as electromotors to drive the boosters as required. By the use of *reversible boosters*, such as those made by the Lancashire Dynamo & Motor Company under the patents of Turnbull & McLeod, having four field windings on the booster magnets (see *The Electrician*, 1904, p. 303), it is possible to adjust the relative duty of the dynamos and battery so that the load on the supply dynamos is always constant. Under these conditions the main engines can be worked all the time at their maximum steam economy and a smaller engine plant employed. If the load in the station rises above the fixed amount, the batteries discharge in parallel with the station dynamos; if it falls below, the batteries are charged and the station dynamos take the external load.

The general arrangements of a low-pressure supply station are shown in figs. 3 and 4. It consists of a boiler-house containing a bank of boilers, either Lancashire or Babcock & Wilcox being generally used (see BOILER), which furnish steam to the engines



From *The Electrician*.

FIGS. 3 and 4.—Low-pressure Supply Station.

and dynamos, provision being made by duplicate steam-pipes or a ring main so that the failure of a single engine or dynamo does not cripple the whole supply.

Generating stations.

The furnace gases are taken through an economizer (generally Green's) so that they give up their heat to the cold feed water. If condensing water is available the engines are worked condensing, and this is an essential condition of economy when steam turbines are employed. Hence, either a condensing water pond or a cooling tower has to be provided to cool the condensing water and enable it to be used over and over again. Preferably the station should be situated near a river or canal and a railway siding. The steam dynamos are generally arranged in an engine-room so as to be overlooked from a switchboard gallery (fig. 3), from which all the control is carried out. The boiler furnaces are usually stoked by automatic stokers. Owing to the relatively small load factor (say 8 or 10%) of a station giving electric supply for lighting only, the object of every station engineer is to cultivate a demand for electric current for power during the day-time by encouraging the use of electric motors for lifts and other purposes, but above all to create a demand for traction purposes. Hence most urban stations now supply current not only for electric lighting but for running the town tramway system, and this traction load being chiefly a daylight load serves to keep the plant employed and remunerative. It is usual to furnish a continuous current supply for traction at 500 or 600 volts, although some station engineers are advocating the use of higher voltages. In those stations which supply current for traction, but which have a widely scattered lighting load, *double current* dynamos are often employed, furnishing from one and the same armature a continuous current for traction purposes, and an alternating current for lighting purposes.

High-pressure continuous supply.

In some places a high voltage system of electric supply by continuous current is adopted. In this case the current is generated at a pressure of 1000 or 2000 volts, and transmitted from the generating station by conductors, called high-pressure feeders, to certain sub-centres or transformer centres, which are either buildings above ground or cellars or excavations under the ground. In these transformer centres are placed machines, called *continuous-current transformers*, which transform the electric energy and create a secondary electric current at a lower pressure, perhaps 100 or 150 volts, to be supplied by distributing mains to users (see Transformers). From these sub-centres insulated conductors are run back to the generating station, by which the engineer can start or stop the continuous-current rotatory transformers, and at the same time inform himself as to their proper action and the electromotive force at the secondary terminals. This system was first put in practice in Oxford, England, and hence has been sometimes called by British engineers "the Oxford system." It is now in operation in a number of places in England, such as Wolverhampton, Walsall, and Shoreditch in London. It has the advantage that in connexion with the low-pressure distributing system secondary batteries can be employed, so that a storage of electric energy is effected. Further, continuous-current arc lamps can be worked in series off the high-pressure mains, that is to say, sets of 20 to 40 arc lamps can be operated for the purpose of street lighting by means of the high-pressure continuous current.

Alternating supply.

The alternating current systems in operation at the present time are the *single-phase* system, with distributing transformers or transformer sub-centres, and the *polyphase* systems, in which the alternating current is transformed down into an alternating current of low pressure, or, by means of rotatory transformers, into a continuous current. The general arrangement of a *single-phase* alternating-current system is as follows: The generating station contains a number of alternators, A_1 A_2 (fig. 5), producing single-phase alternating current, either at 1000, 2000, or sometimes, as at Deptford and other places, 10,000 volts. This current is distributed from the station either at the pressure at which it is generated, or after being transformed up to a higher pressure by the transformer T. The alternators are sometimes worked in parallel, that is to say, all furnish their current to two common omnibus bars on a high-pressure switchboard, and each is switched into circuit at the moment when it is brought into step with the other machines, as shown by some form of *phase-indicator*. In some cases, instead of the high-pressure feeders starting from omnibus bars, each alternator works independently and the feeders are grouped together on the various alternators as required. A number of high-pressure feeders are carried from the main switchboard to various transformer sub-centres or else run throughout the district to which current is to be furnished. If the system laid down is the transformer sub-centre system, then at each of these sub-centres is placed a battery of alternating-current transformers, T_1 T_2 T_3, having their primary circuits all joined in parallel to the terminals of the high-pressure feeders, and their secondary circuits all joined in parallel on a distributing main, suitable switches and cut-outs being interposed. The pressure of the current is then transformed down by these transformers to the required supply pressure. The secondary circuits of these transformers are generally provided with three terminals, so as to supply the low-pressure side on a three-wire system. It is not advisable to connect together directly the secondary circuits of all the different sub-centres, because then a fault or short circuit on one secondary system affects all the others. In banking together transformers in this manner in a sub-station it is necessary to take care that the transformation ratio and secondary drop (see Transformers) are exactly the same, otherwise one transformer will take more than its full share of the load and will become overheated. The transformer sub-station system can only be adopted where the area of supply is tolerably compact. Where the consumers lie scattered over a large area, it is necessary to carry the high-pressure mains throughout the area, and to place a separate transformer or transformers in each building. From a financial point of view, this "house-to-house system" of alternating-current supply, generally speaking, is less satisfactory in results than the transformer sub-centre system. In the latter some of the transformers can be switched off, either by hand or by automatic apparatus, during the time when the load is light, and then no power is expended in magnetizing their cores. But with the house-to-house system the whole of the transformers continually remain connected with the high-pressure circuits; hence in the case of supply stations which have only an ordinary electric lighting load, and therefore a load-factor not above 10%, the efficiency of distribution is considerably diminished.

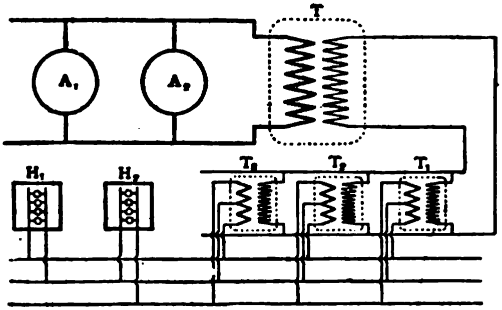


Fig. 5.

The single-phase alternating-current system is defective in that it cannot be readily combined with secondary batteries for the storage of electric energy. Hence in many places preference is now given to the *polyphase system*. In such a system a polyphase alternating current, either two- or three-phase, is transmitted from the generating station at a pressure of 5000 to 10,000 volts, or sometimes higher, and at various sub-stations is transformed down, first by static transformers into an alternating current of lower pressure, say 500 volts, and then by means of rotatory transformers into a continuous current of 500 volts or lower for use for lighting or traction.

In the case of large cities such as London, New York, Chicago, Berlin and Paris the use of small supply stations situated in the interior of the city has gradually given way to the establishment of large supply stations outside the area; in these alternating current is generated on the single or polyphase system at a high voltage and transmitted by underground cables to sub-stations in the city, at which it is transformed down for distribution for private and public electric lighting and for urban electric traction.

Owing to the high relative cost of electric power when generated in small amounts and the great advantages of generating it in proximity to coal mines and waterfalls, the supply of electric power in bulk to small towns and manufacturing districts has become a great feature in modern electrical engineering. In Great Britain, where there is little useful water power but abundance of coal, electric supply stations for supply in bulk have been built in the coal-producing districts of South Wales, the Midlands, the Clyde valley and Yorkshire. In these cases the current is a polyphase current generated at a high voltage, 5000 to 10,000 volts, and sometimes raised again in pressure to 20,000 or 40,000 volts and transmitted by overhead lines to the districts to be supplied. It is there reduced in voltage by transformers and employed as an alternating current, or is used to drive polyphase motors coupled to direct current generators to reproduce the power in continuous current form. It is then distributed for local lighting, street or railway traction, driving motors, and metallurgical or electro-chemical applications. Experience has shown that it is quite feasible to distribute in all directions for 25 miles round a high-pressure generating station, which thus supplies an area of nearly 2000 sq. m. At such stations, employing large turbine engines and alternators, electric power may be generated at a works cost of 0·375d. per kilowatt (K.W.), the coal cost being less than 0·125d. per K.W., and the selling price to large load-factor users not more than 0·5d. per K.W. The average price of supply from the local generating stations in towns and cities is from 3d. to 4d. per unit, electric energy for power and heating being charged at a lower rate than that for lighting only.

Conductors.

We have next to consider the structure and the arrangement of the conductors employed to convey the currents from their place of creation to that of utilization. The conductors themselves for the most part consist of copper having a conductivity of not less than 98% according to Matthiessen's standard. They are distinguished as (1) *External conductors*, which are a part of the public supply and belong to the corporation or company supplying the electricity; (2) *Internal conductors*, or house wiring, forming a part of the structure of the house or building supplied and usually the property of its owner.

External conductors.

The external conductors may be overhead or underground. *Overhead* conductors may consist of bare stranded copper cables carried on porcelain insulators mounted on stout iron or wooden poles. If the current is a high-pressure one, these insulators must be carefully tested, and are preferably of the pattern known as oil insulators. In and near towns it is necessary to employ insulated overhead conductors, generally india-rubber-covered stranded copper cables, suspended by leather loops from steel bearer wires which take the weight. The British Board of Trade have issued elaborate rules for the construction of overhead lines to transmit large electric currents. Where telephone and telegraph wires pass over such overhead electric lighting wires, they have to be protected from falling on the latter by means of guard wires.

By far the largest part, however, of the external electric distribution is now carried out by *underground conductors*, which are either bare or insulated. Bare copper conductors may be carried underground in culverts or chases, air being in this case the insulating material, as in the overhead system. A culvert and covered chase is constructed under the road or side-walk, and properly shaped oak crossbars are placed in it carrying glass or porcelain insulators, on which stranded copper cables, or, preferably, copper strips placed edgeways, are stretched and supported. The advantages of this method of construction are cheapness and the ease with which connexions can be made with service-lines for house supply; the disadvantages are the somewhat large space in which coal-gas leaking out of gas-pipes can accumulate, and the difficulty of keeping the culverts at all times free from rain-water. Moisture has a tendency to collect on the negative insulators, and hence to make a dead earth on the negative side of the main; while unless the culverts are well ventilated, explosions from mixtures of coal-gas and air are liable to occur. Insulated cables are insulated either with a material which is in itself waterproof, or with one which is only waterproof in so far as it is enclosed in a waterproof tube, *e.g.* of lead. Gutta-percha and india-rubber are examples of materials of the former kind. Gutta-percha, although practically everlasting when in darkness and laid under water, as in the case of submarine cables, has not been found satisfactory for use with large systems of electric distribution, although much employed for telephone and telegraph work. Insulated underground external conductors are of three types:—(*a*) *Insulated Cables drawn into Pipes.*—In this system of distribution cast-iron or stoneware pipes, or special stoneware conduits, or conduits made of a material called bitumen concrete, are first laid underground in the street. These contain a number of holes or "ways," and at intervals drawing-in boxes are placed which consist of a brick or cast-iron box having a water-tight lid, by means of which access is gained to a certain section of the conduit. Wires are used to draw in the cables, which are covered with either india-rubber or lead, the copper being insulated by means of paper, impregnated jute, or other similar material. The advantages of a drawing-in system are that spare ways can be left when the conduits are put in, so that at a future time fresh cables can be added without breaking up the roadway. (*b*) *Cables in Bitumen.*—One of the earliest systems of distribution employed by T. A. Edison consisted in fixing two segment-shaped copper conductors in a steel tube, the interspace between the conductors and the tube being filled in with a bitumen compound. A later plan is to lay down an iron trough, in which the cables are supported by wooden bearers at proper distances, and fill in the whole with natural bitumen. This system has been carried out extensively by the Callendar Cable Company. Occasionally concentric lead-covered and armoured cables are laid in this way, and then form an expensive but highly efficient form of insulated conductor. In selecting a system of distribution regard must be paid to the nature of the soil in which the cables are laid. Lead is easily attacked by soft water, although under some conditions it is apparently exceedingly durable, and an atmosphere containing coal-gas is injurious to india-rubber. (*c*) *Armoured Cables.*—In a very extensively used system of distribution armoured cables are employed. In this case the copper conductors, two, three or more in number, may be twisted together or arranged concentrically, and insulated by means of specially prepared jute or paper insulation, overlaid with a continuous tube of lead. Over the lead, but separated by a hemp covering, is put a steel armour consisting of two layers of steel strip, wound in opposite directions and kept in place by an external covering. Such a cable can be laid directly in the ground without any preparation other than the excavation of a simple trench, junction-boxes being inserted at intervals to allow of branch cables being taken off. The armoured cable used is generally of the concentric pattern (fig. 6). It consists of a stranded copper cable composed of a number of wires twisted together and overlaid with an insulating material. Outside this a tubular arrangement of copper wires and a second layer of insulation, and finally a protective covering of lead and steel wires or armour are placed. In some cases three concentric cylindrical conductors are formed by twisting wires or copper strips with insulating material between. In others two or three cables of stranded copper are embedded in insulating material and included in a lead sheath. This last type of cable is usually called a *two-* or *three-core* pattern cable (fig. 7).

The arrangement and nature of the external conductors depends on the system of electric supply in which they are used. In the case of continuous-current supply for incandescent electric lighting and motive power in small units, when the external conductors are laid down on the three-wire system, each main or branch cable in the street consists of a set of three conductors called the positive, middle and negative. Of these triple conductors some run from the supply station to various points in the area of supply without being tapped, and are called the *feeders*; others, called the *distributing mains*, are used for making connexions with the service lines of the consumers, one service line, as already explained, being connected to the middle conductor, and the other to either the positive or the negative one. Since the middle conductor serves to convey only the difference between the currents being used on the two sides of the system, it is smaller in section than the positive and negative ones. In laying out the system great judgment has to be exercised as to the selection of the points of attachment of the feeders to the distributing mains, the object being to keep a constant electric pressure or voltage between the two service-lines in all the houses independently of the varying demand for current. Legally the suppliers are under regulations to keep the supply voltage constant within 4% either way above or below the standard pressure. As a matter of fact very few stations do maintain such good regulation. Hence a considerable variation in the light given by the incandescent lamps is observed, since the candle-power of carbon glow lamps varies as the fifth or sixth power of the voltage of supply, *i.e.* a variation of only 2% in the supply pressure affects the resulting candle-power of the lamps to the extent of 10 or 12%. This variation is, however, less in the case of metallic filament lamps (see LIGHTING: *Electric*). In the service-lines are inserted the meters for measuring the electric energy supplied to the customer (see METER, ELECTRIC).

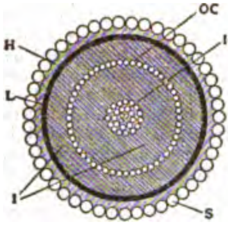


FIG. 6.—Armoured Concentric Cable (Section).

IC, Inner conductor.
OC, Outer conductor.
I, Insulation.
L, Lead sheath.
S, Steel armour.
H, Hemp covering.

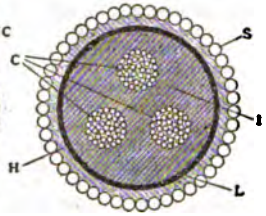


FIG. 7.—Triple Conductor Armoured Cable (Section).

C, Copper conductor.
I, Insulation.
L, Lead sheath.
H, Hemp covering.
S, Steel armour.

Interior wiring.

In the interior of houses and buildings the conductors generally consist of india-rubber-covered cables laid in wood casing. The copper wire must be tinned and then covered, first with a layer of unvulcanized pure india-rubber, then with a layer of vulcanized rubber, and lastly with one or more layers of protective cotton twist or tape. No conductor of this character employed for interior house-wiring should have a smaller insulation resistance than 300 megohms per mile when tested with a pressure of 600 volts after soaking 24 hours in water. The wood casing should, if placed in damp positions or under plaster, be well varnished with waterproof varnish. As far as possible all joints in the run of the cable should be avoided by the use of the so-called looping-in system, and after the wiring is complete, careful tests for insulation should be made. The Institution of Electrical Engineers of Great Britain have drawn up rules to be followed in interior house-wiring, and the principal Fire Insurance offices, following the lead of the Phoenix Fire Office, of London, have made regulations which, if followed, are a safeguard against bad workmanship and resulting possibility of damage by fire. Where fires having an electric origin have taken place, they have invariably been traced to some breach of these rules. Opinions differ, however, as to the value and security of this method of laying interior conductors in buildings, and two or three alternative systems have been much employed. In one of these, called the *interior conduit* system, highly insulating waterproof and practically fireproof tubes or conduits replace the wooden casing; these, being either of plain insulating material, or covered with brass or steel armour, may be placed under plaster or against walls. They are connected by bends or joint-boxes. The insulated wires being drawn into them, any short circuit or heating of the wire cannot give rise to a fire, as it can only take place in the interior of a non-inflammable tube. A third system of electric light wiring is the safety concentric system, in which concentric conductors are used. The inner one, which is well insulated, consists of a copper-stranded cable. The outer may be a galvanized iron strand, a copper tape or braid, or a brass tube, and is therefore necessarily connected with the earth. A fourth system consists in the employment of twin insulated wires twisted together and sheathed with a lead tube; the conductor thus formed can be fastened by staples against walls, or laid under plaster or floors.

The general arrangement for distributing current to the different portions of a building for the purpose of electric lighting is to run up one or more rising mains, from which branches are taken off to distributing boxes on each floor, and from these boxes to carry various branch circuits to the lamps. At the distributing boxes are collected the cut-outs and switches controlling the various circuits. When alternating currents are employed, it is usual to select as a type of conductor either twin-twisted conductor or concentric; and the employment of these types of cable, rather than two separate cables, is essential in any case where there are telephone or telegraph wires in proximity, for otherwise the alternating current would create inductive disturbances in the telephone circuit. The house-wiring also comprises the details of *switches* for controlling the lamps, *cut-outs* or fuses for preventing an excess of current passing, and fixtures or supports for lamps often of an ornamental character. For the details of these, special treatises on electric interior wiring must be consulted.

For further information the reader may be referred to the following books:—C. H. Wordingham, *Central Electrical Stations* (London, 1901); A. Gay and C. Y. Yeaman, *Central Station Electricity Supply* (London, 1906); S. P. Thompson, *Dynamo Electric Machinery* (2 vols., London, 1905); E. Tremlett Carter and T. Davies, *Motive Power and Gearing* (London, 1906); W. C. Clinton, *Electric Wiring* (2nd ed., London, 1906); W. Perren Maycock, *Electric Wiring, Fitting, Switches and Lamps* (London, 1899); D. Salomons, *Electric Light Installations* (London, 1894); Stuart A. Russell, *Electric Light Cables* (London, 1901); F. A. C. Perrine, *Conductors for Electrical Distribution* (London, 1903); E. Rosenberg, W. W. Haldane Gee and C. Kinzbrunner, *Electrical Engineering* (London, 1903); E. C. Metcalfe, *Practical Electric Wiring for Lighting Installations* (London, 1905); F. C. Raphael, *The Wireman's Pocket Book* (London, 1903). (J. A. F.)

History.

II. *Commercial Aspects.*—To enable the public supply enterprises referred to in the foregoing section to be carried out in England, statutory powers became necessary to break up the streets. In the early days a few small stations were established for the supply of electricity within "block" buildings, or by means of overhead wires within restricted areas, but the limitatons proved uneconomical and the installations were for the most part merged into larger undertakings sanctioned by parliamentary powers. In the year 1879 the British government had its attention directed for the first time to electric lighting as a possible subject for legislation, and the consideration of the then existing state of electric lighting was referred to a select committee of the House of Commons. No legislative action, however, was taken at that time. In fact the invention of the incandescent lamp was incomplete—Edison's British master-patent was only filed in Great Britain in November 1879. In 1881 and 1882 electrical exhibitions were held in Paris and at the Crystal Palace, London, where the improved electric incandescent lamp was brought before the general public. In 1882 parliament passed the first Electric Lighting Act, and considerable speculation ensued. The aggregate capital of the companies registered in 1882–1883 to carry out the public supply of electricity in the United Kingdom amounted to £15,000,000, but the onerous conditions of the act deterred investors from proceeding with the enterprise. Not one of the sixty-two provisional orders granted to companies in 1883 under the act was carried out. In 1884 the Board of Trade received only four applications for provisional orders, and during the subsequent four years only one order was granted. Capitalists declined to go on with a business which if successful could be taken away from them by local authorities at the end of twenty-one years upon terms of paying only the then value of the plant, lands and buildings, without regard to past or future profits, goodwill or other considerations. The electrical industry in Great Britain ripened at a time when public opinion was averse to the creation of further monopolies, the general belief being that railway, water and gas companies had in the past received valuable concessions on terms which did not sufficiently safeguard the interests of the community. The great development of industries by means of private enterprise in the early part of the 19th century produced a reaction which in the latter part of the century had the effect of discouraging the creation by private enterprise of undertakings partaking of the nature of monopolies; and at the same time efforts were made to strengthen local and municipal institutions by investing them with wider functions. There were no fixed principles governing the relations between the state or municipal authorities and commercial companies rendering monopoly services. The new conditions imposed on private enterprise for the purpose of safeguarding the interests of the public were very tentative, and a former permanent secretary of the Board of Trade has stated that the efforts made by parliament in these directions have sometimes proved injurious alike to the public and to investors. One of these tentative measures was the Tramways Act 1870, and twelve years later it was followed by the first Electric Lighting Act.

It was several years before parliament recognized the harm that had been done by the passing of the Electric Lighting Act 1882. A select committee of the House of Lords sat in 1886 to consider the question of reform, and as a result the Electric Lighting Act 1888 was passed. This amending act altered the period of purchase from twenty-one to forty-two years, but the terms of purchase were not materially altered in favour of investors. The act, while stipulating for the consent of local authorities to the granting of provisional orders, gives the Board of Trade power in exceptional cases to dispense with the consent, but this power has been used very sparingly. The right of vetoing an undertaking, conferred on local authorities by the Electric Lighting Acts and also by the Tramways Act 1870, has frequently been made use of to exact unduly onerous conditions from promoters, and has been the subject of complaint for years. Although, in the opinion of ministers of the Crown, the exercise of the veto by local authorities has on several occasions led to considerable scandals, no government has so far been able, owing to the very great power possessed by local authorities, to modify the law in this respect. After 1888 electric lighting went ahead in Great Britain for the first time, although other countries where legislation was different had long previously enjoyed its benefits. The developments proceeded along three well-defined lines. In London, where none of the gas undertakings was in the hands of local authorities, many of the districts were allotted to companies, and competition was permitted between two and sometimes three companies. In the provinces the cities and larger towns were held by the municipalities, while the smaller towns, in cases where consents could be obtained, were left to the enterprise of companies. Where consents could not be obtained these towns were for some time left without supply.

Some statistics showing the position of the electricity supply business respectively in 1896 and 1906 are interesting as indicating the progress made and as a means of comparison between these two periods of the state of the industry as a whole. In 1896 thirty-eight companies were at work with an aggregate capital of about £6,000,000, and thirty-three municipalities with electric lighting loans of nearly £2,000,000. The figures for 1906, ten years later, show that 187 electricity supply companies were in operation with a total investment of close on £32,000,000, and 277 municipalities with loans amounting to close on £36,000,000. The average return on the capital invested in the companies at the later period was 5·1% per annum. In 1896 the average capital expenditure was about £100 per kilowatt of plant installed; and £50 per kilowatt was regarded as a very low record. For 1906 the average capital expenditure per kilowatt installed was about £81. The main divisions of the average expenditure are:—

	1896.	1906.
Land and buildings . . .	22·3%	17·8%
Plant and machinery . . .	36·7	36·5
Mains	32·2	35·5
Meters and instruments . . .	4·6	5·7
Provisional orders, &c. . . .	3·2	2·8

The load connected, expressed in equivalents of eight candle-power lamps, was 2,000,000 in 1896 and 24,000,000 in 1906. About one-third of this load would be for power purposes and about two-thirds for lighting. The Board of Trade units sold were 30,200,000 in 1896 and 533,600,000 in 1906, and the average prices per unit obtained were 5·7d. and 2·7d. respectively, or a revenue of £717,250 in 1896 and over £6,000,000 in 1906. The working expenses per Board of Trade unit sold, excluding depreciation, sinking fund and interest were as follows:—

	1896.	1906.
Generation and distribution . . .	2·81d.	·99d.
Rent, rates and taxes	·35	·14
Management	·81	·18
Sundries	·10	·02
Total . . .	4·07d.	1·33d.

In 1896 the greatest output at one station was about 5½ million units, while in 1906 the station at Manchester had the largest output of over 40 million units.

The capacity of the plants installed in the United Kingdom in 1906 was:—

	K.W.		
Continuous current .	417,000	Provinces . . .	333,000
		London . . .	84,000
Alternating current .	132,000	Provinces . . .	83,000
		London . . .	49,000
Continuous current and alternating current combined . .	480,000	Provinces . . .	366.000
		London . . .	114,000
	1,029,000 k.w.		

Economics.

The economics of electric lighting were at first assumed to be similar to those of gas lighting. Experience, however, soon proved that there were important differences, one being that gas may be stored in gasometers without appreciable loss and the work of production carried on steadily without reference to fluctuations of demand. Electricity cannot be economically stored to the same extent, and for the most part it has to be used as it is generated. The demand for electric light is practically confined to the hours between sunset and midnight, and it rises sharply to a "peak" during this period. Consequently the generating station has to be equipped with plant of sufficient capacity to cope with the maximum load, although the peak does not persist for many minutes—a condition which is very uneconomical both as regards capital expenditure and working costs (see LIGHTING: *Electric*). In order to obviate the unproductiveness of the generating plant during the greater part of the day, electricity supply undertakings sought to develop the "daylight" load. This they did by supplying electricity for traction purposes, but more particularly for industrial power purposes. The difficulties in the way of this line of development, however, were that electric power could not be supplied cheaply enough to compete with steam, hydraulic, gas and other forms of power, unless it was generated on a very large scale, and this large demand could not be developed within the restricted areas for which provisional orders were granted and under the restrictive conditions of these orders in regard to situation of power-house and other matters.

The leading factors which make for economy in electricity supply are the magnitude of the output, the load factor, and the diversity factor, also the situation of the power house, the means of distribution, and the provision of suitable, trustworthy and efficient plant. These factors become more favourable the larger the area and the greater and more varied the demand to be supplied. Generally speaking, as the output increases so the cost per unit diminishes, but the ratio (called the load factor) which the output during any given period bears to the *maximum* possible output during the same period has a very important influence on costs. The ideal condition would be when a power station is working at its normal *maximum* output continuously night and day. This would give a load-factor of 100%, and represents the ultimate ideal towards which the electrical engineer strives by increasing the area of his operations and consequently also the load and the variety of the overlapping demands. It is only by combining a large number of demands which fluctuate at different times—that is by achieving a high diversity factor—that the supplier of electricity can hope to approach the ideal of continuous and steady output. Owing to the dovetailing of miscellaneous demands the actual demand on a power station at any moment is never anything like the aggregate of all the maximum demands. One large station would require a plant of 36,000 k.w. capacity if all the demands came upon the station simultaneously, but the maximum demand on the generating plant is only 15,000 kilowatts. The difference between these two figures may be taken to represent the economy effected by combining a large number of demands on one station. In short, the keynote of progress in cheap electricity is increased and diversified demand combined with concentration of load. The average load-factor of all the British electricity stations in 1907 was 14·5%—a figure which tends to improve.

Several electric power supply companies have been established in the United Kingdom to give practical effect to these principles.

Power companies.

The Electric Lighting Acts, however, do not provide for the establishment of large power companies, and special acts of parliament have had to be promoted to authorize these undertakings. In 1898 several bills were introduced in parliament for these purposes. They were referred to a joint committee of both Houses of Parliament presided over by Lord Cross. The committee concluded that, where sufficient public advantages are shown, powers should be given for the supply of electricity over areas including the districts of several local authorities and involving the use of exceptional plant; that the usual conditions of purchase of the undertakings by the local authorities did not apply to such undertakings; that the period of forty-two years was "none too long" a tenure; and that the terms of purchase should be reconsidered. With regard to the provision of the Electric Lighting Acts which requires that the consent of the local authority should be obtained as a condition precedent to the granting of a provisional order, the committee was of opinion that the local authority should be entitled to be heard by the Board of Trade, but should not have the power of veto. No general legislation took place as a result of these recommendations, but the undermentioned special acts constituting power supply companies were passed.

In 1902 the president of the Board of Trade stated that a bill had been drafted which he thought "would go far to meet all the reasonable objections that had been urged against the present powers by the local authorities." In 1904 the government introduced the Supply of Electricity Bill, which provided for the removal of some of the minor anomalies in the law relating to electricity. The bill passed through all its stages in the House of Lords but was not proceeded with in the House of Commons. In 1905 the bill was again presented to parliament but allowed to lie on the table. In the words of the president of the Board of Trade, there was "difficulty of dealing with this question so long as local authorities took so strong a view as to the power which ought to be reserved to them in connexion with this enterprise." In the official language of the council of the Institution of Electrical Engineers, the development of electrical science in the United Kingdom is in a backward condition as compared with other countries in respect of the practical application to the industrial and social requirements of the nation, notwithstanding that Englishmen have been among the first in inventive genius. The cause of such backwardness is largely due to the conditions under which the electrical industry has been carried on in the country, and especially to the restrictive character of the legislation governing the initiation and development of electrical power and traction undertakings, and to the powers of obstruction granted to local authorities. Eventually The Electric Lighting Act 1909 was passed. This Act provides:—(1) for the granting of provisional orders authorizing any local authority or company to supply electricity in bulk; (2) for the exercise of electric lighting powers by local authorities jointly under provisional order; (3) for the supply of electricity to railways, canals and tramways outside the area of supply with the consent of the Board of Trade; (4) for the compulsory acquisition of land for generating stations by provisional order; (5) for the exemption of agreements for the supply of electricity from stamp duty; and (6) for the amendment of regulations relating to July notices, revision of maximum price, certification of meters, transfer of powers of undertakers, auditors' reports, and other matters.

The first of the Power Bills was promoted in 1898, under which it was proposed to erect a large generating station in the Midlands from which an area of about two thousand square miles would be supplied. Vigorous opposition was organized against the bill by the local authorities and it did not pass. The bill was revived in 1899, but was finally crushed. In 1900 and following years several power bills were successfully promoted, and the following are the areas over which the powers of these acts extend:

In Scotland, (1) the Clyde Valley, (2) the county of Fife, (3) the districts described as "Scottish Central," comprising Linlithgow, Clackmannan, and portions of Dumbarton and Stirling, and (4) the Lothians, which include portions of Midlothian, East Lothian, Peebles and Lanark.

In England there are companies operating in (1) Northumberland, (2) Durham county, (3) Lancashire, (4) South Wales and Carmarthenshire, (5) Derbyshire and Nottinghamshire, (6) Leicestershire and Warwickshire, (7) Yorkshire, (8) Shropshire, Worcestershire and Staffordshire, (9) Somerset, (10) Kent, (11) Cornwall, (12) portions of Gloucestershire, (13) North Wales, (14) North Staffordshire, Derbyshire, Denbighshire and Flintshire, (15) West Cumberland, (16) the Cleveland district, (17) the North Metropolitan district, and (18) the West Metropolitan area. An undertaking which may be included in this category, although it is not a Power Act company, is the Midland Electric Corporation in South Staffordshire. The systems of generation and distribution are generally 10,000 or 11,000 volts three-phase alternating current.

The powers conferred by these acts were much restricted as a result of opposition offered to them. In many cases the larger towns were cut out of the areas of supply altogether, but the general rule was that the power company was prohibited from supplying direct to a power consumer in the area of an authorized distributor without the consent of the latter, subject to appeal to the Board of Trade. Even this restricted power of direct supply was not embodied in all the acts, the power of taking supply in bulk being left only to certain authorized distributors and to authorized users such as railways and tramways. Owing chiefly to the exclusion of large towns and industrial centres from their areas, these power supply companies did not all prove as successful as was expected.

In the case of one of the power companies which has been in a favourable position for the development of its business, the theoretical conclusions in regard to the economy of large production above stated have been amply demonstrated in practice. In 1901, when this company was emerging from the stage of a simple electric lighting company, the total costs per unit were 1 05d. with an output of about 2½ million units per annum. In 1905 the output rose to over 30 million units mostly for power and traction purposes, and the costs fell to 0·56d. per unit.

An interesting phase of the power supply question has arisen in London. Under the general acts it was stipulated that the power-house should be erected within the area of supply, and amalgamation of undertakings was prohibited. After less than a decade of development several of the companies in London found themselves obliged to make considerable additions to their generating plants. But their existing buildings were full to their utmost capacity, and the difficulties of generating cheaply on crowded sites had increased instead of diminished during the interval. Several of the companies had to promote special acts of parliament to obtain relief, but the idea of a general combination was not considered to be within the range of practical politics until 1905, when the Administrative County of London Electric Power Bill was introduced. Compared with other large cities, the consumption of electricity in London is small. The output of electricity in New York for all purposes is 971 million units per annum or 282 units per head of population. The output of electricity in London is only 42 units per head per annum. There are in London twelve local authorities and fourteen companies carrying on electricity supply undertakings. The capital expenditure is £3,127,000 by the local authorities and £12,530,000 by the companies, and their aggregate capacity of plant is 165,000 k.w. The total output is about 160,000,000 units per annum, the total revenue is over £2,000,000, and the gross profit before providing for interest and sinking fund charges is £1,158,000. The general average cost of production is 1·55d. per unit, and the average price per unit sold is 3·16d., but some of the undertakers have already supplied electricity to large power consumers at below 1d. per unit. By generating on a large scale for a wide variety of demands the promoters of the new scheme calculated to be able to offer electrical energy in bulk to electricity supply companies and local authorities at prices substantially below their costs of production at separate stations, and also to provide them and power users with electricity at rates which would compete with other forms of power. The authorized capital was fixed at £6,666,000, and the initial outlay on the first plant of 90,000 k.w., mains, &c., was estimated at £2,000,000. The costs of generation were estimated at 0·15d. per unit, and the total cost at 0·52d. per unit sold. The output by the year 1911 was estimated at 133,500,000 units at an average selling price of 0·7d. per unit, to be reduced to 0·55d. by 1916 when the output was estimated at 600,000,000 units. The bill underwent a searching examination before the House of Lords committee and was passed in an amended form. At the second reading in the House of Commons a strong effort was made to throw it out, but it was allowed to go to committee on the condition—contrary to the general recommendations of the parliamentary committee of 1898—that a purchase clause would be inserted; but amendments were proposed to such an extent that the bill was not reported for third reading until the eve of the prorogation of parliament. In the following year (1906) the Administrative Company's bill was again introduced in parliament, but the London County Council, which had previously adopted an attitude both hostile and negative, also brought forward a similar bill. Among other schemes, one known as the Additional Electric Power Supply Bill was to authorize the transmission of current from St Neots in Hunts. This bill was rejected by the House of Commons because the promoters declined to give precedence to the bill of the London County Council. The latter bill was referred to a hybrid committee with instructions to consider the whole question of London power supply, but it was ultimately rejected. The same result attended a second bill which was promoted by the London County Council in 1907. The question was settled by the London Electric Supply Act 1908, which constitutes the London County Council the purchasing authority (in the place of the local authorities) for the electric supply companies in London. This Act also enabled the Companies and other authorized undertakers to enter into agreements for the exchange of current and the linking-up of stations.

The general supply of electricity is governed primarily by the two acts of parliament passed in 1882 and 1888, which apply to the whole of the United Kingdom. Until 1899 the other statutory provisions relating to electricity supply were incorporated in provisional orders granted by the Board of Trade and confirmed by parliament in respect of each undertaking, but in that year an Electric Lighting Clauses Act was passed by which the clauses previously inserted in each order were standardized. Under these acts the Board of Trade made rules with respect to applications for licences and provisional orders, and regulations for the protection of the public, and of the electric lines and works of the post office, and others, and also drew up a model form for provisional orders.

Legislation and regulations.

Until the passing of the Electric Lighting Acts, wires could be placed wherever permission for doing so could be obtained, but persons breaking up streets even with the consent of the local authority were liable to indictment for nuisance. With regard to overhead wires crossing the streets, the local authorities had no greater power than any member of the public, but a road authority having power to make a contract for lighting the road could authorize others to erect poles and wires for the purpose. A property owner, however, was able to prevent wires from being taken over his property. The act of 1888 made all electric lines or other works for the supply of electricity, not entirely enclosed within buildings or premises in the same occupation, subject to regulations of the Board of Trade. The postmaster-general may also impose conditions for the protection of the post office. Urban authorities, the London County Council, and some other corporations have now powers to make by-laws for prevention of obstruction from posts and overhead wires for telegraph, telephone, lighting or signalling purposes; and electric lighting stations are now subject to the provisions of the Factory Acts.

Parliamentary powers to supply electricity can now be obtained by (A) Special Act, (B) Licence, or (C) Provisional order.

A. *Special Act.*—Prior to the report of Lord Cross's joint committee of 1898 (referred to above), only one special act was passed. The provisions of the Electric Power Acts passed subsequently are not uniform, but the following are some of the usual provisions:—

The company shall not supply electricity for lighting purposes except to authorized undertakers, provided that the energy supplied to any person for power may be used for lighting any premises on which the power is utilized. The company shall not supply energy (except to authorized undertakers) in any area which forms part of the area of supply of any authorized distributors without their consent, such consent not to be unreasonably withheld. The company is bound to supply authorized undertakers upon receiving notice and upon the applicants agreeing to pay for at least seven years an amount sufficient to yield 20% on the outlay (excluding generating plant or wires already installed). Other persons to whom the company is authorized to supply may require it upon terms to be settled, if not agreed, by the Board of Trade. Dividends are usually restricted to 8%, with a provision that the rate may be increased upon the average price charged being reduced. The maximum charges are usually limited to 3d. per unit for any quantity up to 400 hours' supply, and 2d. per unit beyond. No preference is to be shown between consumers in like circumstances. Many provisions of the general Electric Lighting Acts are excluded from these special acts, in particular the clause giving the local authority the right to purchase the undertaking compulsorily.

B. *Licence.*—The only advantages of proceeding by licence are that it can be expeditiously obtained and does not require confirmation by parliament; but some of the provisions usually inserted in provisional orders would be *ultra vires* in a licence, and the Electric Lighting Clauses Act 1899 does not extend to licences. The term of a licence does not exceed seven years, but is renewable. The consent of the local authority is necessary even to an application for a licence. None of the licences that have been granted is now in force.

C. *Provisional Order.*—An intending applicant for a provisional order must serve notice of his intention on every local authority within the proposed area of supply on or before the 1st of July prior to the session in which application is to be made to the Board of Trade. This provision has given rise to much complaint, as it gives the local authorities a long time for bargaining and enables them to supersede the company's application by themselves applying for provisional orders. The Board of Trade generally give preference to the applications of local authorities.

In 1905 the Board of Trade issued a memorandum stating that, in view of the revocation of a large number of provisional orders which had been obtained by local authorities, or in regard to which local authorities had entered into agreements with companies for carrying the orders into effect (which agreements were in many cases *ultra vires* or at least of doubtful validity), it appeared undesirable that a local authority should apply for a provisional order without having a definite intention of exercising the powers, and that in future the Board of Trade would not grant an order to a local authority unless the board were satisfied that the powers would be exercised within a specified period.

Every undertaking authorized by provisional order is subject to the provision of the general act entitling the local authority to purchase compulsorily at the end of forty-two years (or shorter period), or after the expiration of every subsequent period of ten years (unless varied by agreement between the parties with the consent of the Board of Trade), so much of the undertaking as is within the jurisdiction of the purchasing authority upon the terms of paying the then value of all lands, buildings, works, materials and plant, suitable to and used for the purposes of the undertaking; provided that the value of such lands, &c., shall be deemed to be their fair market value at the time of purchase, due regard being had to the nature and then condition and state of repair thereof, and to the circumstance that they are in such positions as to be ready for immediate working, and to the suitability of the same to the purposes of the undertaking, and where a part only of the undertaking is purchased, to any loss occasioned by severance, but without any addition in respect of compulsory purchase or of goodwill, or of any profits which may or might have been or be made from the undertaking or any similar consideration. Subject to this right of purchase by the local authority, a provisional order (but not a licence) may be for such period as the Board of Trade may think proper, but so far no limit has been imposed, and unless purchased by a local authority the powers are held in perpetuity. No monopoly is granted to undertakers, and since 1889 the policy of the Board of Trade has been to sanction two undertakings in the same metropolitan area, preferably using different systems, but to discourage competing schemes within the same area in the provinces. Undertakers must within two years lay mains in certain specified streets. After the first eighteen months they may be required to lay mains in other streets upon conditions specified in the order, and any owner or occupier of premises within 50 yds. of a distributing main may require the undertakers to give a supply to his premises; but the consumer must pay the cost of the lines laid upon his property and of so much outside as exceeds 60 ft. from the main, and he must also contract for two and in some cases for three years' supply. But undertakers are prohibited in making agreements for supply from showing any undue preference. The maximum price in London is 13s. 4d. per quarter for any quantity up to 20 units, and beyond that 8d. per unit, but 11s. 8d. per quarter up to 20 units and 7d. per unit beyond is the more general maximum. The "Bermondsey clause" requires the undertakers (local authority) so to fix their charges (not exceeding the specified maximum) that the revenue shall not be less than the expenditure.

There is no statutory obligation on municipalities to provide for depreciation of electricity supply undertakings, but after providing for all expenses, interest on loans, and sinking fund instalments, the local authority may create a reserve fund until it amounts, with interest, to one-tenth of the aggregate capital expenditure. Any deficiency when not met out of reserve is payable out of the local rates.

The principle on which the Local Government Board sanctions municipal loans for electric lighting undertakings is that the period of the loan shall not exceed the life of the works, and that future ratepayers shall not be unduly burdened. The periods of the loans vary from ten years for accumulators and arc lamps to sixty years for lands. Within the county of London the loans raised by the metropolitan borough councils for electrical purposes are sanctioned by the London County Council, and that body allows a minimum period of twenty years for repayment. Up to 1904–1905, 245 loans had been granted by the council amounting in the aggregate to £4,045,067.

Standardization.

In 1901 the Institution of Civil Engineers appointed a committee to consider the advisability of standardizing various kinds of iron and steel sections. Subsequently the original reference was enlarged, and in 1902 the Institution of Electrical Engineers was invited to co-operate. The treasury, as well as railway companies, manufacturers and others, have made grants to defray the expenses. The committee on electrical plant has ten sub-committees. In August 1904 an interim report was issued by the sub-committee on generators, motors and transformers, dealing with pressures and frequencies, rating of generators and motors, direct-current generators, alternating-current generators, and motors.

In 1903 the specification for British standard tramway rails and fish-plates was issued, and in 1904 a standard specification for tubular tramway poles was issued. A sectional committee was formed in 1904 to correspond with foreign countries with regard to the formation of an electrical international commission to study the question of an international standardization of nomenclature and ratings of electrical apparatus and machinery.

The electrical industry.

The electrical manufacturing branch, which is closely related to the electricity supply and other operating departments of the electrical industry, only dates from about 1880. Since that time it has undergone many vicissitudes. It began with the manufacture of small arc lighting equipments for railway stations, streets and public buildings. When the incandescent lamp became a commercial article, ship-lighting sets and installations for theatres and mansions constituted the major portion of the electrical work. The next step was the organization of house-to-house distribution of electricity from small "central stations," ultimately leading to the comprehensive public supply in large towns, which involved the manufacture of generating and distributing plants of considerable magnitude and complexity. With the advent of electric traction about 1896, special machinery had to be produced, and at a later stage the manufacturer had to solve problems in connexion with bulk supply in large areas and for power purposes. Each of these main departments involved changes in ancillary manufactures, such as cables, switches, transformers, meters, &c., so that the electrical manufacturing industry has been in a constant state of transition. At the beginning of the period referred to Germany and America were following the lead of England in theoretical developments, and for some time Germany obtained electrical machinery from England. Now scarcely any electrical apparatus is exported to Germany, and considerable imports are received by England from that country and America. The explanation is to be found mainly in the fact that the adverse legislation of 1882 had the effect of restricting enterprise, and while British manufacturers were compulsorily inert during periods of impeded growth of the two most important branches of the industry—electric lighting and traction—manufacturers in America and on the continent of Europe, who were in many ways encouraged by their governments, devoted their resources to the establishment of factories and electrical undertakings, and to the development of efficient selling organizations at home and abroad. When after the amendment of the adverse legislation in 1888 a demand for electrical machinery arose in England, the foreign manufacturers were fully organized for trade on a large scale, and were further aided by fiscal conditions to undersell English manufacturers, not only in neutral markets, but even in their own country. Successful manufacture on a large scale is possible only by standardizing the methods of production. English manufacturers were not able to standardize because they had not the necessary output. There had been no repetitive demand, and there was no production on a large scale. Foreign manufacturers, however, were able to standardize by reason of the large uniform demand which existed for their manufactures. Statistics are available showing the extent to which the growth of the electrical manufacturing industry in Great Britain was delayed. Nearly twenty years after the inception of the industry there were only twenty-four manufacturing companies registered in the United Kingdom, having an aggregate subscribed capital of under £7,000,000. But in 1907 there were 292 companies with over £42,000,000 subscribed capital. The cable and incandescent lamp sections show that when the British manufacturers are allowed opportunities they are not slow to take advantage of them. The cable-making branch was established under the more encouraging conditions of the telegraph industry, and the lamp industry was in the early days protected by patents. Other departments not susceptible to foreign competition on account of freightage, such as the manufacture of storage batteries and rolling stock, are also fairly prosperous. In departments where special circumstances offer a prospect of success, the technical skill, commercial enterprise and general efficiency of British manufacturers manifest themselves by positive progress and not merely by the continuance of a struggle against adverse conditions. The normal posture of the British manufacturer of electrical machinery has been described as one of desperate defence of his home trade; that of the foreign manufacturer as one of vigorous attack upon British and other open markets. In considering the position of English manufacturers as compared with their foreign rivals, some regard should be had to the patent laws. One condition of a grant of a patent in most foreign countries is that the patent shall be worked in those countries within a specified period. But a foreign inventor was until 1907 able to secure patent protection in Great Britain without any obligation to manufacture there. The effect of this was to encourage the manufacture of patented apparatus in foreign countries, and to stimulate their exportation to Great Britain in competition with British products. With regard to the electro-chemical industry the progress which has been achieved by other nations, notably Germany, is very marvellous by comparison with the advance made by England, but to state the reasons why this industry has had such extraordinary development in Germany, notwithstanding that many of the fundamental inventions were made in England, would require a statement of the marked differences in the methods by which industrial progress is promoted in the two countries.

There has been very little solidarity among those interested in the commercial development of electricity, and except for the discussion of scientific subjects there has been very little organization with the object of protecting and promoting common interests. (E. Ga.)

ELECTRIC WAVES. § 1. Clerk Maxwell proved that on his theory electro-magnetic disturbances are propagated as a wave motion through the dielectric, while Lord Kelvin in 1853 (*Phil. Mag.* [4] 5, p. 393) proved from electro-magnetic theory that the discharge of a condenser is oscillatory, a result which Feddersen (*Pogg. Ann.* 103, p. 69, &c.) verified by a beautiful series of experiments. The oscillating discharge of a condenser had been inferred by Henry as long ago as 1842 from his experiments on the magnetization produced in needles by the discharge of a condenser. From these two results it follows that electric waves must be passing through the dielectric surrounding a condenser in the act of discharging, but it was not until 1887 that the existence of such waves was demonstrated by direct experiment. This great step was made by Hertz (*Wied. Ann.* 34, pp. 155, 551, 609; *Ausbreitung der elektrischen Kraft*, Leipzig, 1892), whose experiments on this subject form one of the greatest contributions ever made to experimental physics. The difficulty which had stood in the way of the observations of these waves was the absence of any method of detecting electrical and magnetic forces, reversed some millions of times per second, and only lasting for an exceedingly short time. This was removed by Hertz, who showed that such forces would produce small sparks between pieces of metal very nearly in contact, and that these sparks were sufficiently regular to be used to detect electric waves and to investigate their properties. Other and more delicate methods have subsequently been discovered, but the results obtained by Hertz with his detector were of such signal importance, that we shall begin our account of experiments on these waves by a description of some of Hertz's more fundamental experiments.

To produce the waves Hertz used two forms of vibrator. The first is represented in fig. 1. A and B are two zinc plates about 40 cm. square; to these brass rods, C, D, each about 30 cm. long, are soldered, terminating in brass balls E and F. To get good results it is necessary that these balls should be very brightly polished, and as they get roughened by the sparks which pass between them it is necessary to repolish them at short intervals; they should be shaded from light and from sparks, or other source of ultra-violet light. In order to excite the waves, C and D are connected to the two poles of an induction coil; sparks cross the air-gap which becomes a conductor, and the charges on the plates oscillate backwards and forwards like the charges on the coatings of a Leyden jar when it is short-circuited. The object of polishing the balls and screening off light is to get a sudden and sharp discharge; if the balls are rough there will be sharp points from which the charge will gradually leak, and the discharge will not be abrupt enough to start electrical vibrations, as these have an exceedingly short period. From the open form of this vibrator we should expect the radiation to be very large and the rate of decay of the amplitude very rapid. Bjerknes (*Wied. Ann.* 44, p. 74) found that the amplitude fell to $1/e$ of the original value, after a time $4T$ where T was the period of the electrical vibrations. Thus after a few vibrations the amplitude becomes inappreciable. To detect the waves produced by this vibrator Hertz used a piece of copper wire bent into a circle, the ends being furnished with two balls, or a ball and a point connected by a screw, so that the distance between them admitted of very fine adjustment. The radius of the circle for use with the vibrator just described was 35 cm., and was so chosen that the free period of the detector might be the same as that of the vibrator, and the effects in it increased by resonance. It is evident, however, that with a primary system as greatly damped as the vibrator used by Hertz, we could not expect very marked resonance effects, and as a matter of fact the accurate timing of vibrator and detector in this case is not very important. With electrical vibrators which can maintain a large number of vibrations, resonance effects are very striking, as is beautifully shown by the following experiment due to Lodge (*Nature*, 41, p. 368), whose researches have greatly advanced our knowledge of electric waves. A and C (fig. 2) are two Leyden jars, whose inner and outer coatings are connected by wires, B and D, bent so as to include a considerable area. There is an air-break in the circuit connecting the inside and outside of one of the jars, A, and electrical oscillations are started in A by joining the inside and outside with the terminals of a coil or electrical machine. The circuit in the jar C is provided

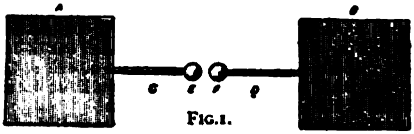


Fig. 1.

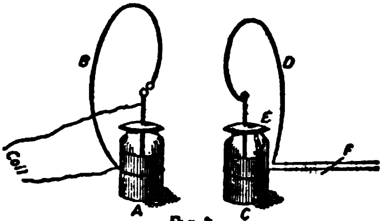


Fig. 2.

with a sliding piece, F, by means of which the self-induction of the discharging circuit, and, therefore, the time of an electrical oscillation of the jar, can be adjusted. The inside and outside of this jar are put almost, but not quite, into electrical contact by means of a piece of tin-foil, E, bent over the lip of the jar. The jars are placed face to face so that the circuits B and D are parallel to each other, and approximately at right angles to the line joining their centres. When the electrical machine is in action sparks pass across the air-break in the circuit in A, and by moving the slider F it is possible to find one position for it in which sparks pass from the inside to the outside of C across the tin-foil, while when the slider is moved a short distance on either side of this position the sparks cease.

Hertz found that when he held his detector in the neighbourhood of the vibrator minute sparks passed between the balls. These sparks were not stopped when a large plate of non-conducting substance, such as the wall of a room, was interposed between the vibrator and detector, but a large plate of very thin metal stopped them completely.

To illustrate the analogy between electric waves and waves of light Hertz found another form of apparatus more convenient. The vibrator consisted of two equal brass cylinders, 12 cm. long and 3 cm. in diameter, placed with their axes coincident, and in the focal line of a large zinc parabolic mirror about 2 m. high, with a focal length of 12·5 cm. The ends of the cylinders nearest each other, between which the sparks passed, were carefully polished. The detector, which was placed in the focal line of an equal parabolic mirror, consisted of two lengths of wire, each having a straight piece about 50 cm. long and a curved piece about 15 cm. long bent round at right angles so as to pass through the back of the mirror. The ends which came through the mirror were connected with a spark micrometer, the sparks being observed from behind the mirror. The mirrors are shown in fig. 3.

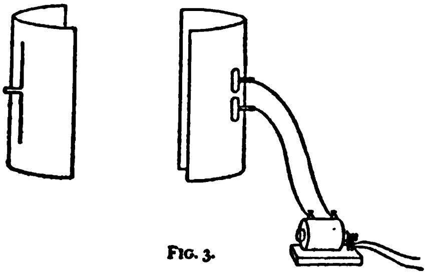


FIG. 3.

§ 2. *Reflection and Refraction.*—To show the reflection of the waves Hertz placed the mirrors side by side, so that their openings looked in the same direction, and their axes converged at a point about 3 m. from the mirrors. No sparks were then observed in the detector when the vibrator was in action. When, however, a large zinc plate about 2 m. square was placed at right angles to the line bisecting the angle between the axes of the mirrors sparks became visible, but disappeared again when the metal plate was twisted through an angle of about 15° to either side. This experiment showed that electric waves are reflected, and that, approximately at any rate, the angle of incidence is equal to the angle of reflection. To show refraction Hertz used a large prism made of hard pitch, about 1·5 m. high, with a slant side of 1·2 m. and an angle of 30°. When the waves from the vibrator passed through this the sparks in the detector were not excited when the axes of the two mirrors were parallel, but appeared when the axis of the mirror containing the detector made a certain angle with the axis of that containing the vibrator. When the system was adjusted for minimum deviation the sparks were most vigorous when the angle between the axes of the mirrors was 22°. This corresponds to an index of refraction of 1·69.

§ 3. *Analogy to a Plate of Tourmaline.*—If a screen be made by winding wire round a large rectangular framework, so that the turns of the wire are parallel to one pair of sides of the frame, and if this screen be interposed between the parabolic mirrors when placed so as to face each other, there will be no sparks in the detector when the turns of the wire are parallel to the focal lines of the mirror; but if the frame is turned through a right angle so that the wires are perpendicular to the focal lines of the mirror the sparks will recommence. If the framework is substituted for the metal plate in the experiment on the reflection of electric waves, sparks will appear in the detector when the wires are parallel to the focal lines of the mirrors, and will disappear when the wires are at right angles to these lines. Thus the framework reflects but does not transmit the waves when the electric force in them is parallel to the wires, while it transmits but does not reflect waves in which the electric force is at right angles to the wires. The wire framework behaves towards the electric waves exactly as a plate of tourmaline does to waves of light. Du Bois and Rubens (*Wied. Ann.* 49, p. 593), by using a framework wound with very fine wire placed very close together, have succeeded in polarizing waves of radiant heat, whose wave length, although longer than that of ordinary light, is very small compared with that of electric waves.

§ 4. *Angle of Polarization.*—When light polarized at right angles to the plane of incidence falls on a refracting substance at an angle $\tan^{-1}\mu$, where μ is the refractive index of the substance, all the light is refracted and none reflected; whereas when light is polarized in the plane of incidence, some of the light is always reflected whatever the angle of incidence. Trouton (*Nature*, 39, p. 391) showed that similar effects take place with electric waves. From a paraffin wall 3 ft. thick, reflection always took place when the electric force in the incident wave was at right angles to the plane of incidence, whereas at a certain angle of incidence there was no reflection when the vibrator was turned, so that the electric force was in the plane of incidence. This shows that on the electromagnetic theory of light the electric force is at right angles to the plane of polarization.

§ 5. *Stationary Electrical Vibrations.*—Hertz (*Wied. Ann.* 34, p. 609) made his experiments on these in a large room about 15 m. long. The vibrator, which was of the type first described, was placed at one end of the room, its plates being parallel to the wall, at the other end a piece of sheet zinc about 4 m. by 2 m. was placed vertically against the wall. The detector—the circular ring previously described—was held so that its plane was parallel to the metal plates of the vibrator, its centre on the line at right angles to the metal plate bisecting at right angles the spark gap of the vibrator, and with the spark gap of the detector parallel to that of the vibrator. The following effects were observed when the detector was moved about. When it was close up to the zinc plate there were no sparks, but they began to pass feebly as soon as it was moved forward a little way from the plate, and increased rapidly in brightness until it was about 1·8 m. from the plate, when they attained their maximum. When its distance was still further increased they diminished in brightness, and vanished again at a distance of about 4 m. from the plate. When the distance was still further increased they reappeared, attained another maximum, and so on. They thus exhibited a remarkable periodicity similar to that which occurs when stationary vibrations are produced by the interference of direct waves with those reflected from a surface placed at right angles to the direction of propagation. Similar periodic alterations in the spark were observed by Hertz when the waves, instead of passing freely through the air and being reflected by a metal plate at the end of the room, were led along wires, as in the arrangement shown in fig. 4. L and K are metal plates placed parallel to the plates of the vibrator, long parallel wires being attached to act as guides to the waves which were reflected from the isolated end. (Hertz used only one

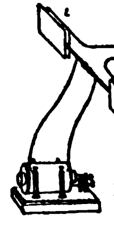


FIG. 4.

plate and one wire, but the double set of plates and wires introduced by Sarasin and De la Rive make the results more definite.) In this case the detector is best placed so that its plane is at right angles to the wires, while the air space is parallel to the plane containing the wires. The sparks instead of vanishing when the detector is at the far end of the wire are a maximum in this position, but wax and wane periodically as the detector is moved along the wires. The most obvious interpretation of these experiments was the one given by Hertz—that there was interference between the direct waves given out by the vibrator and those reflected either from the plate or from the ends of the wire, this interference giving rise to stationary waves. The places where the electric force was a maximum were the places where the sparks were brightest, and the places where the electric force was zero were the places where the sparks vanished. On this explanation the distance between two consecutive places where the sparks vanished would be half the wave length of the waves given out by the vibrator.

Some very interesting experiments made by Sarasin and De la Rive (*Comptes rendus*, 115, p. 489) showed that this explanation could not be the true one, since by using detectors of different sizes they found that the distance between two consecutive places where the sparks vanished depended mainly upon the size of the detector, and very little upon that of the vibrator. With small detectors they found the distance small, with large detectors, large; in fact it is directly proportional to the diameter of the detector. We can see that this result is a consequence of the large damping of the oscillations of the vibrator and the very small damping of those of the detector. Bjerknes showed that the time taken for the amplitude of the vibrations of the vibrator to sink to $1/e$ of their original value was only $4T$, while for the detector it was $500T'$, when T and T' are respectively the times of vibration of the vibrator and the detector. The rapid decay of the oscillations of the vibrator will stifle the interference between the direct and the reflected wave, as the amplitude of the direct wave will, since it is emitted later, be much smaller than that of the reflected one, and not able to annul its effects completely; while the well-maintained vibrations of the detector will interfere and produce the effects observed by Sarasin and De la Rive. To see this let us consider the extreme case in which the oscillations of the vibrator are absolutely deadbeat. Here an impulse, starting from the vibrator on its way to the reflector, strikes against the detector and sets it in vibration; it then travels up to the plate and is reflected, the electric force in the impulse being reversed by reflection. After reflection the impulse again strikes the detector, which is still vibrating from the effects of the first impact; if the phase of this vibration is such that the reflected impulse tends to produce a current round the detector in the same direction as that which is circulating from the effects of the first impact, the sparks will be increased, but if the reflected impulse tends to produce a current in the opposite direction the sparks will be diminished. Since the electric force is reversed by reflection, the greatest increase in the sparks will take place when the impulse finds, on its return, the detector in the opposite phase to that in which it left it; that is, if the time which has elapsed between the departure and return of the impulse is equal to an odd multiple of half the time of vibration of the detector. If d is the distance of the detector from the reflector when the sparks are brightest, and V the velocity of propagation of electromagnetic disturbance, then $2d/V = (2n + 1)(T'/2)$; where n is an integer and T' the time of vibration of the detector, the distance between two spark maxima will be $VT'/2$, and the places where the sparks are a minimum will be midway between the maxima. Sarasin and De la Rive found that when the same detector was used the distance between two spark maxima was the same with the waves through air reflected from a metal plate and with those guided by wires and reflected from the free ends of the wire, the inference being that the velocity of waves along wires is the same as that through the air. This result, which follows from Maxwell's theory, when the wires are not too fine, had been questioned by Hertz on account of some of his experiments on wires.

§ 6. *Detectors*.—The use of a detector with a period of vibration of its own thus tends to make the experiments more complicated, and many other forms of detector have been employed by subsequent experimenters. For example, in place of the sparks in air the luminous discharge through a rarefied gas has been used by Dragoumis, Lecher (who used tubes without electrodes laid across the wires in an arrangement resembling that shown in fig. 7) and Arons. A tube containing neon at a low pressure is especially suitable for this purpose. Zehnder (*Wied. Ann.* 47, p. 777) used an exhausted tube to which an external electromotive force almost but not quite sufficient of itself to produce a discharge was applied; here the additional electromotive force due to the waves was sufficient to start the discharge. Detectors depending on the heat produced by the rapidly alternating currents have been used by Paalzow and Rubens, Rubens and Ritter, and I. Klemenčič. Rubens measured the heat produced by a bolometer arrangement, and Klemenčič used a thermo-electric method for the same purpose; in consequence of the great increase in the sensitiveness of galvanometers these methods are now very frequently resorted to. Boltzmann used an electroscope as a detector. The spark gap consisted of a ball and a point, the ball being connected with the electroscope and the point with a battery of 200 dry cells. When the spark passed the cells charged up the electroscope. Ritter utilized the contraction of a frog's leg as a detector, Lucas and Garrett the explosion produced by the sparks in an explosive mixture of hydrogen and oxygen; while Bjerknes and Franke used the mechanical attraction between oppositely charged conductors. If the two sides of the spark gap are connected with the two pairs of quadrants of a very delicate electrometer, the needle of which is connected with one pair of quadrants, there will be a deflection of the electrometer when the detector is struck by electric waves. A very efficient detector is that invented by E. Rutherford (*Trans. Roy. Soc.* A. 1897, 189, p. 1); it consists of a bundle of fine iron wires magnetized to saturation and placed inside a small magnetizing coil, through which the electric waves cause rapidly alternating currents to pass which demagnetize the soft iron. If the instrument is used to detect waves in air, long straight wires are attached to the ends of the demagnetizing coil to collect the energy from the field; to investigate waves in wires it is sufficient to make a loop or two in the wire and place the magnetized piece of iron inside it. The amount of demagnetization which can be observed by the change in the deflection of a magnetometer placed near the iron, measures the intensity of the electric waves, and very accurate determinations can be made with ease with this apparatus. It is also very delicate, though in this respect it does not equal the detector to be next described, the coherer; Rutherford got indications in 1895 when the vibrator was ¾ of a mile away from the detector, and where the waves had to traverse a thickly populated part of Cambridge. It can also be used to measure the coefficient of damping of the electric waves, for since the wire is initially magnetized to saturation, if the direction of the current when it first begins to flow in the magnetizing coil is such as to tend to increase the magnetization of the wire, it will produce no effect, and it will not be until the current is reversed that the wire will lose some of its magnetization. The effect then gives the measure of the intensity half a period after the commencement of the waves. If the wire is put in the coil the opposite way, *i.e.* so that the magnetic force due to the current begins at once to demagnetize the wire, the demagnetization gives a measure of the initial intensity of the waves. Comparing this result with that obtained when the wires were reversed, we get the coefficient of damping. A very convenient detector of electric waves is the one discovered almost simultaneously by Fessenden (*Electrotech. Zeits.*, 1903, 24, p. 586) and Schlömilch (*ibid.* p. 959). This consists of an electrolytic cell in which one of the electrodes is an exceedingly fine point. The electromotive force in the circuit is small, and there is large polarization in the circuit with only a small current. When the circuit is struck by electric waves there is an increase in the currents due to the depolarization of the circuit. If a galvanometer is in the circuit, the increased deflection of the instrument will indicate the presence of the waves.

§ 7. *Coherers.*—The most sensitive detector of electric waves is the "coherer," although for metrical work it is not so suitable as that just described. It depends upon the fact discovered by Branly (*Comptes rendus*, 111, p. 785; 112, p. 90) that the resistance between loose metallic contacts, such as a pile of iron turnings, diminishes when they are struck by an electric wave. One of the forms made by Lodge (*The Work of Hertz and some of his Successors*, 1894) on this principle consists simply of a glass tube containing iron turnings, in contact with which are wires led into opposite ends of the tube. The arrangement is placed in series with a galvanometer (one of the simplest kind will do) and a battery; when the iron turnings are struck by electric waves their resistance is diminished and the deflection of the galvanometer is increased. Thus the deflection of the galvanometer can be used to indicate the arrival of electric waves. The tube must be tapped between each experiment, and the deflection of the galvanometer brought back to about its original value. This detector is marvellously delicate, but not metrical, the change produced in the resistance depending upon so many things besides the intensity of the waves that the magnitude of the galvanometer deflection is to some extent a matter of chance. Instead of the iron turnings we may use two iron wires, one resting on the other; the resistance of this contact will be altered by the incidence of the waves. To get greater regularity Bose uses, instead of the iron turnings, spiral springs, which are pushed against each other by means of a screw until the most sensitive state is attained. The sensitiveness of the coherer depends on the electromotive force put in the galvanometer circuit. Very sensitive ones can be made by using springs of very fine silver wire coated electrolytically with nickel. Though the impact of electric waves generally produces a diminution of resistance with these loose contacts, yet there are exceptions to the rule. Thus Branly showed that with lead peroxide, PbO_2, there is an increase in resistance. Aschkinass proved the same to be true with copper sulphide, CuS; and Bose showed that with potassium there is an increase of resistance and great power of self-recovery of the original resistance after the waves have ceased. Several theories of this action have been proposed. Branly (*Lumière électrique*, 40, p. 511) thought that the small sparks which certainly pass between adjacent portions of metal clear away layers of oxide or some other kind of non-conducting film, and in this way improve the contact. It would seem that if this theory is true the films must be of a much more refined kind than layers of oxide or dirt, for the coherer effect has been observed with clean non-oxidizable metals. Lodge explains the effect by supposing that the heat produced by the sparks fuses adjacent portions of metal into contact and hence diminishes the resistance; it is from this view of the action that the name coherer is applied to the detector. Auerbeck thought that the effect was a mechanical one due to the electrostatic attractions between the various small pieces of metal. It is probable that some or all of these causes are at work in some cases, but the effects of potassium make us hesitate to accept any of them as the complete explanation. Blanc (*Ann. chim. phys.*, 1905, [8] 6, p. 5), as the result of a long series of experiments, came to the conclusion that coherence is due to pressure. He regarded the outer layers as different from the mass of the metal and having a much greater specific resistance. He supposed that when two pieces of metal are pressed together the molecules diffuse across the surface, modifying the surface layers and increasing their conductivity.

§ 8. *Generators of Electric Waves.*—Bose (*Phil. Mag.* 43, p. 55) designed an instrument which generates electric waves with a length of not more than a centimetre or so, and therefore allows their properties to be demonstrated with apparatus of moderate dimensions. The waves are excited by sparking between two platinum beads carried by jointed electrodes; a platinum sphere is placed between the beads, and the distance between the beads and the sphere can be adjusted by bending the electrodes. The diameter of the sphere is 8 mm., and the wave length of the shortest electrical waves generated is said to be about 6 mm. The beads are connected with the terminals of a small induction coil, which, with the battery to work it and the sparking arrangement, are enclosed in a metal box, the radiation passing out through a metal tube opposite to the spark gap. The ordinary vibrating break of the coil is not used, a single spark made by making and breaking the circuit by means of a button outside the box being employed instead. The detector is one of the spiral spring coherers previously described; it is shielded from external disturbance by being enclosed in a metal box provided with a funnel-shaped opening to admit the radiation. The wires leading from the coherers to the galvanometer are also surrounded by metal tubes to protect them from stray radiation. The radiating apparatus and the receiver are mounted on stands sliding in an optical bench. If a parallel beam of radiation is required, a cylindrical lens of ebonite or sulphur is mounted in a tube fitting on to the radiator tube and stopped by a guide when the spark is at the principal focal line of the lens. For experiments requiring angular measurements a spectrometer circle is mounted on one of the sliding stands, the receiver being carried on a radial arm and pointing to the centre of the circle. The arrangement is represented in fig. 5.

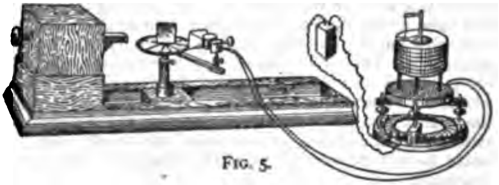


FIG. 5.

With this apparatus the laws of reflection, refraction and polarization can readily be verified, and also the double refraction of crystals, and of bodies possessing a fibrous or laminated structure such as jute or books. (The double refraction of electric waves seems first to have been observed by Righi, and other researches on this subject have been made by Garbasso and Mack.) Bose showed the rotation of the plane of polarization by means of pieces of twisted jute rope; if the pieces were arranged so that their twists were all in one direction and placed in the path of the radiation, they rotated the plane of polarization in a direction depending upon the direction of twist; if they were mixed so that there were as many twisted in one direction as the other, there was no rotation.

A series of experiments showing the complete analogy between electric and light waves is described by Righi in his book *L'Ottica delle oscillazioni elettriche*. Righi's exciter, which is especially convenient when large statical electric machines are used instead of induction coils, is shown in fig. 6. E and F are balls connected with the terminals of the machine, and AB and CD are conductors insulated from each other, the ends B, C, between which the sparks pass, being immersed in vaseline oil. The period of the vibrations given out by the system is adjusted by means of metal plates M and N attached to AB and CD. When the waves are produced by induction coils or by electrical machines the intervals between the emission of different sets of waves occupy by far the largest part of the time. Simon (*Wied. Ann.*, 1898, 64, p. 293; *Phys. Zeit.*, 1901, 2, p. 253), Duddell (*Electrician*, 1900, 46, p. 269) and Poulsen (*Electrotech. Zeits.*, 1906, 27, p. 1070) reduced these intervals very considerably by using the electric arc to excite the waves, and in these methods the terminals between which the arc is passing are connected through coils with self-induction L to the plates of a condenser of capacity C. The arc is not steady, but is continually varying. This is especially the case when it passes through hydrogen. These variations excite vibrations with a period $2\pi\sqrt{(LC)}$ in the circuit containing the capacity of the self-induction. By this method Duddell produced waves with a frequency of 40,000. Poulsen, who cooled the terminals of the arc, produced waves with a frequency of 1,000,000, while Stechodro (*Ann. der Phys.* 27, p. 225) claims to have produced waves with three hundred times this frequency, *i.e.* having a wave length of about a metre. When the self-induction

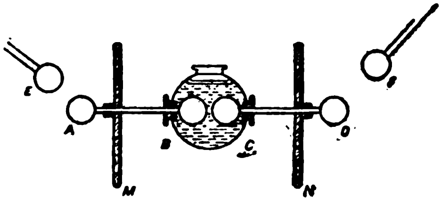


FIG. 6.

and capacity are large so that the frequency comes within the limits of the frequency of audible notes, the system gives out a musical note, and the arrangement is often referred to as the singing arc.

§ 9. *Waves in Wires.*—Many problems on electric waves along wires can readily be investigated by a method due to Lecher (*Wied. Ann.* 41, p. 850), and known as Lecher's bridge, which furnishes us with a means of dealing with waves of a definite and determinable wave-length. In this arrangement (fig. 7) two large plates A and B are, as in Hertz's exciter, connected with the terminals of an induction coil; opposite these and insulated from them are two smaller plates D, E, to which long parallel wires DFH, EGJ are attached. These wires are bridged across by a wire LM, and their farther ends H, J, may be insulated, or connected together, or with the plates of a condenser. To detect the waves in the circuit beyond the bridge, Lecher used an exhausted tube placed across the wires, and Rubens a bolometer, but Rutherford's detector is the most convenient and accurate. If this detector is placed in a fixed position at the end of the circuit, it is found that the deflections of this detector depend greatly upon the position of the bridge LM, rising rapidly to a maximum for some positions, and falling rapidly away when the bridge is displaced. As the bridge is moved from the coil end towards the detector the deflections show periodic variations, such as are represented in fig. 8 when the ordinates represent the deflections of the detector and the abscissae the distance of the bridge from the ends D, E. The maximum deflections of the detector correspond to the positions in which the two circuits DFLMGE, HLMJ (in which the vibrations are but slightly damped) are in resonance. For since the self-induction and resistance of the bridge LM is very small compared with that of the circuit beyond, it follows from the theory of circuits in parallel that only a small part of the current will in general flow round the longer circuit; it is only when the two circuits DFLMGE, HLMJ are in resonance that a considerable current will flow round the latter. Hence when we get a maximum effect in the detector we know that the waves we are dealing with are those corresponding to the free periods of the system HLMJ, so that if we know the free periods of this circuit we know the wave length of the electric waves under consideration. Thus if the ends of the wires H, J are free and have no capacity, the current along them must vanish at H and J, which must be in opposite electric condition. Hence half the wave length must be an odd submultiple of the length of the circuit HLMJ. If H and J are connected together the wave length must be a submultiple of the length of this circuit. When the capacity at the ends is appreciable the wave length of the circuit is determined by a somewhat complex expression. To facilitate the determination of the wave length in such cases, Lecher introduced a second bridge L'M', and moved this about until the deflection of the detector was a maximum; when this occurs the wave length is one of those corresponding to the closed circuit LMM'L', and must therefore be a submultiple of the length of the circuit. Lecher showed that if instead of using a single wire LM to form the bridge, he used two parallel wires PQ, LM, placed close together, the currents in the further circuit were hardly appreciably diminished when the main wires were cut between PL and QM. Blondlot used a modification of this apparatus better suited for the production of short waves. In his form (fig. 9) the exciter consists of two semicircular arms connected with the terminals of an induction coil, and the long wires, instead of being connected with the small plates, form a circuit round the exciter.

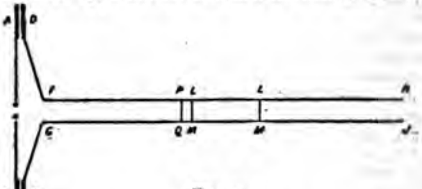


FIG. 7.

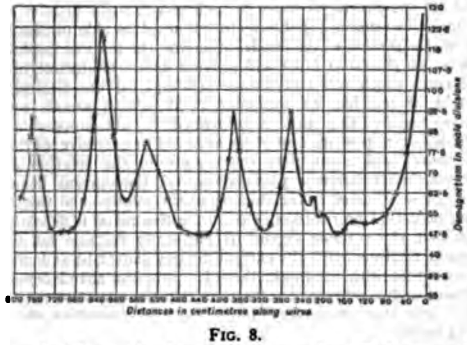


FIG. 8.

As an example of the use of Lecher's arrangement, we may quote Drude's application of the method to find the specific induction capacity of dielectrics under electric oscillations of varying frequency. In this application the ends of the wire are connected to the plates of a condenser, the space between whose plates can be filled with the liquid whose specific inductive capacity is required, and the bridge is moved until the detector at the end of the circuit gives the maximum deflection. Then if λ is the wave length of the waves, λ is the wave length of one of the free vibrations of the system HLMJ; hence if C is the capacity of the condenser at the end in electrostatic measure we have

$$\frac{\cot \frac{2\pi l}{\lambda}}{\frac{2\pi l}{\lambda}} = \frac{C}{C'l}$$

where l is the distance of the condenser from the bridge and C' is the capacity of unit length of the wire. In the condenser part of the lines of force will pass through air and part through the dielectric; hence C will be of the form $C_0 + KC_1$ where K is the specific inductive capacity of the dielectric. Hence if l is the distance of maximum deflection when the dielectric is replaced by air, l' when filled with a dielectric whose specific inductive capacity is known to be K', and l'' the distance when filled with the dielectric whose specific inductive capacity is required, we easily see that—

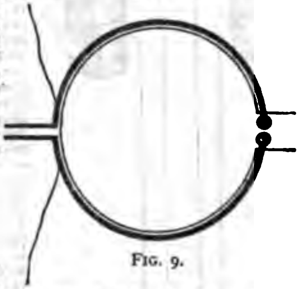


FIG. 9.

$$\frac{\cot\frac{2\pi l}{\lambda} - \cot\frac{2\pi l'}{\lambda}}{\cot\frac{2\pi l}{\lambda} - \cot\frac{2\pi l''}{\lambda}} = \frac{1-K'}{1-K}$$

an equation by means of which K can be determined. It was in this way that Drude investigated the specific inductive capacity with varying frequency, and found a falling off in the specific inductive capacity with increase of frequency when the dielectrics contained the radicle OH. In another method used by him the wires were led through long tanks filled with the liquid whose specific inductive capacity was required; the velocity of propagation of the electric waves along the wires in the tank being the same as the velocity of propagation of an electromagnetic disturbance through the liquid filling the tank, if we find the wave length of the waves along the wires in the tank, due to a vibration of a given frequency, and compare this with the wave lengths corresponding to the same frequency when the wires are surrounded by air, we obtain the velocity of propagation of electromagnetic disturbance through the fluid, and hence the specific inductive capacity of the fluid.

§ 10. *Velocity of Propagation of Electromagnetic Effects through Air.*—The experiments of Sarasin and De la Rive already described (see § 5) have shown that, as theory requires, the velocity of propagation of electric effects through air is the same as along wires. The same result had been arrived at by J. J. Thomson, although from the method he used greater differences between the velocities might have escaped detection than was possible by Sarasin and De la Rive's method. The velocity of waves along wires has been directly determined by Blondlot by two different methods. In the first the detector consisted of two parallel plates about 6 cm. in diameter placed a fraction of a millimetre apart, and forming a condenser whose capacity C was determined in electromagnetic measure by Maxwell's method. The plates were connected by a rectangular circuit whose self-induction L was calculated from the dimensions of the rectangle and the size of the wire. The time of vibration T is equal to $2\pi\sqrt{(LC)}$. (The wave length corresponding to this time is long compared with the length of the circuit, so that the use of this formula is legitimate.) This detector is placed between two parallel wires, and the waves produced by the exciter are reflected from a movable bridge. When this bridge is placed just beyond the detector vigorous sparks are observed, but as the bridge is pushed away a place is reached where the sparks disappear; this place is distance $2/\lambda$ from the detector, when λ is the wave length of the vibration given out by the detector. The sparks again disappear when the distance of the bridge from the detector is $3\lambda/4$. Thus by measuring the distance between two consecutive positions of the bridge at which the sparks disappear λ can be determined, and v, the velocity of propagation, is equal to λ/T. As the means of a number of experiments Blondlot found v to be $3{\cdot}02\times10^{10}$ cm./sec., which, within the errors of experiment, is equal to 3×10^{10} cm./sec., the velocity of light. A second method used by Blondlot, and one which does not involve the calculation of the period, is as follows:—A and A′ (fig. 10) are two equal Leyden jars coated inside and outside with tin-foil. The outer coatings form two separate rings a, a_1; a', a'_1, and the inner coatings are connected with the poles of the induction coil by means of the metal pieces b, b'. The sharply pointed conductors p and p', the points of which are about ½ mm. apart, are connected with the rings of the tin-foil a and a', and two long copper wires pca_1, $p'c'a'_1$, 1029 cm. long, connect these points with the other rings a_1, a_1'. The rings aa', a_1a_1', are connected by wet strings so as to charge up the jars. When a spark passes between b and b', a spark at once passes between pp', and this is followed by another spark when the waves travelling by the paths $a_1\,cp$, $a'_1c'p'$ reach p and p'. The time between the passage of these sparks, which is the time taken by the waves to travel 1029 cm., was observed by means of a rotating mirror, and the velocity measured in 15 experiments varied between $2{\cdot}92\times10^{10}$ and $3{\cdot}03\times10^{10}$ cm./sec., thus agreeing well with that deduced by the preceding method. Other determinations of the velocity of electromagnetic propagation have been made by Lodge and Glazebrook, and by Saunders.

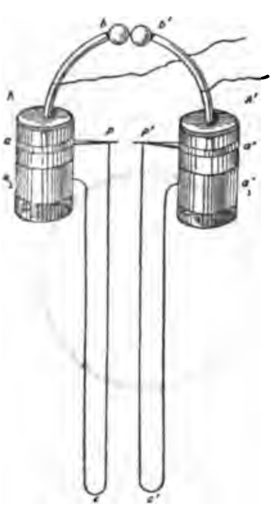


FIG. 10.

On Maxwell's electromagnetic theory the velocity of propagation of electromagnetic disturbances should equal the velocity of light, and also the ratio of the electromagnetic unit of electricity to the electrostatic unit. A large number of determinations of this ratio have been made:—

Observer.	Date.	Ratio $10^{10}\times$.
Klemenčič	1884	3·019 cm./sec.
Himstedt	1888	3·009 cm./sec.
Rowland	1889	2·9815 cm./sec.
Rosa	1889	2·9993 cm./sec.
J. J. Thomson and Searle	1890	2·9955 cm./sec.
Webster	1891	2·987 cm./sec.
Pellat	1891	3·009 cm./sec.
Abraham	1892	2·992 cm./sec.
Hurmuzescu	1895	3·002 cm./sec.
Rosa	1908	2·9963 cm./sec.

The mean of these determinations is $3{\cdot}001\times10^{10}$ cm./sec., while the mean of the last five determinations of the velocity of light in air is given by Himstedt as $3{\cdot}002\times10^{10}$ cm./sec. From these experiments we conclude that the velocity of propagation of an electromagnetic disturbance is equal to the velocity of light, and to the velocity required by Maxwell's theory.

In experimenting with electromagnetic waves it is in general more difficult to measure the period of the oscillations than their wave length. Rutherford used a method by which the period of the vibration can easily be determined; it is based upon the theory of the distribution of alternating currents in two circuits ACB, ADB in parallel. If A and B are respectively the maximum currents in the circuits ACB, ADB, then

$$\frac{A}{B}=\sqrt{\frac{S^2+(N-M)^2p^2}{R^2+(L-M)^2p^2}}$$

when R and S are the resistances, L and N the coefficients of self-induction of the circuits ACB, ADB respectively, M the coefficient of mutual induction between the circuits, and p the frequency of the currents. Rutherford detectors were placed in the two circuits, and the circuits adjusted until they showed that A=B; when this is the case

$$p^2=\frac{R^2-S^2}{N^2-L^2-2M(N-L)}.$$

If we make one of the circuits, ADB, consist of a short length of a high liquid resistance, so that S is large and N small, and the other circuit ACB of a low metallic resistance bent to have considerable self-induction, the preceding equation becomes approximately $p=S/L$, so that when S and L are known p is readily determined. (J. J. T.)

ELECTROCHEMISTRY. The present article deals with processes that involve the electrolysis of aqueous solutions, whilst those in which electricity is used in the manufacture of chemical products at furnace temperatures are treated under ELECTROMETALLURGY, although, strictly speaking, in some cases (*e.g.* calcium carbide and phosphorus manufacture) they are not truly metallurgical in character. For the theory and elemental laws of electro-deposition see ELECTROLYSIS; and for the construction and use of electric generators see DYNAMO and BATTERY: *Electric*. The importance of the subject may be gauged by the fact that all the aluminium, magnesium; sodium, potassium, calcium carbide, carborundum and artificial graphite, now placed on the market, is made by electrical processes, and that the use of such processes for the refining of copper and silver, and in the manufacture of phosphorus, potassium chlorate and bleach, already pressing very heavily on the older non-electrical systems, is every year extending. The convenience also with which the energy of waterfalls can be converted into electric energy has led to the introduction of chemical industries into countries and districts where, owing to the absence of coal, they were previously unknown. Norway and Switzerland have become important producers of chemicals, and pastoral districts such as those in which Niagara or Foyers are situated manufacturing centres. In this way the development of the electrochemical industry is in a marked degree altering the distribution of trade throughout the world.

Electrolytic Refining of Metals.—The principle usually followed in the electrolytic refining of metals is to cast the impure metal into plates, which are exposed as anodes in a suitable solvent, commonly a salt of the metal under treatment. On passing a current of electricity, of which the volume and pressure are adjusted to the conditions of the electrolyte and electrodes, the anode slowly dissolves, leaving the insoluble impurities in the form of a sponge, if the proportion be considerable, but otherwise as a mud or slime which becomes detached from the anode surface and must be prevented from coming into contact with the cathode. The metal to be refined passing into solution is concurrently deposited at the cathode. Soluble impurities which are more electro-negative than the metal under treatment must, if present, be removed by a preliminary process, and the voltage and other conditions must be so selected that none of the more electro-positive metals are co-deposited with the metal to be refined. From these and other considerations it is obvious that (1) the electrolyte must be such as will freely dissolve the metal to be refined; (2) the electrolyte must be able to dissolve the major portion of the anode, otherwise the mass of insoluble matter on the outer layer will prevent access of electrolyte to the core, which will thus escape refining; (3) the electrolyte should, if possible, be incapable of dissolving metals more electro-negative than that to be refined; (4) the proportion of soluble electro-positive impurities must not be excessive, or these substances will accumulate too rapidly in the solution and necessitate its frequent purification; (5) the current density must be so adjusted to the strength of the solution and to other conditions that no relatively electro-positive metal is deposited, and that the cathode deposit is physically suitable for subsequent treatment; (6) the current density should be as high as is consistent with the production of a pure and sound deposit, without undue expense of voltage, so that the operation may be rapid and the "turnover" large; (7) the electrolyte should be as good a conductor of electricity as possible, and should not, ordinarily, be altered chemically by exposure to air; and (8) the use of porous partitions should be avoided, as they increase the resistance and usually require frequent renewal. For details of the practical methods see GOLD; SILVER; COPPER and headings for other metals.

Electrolytic Manufacture of Chemical Products.—When an aqueous solution of the salt of an alkali metal is electrolysed, the metal reacts with the water, as is well known, forming caustic alkali, which dissolves in the solution, and hydrogen, which comes off as a gas. So early as 1851 a patent was taken out by Cooke for the production of caustic alkali without the use of a separate current, by immersing iron and copper plates on opposite sides of a porous (biscuit-ware) partition in a suitable cell, containing a solution of the salt to be electrolysed, at 21°-65° C. (70°-150° F.). The solution of the iron anode was intended to afford the necessary energy. In the same year another patent was granted to C. Watt for a similar process, involving the employment of an externally generated current. When an alkaline chloride, say sodium chloride, is electrolysed with one electrode immersed in a porous cell, while caustic soda is formed at the cathode, chlorine is deposited at the anode. If the latter be insoluble, the gas diffuses into the solution and, when this becomes saturated, escapes into the air. If, however, no porous division be used to prevent the intermingling by diffusion of the anode and cathode solutions, a complicated set of subsidiary reactions takes place. The chlorine reacts with the caustic soda, forming sodium hypochlorite, and this in turn, with an excess of chlorine and at higher temperatures, becomes for the most part converted into chlorate, whilst any simultaneous electrolysis of a hydroxide or water and a chloride (so that hydroxyl and chlorine are simultaneously liberated at the anode) also produces oxygen-chlorine compounds direct. At the same time, the diffusion of these compounds into contact with the cathode leads to a partial reduction to chloride, by the removal of combined oxygen by the instrumentality of the hydrogen there evolved. In proportion as the original chloride is thus reproduced, the efficiency of the process is of course diminished. It is obvious that, with suitable methods and apparatus, the electrolysis of alkaline chlorides may be made to yield chlorine, hypochlorites (bleaching liquors), chlorates or caustic alkali, but that great care must be exercised if any of these products is to be obtained pure and with economy. Many patents have been taken out in this branch of electrochemistry, but it is to be remarked that that granted to C. Watt traversed the whole of the ground. In his process a current was passed through a tank divided into two or three cells by porous partitions, hoods and tubes were arranged to carry off chlorine and hydrogen respectively, and the whole was heated to 120° F. by a steam jacket when caustic alkali was being made. Hypochlorites were made, at ordinary temperatures, and chlorates at higher temperatures, in a cell without a partition in which the cathode was placed horizontally immediately above the anode, to favour the mixing of the ascending chlorine with the descending caustic solution.

The relation between the composition of the electrolyte and the various conditions of current-density, temperature and the like has been studied by F. Oettel (*Zeitschrift f. Elektrochem.*, 1894, vol. i. pp. 354 and 474) in connexion with the production of hypochlorites and chlorates in tanks without diaphragms, by C. Häussermann and W. Naschold (*Chemiker Zeitung*, 1894, vol. xviii. p. 857) for their production in cells with porous diaphragms, and by F. Haber and S. Grinberg (*Zeitschrift f. anorgan. Chem.*, 1898, vol. xvi. pp. 198, 329, 438) in connexion with the electrolysis of hydrochloric acid. Oettel, using a 20% solution of potassium chloride, obtained the best yield of hypochlorite with a high current-density, but as soon as 1½% of bleaching chlorine (as hypochlorite) was present, the formation of chlorate commenced. The yield was at best very low as compared with that theoretically possible. The best yield of chlorate was obtained when from 1 to 4% of caustic potash was present. With high current-density, heating the solution tended to increase the proportion of chlorate to hypochlorite, but as the proportion of water decomposed is then higher, the amount of chlorine produced must be less and the total chlorine efficiency lower. He also traced a connexion between alkalinity, temperature and current-density, and showed that these conditions should be mutually adjusted. With a current-density of 130 to 140 amperes per sq. ft., at 3 volts, passing between platinum electrodes, he attained to a current-efficiency of 52%, and each (British) electrical horse-power hour was equivalent to a production of 1378·5 grains of potassium chlorate. In other words, each pound of chlorate would require an expenditure of nearly 5·1 e.h.p. hours. One of the earliest of the more modern processes was that of E. Hermite, which consisted in the production of bleach-liquors by the electrolysis (according to the 1st edition of the 1884 patent) of magnesium or calcium chloride between platinum anodes carried in wooden frames, and zinc cathodes. The solution, containing hypochlorites and chlorates, was then applied to the bleaching of linen, paper-pulp or the like, the solution being used over and over again. Many modifications have been patented by Hermite, that of 1895 specifying the use of platinum gauze anodes, held in ebonite or other frames. Rotating zinc cathodes were used, with scrapers to prevent the accumulation of a layer of insoluble magnesium compounds, which would otherwise increase the electrical resistance beyond reasonable limits. The same inventor has patented the application of electrolysed chlorides to the purification of starch by the oxidation of less stable organic bodies, to the bleaching of oils, and to the purification of coal gas, spirit and other substances. His system for the disinfection of sewage and similar matter by the electrolysis of chlorides, or of sea-water, has been tried, but for the most part abandoned on the score of expense. Reference may be made to papers written in the early days of the process by C. F. Cross and E. J. Bevan (*Journ. Soc. Chem. Industry*, 1887, vol. vi. p. 170, and 1888, vol. vii. p. 292), and to later papers by P. Schoop (*Zeitschrift f. Elektrochem.*, 1895, vol. ii. pp. 68, 88, 107, 209, 289).

E. Kellner, who in 1886 patented the use of cathode (caustic soda) and anode (chlorine) liquors in the manufacture of cellulose from wood-fibre, and has since evolved many similar processes, has produced an apparatus that has been largely used. It consists of a stoneware tank with a thin sheet of platinum-iridium alloy at either end forming the primary electrodes, and between them a number of glass plates reaching nearly to the bottom, each having a platinum gauze sheet on either side; the two sheets belonging to each plate are in metallic connexion, but insulated from all the others, and form intermediary or bi-polar electrodes. A 10-12% solution of sodium chloride is caused to flow upwards through the apparatus and to overflow into troughs, by which it is conveyed (if necessary through a cooling apparatus) back to the circulating pump. Such a plant has been reported as giving 0·229 gallon of a liquor containing 1% of available chlorine per kilowatt hour, or 0·171 gallon per e.h.p. hour. Kellner has also patented a "bleaching-block," as he terms it, consisting of a frame carrying parallel plates similar in principle to those last described. The block is immersed in the solution to be bleached, and may be lifted in or out as required. O. Knöfler and Gebauer have also a system of bi-polar electrodes, mounted in a frame in appearance resembling a filter-press.

Other Electrochemical Processes.—It is obvious that electrolytic iodine and bromine, and oxygen compounds of these elements, may be produced by methods similar to those applied to chlorides (see ALKALI MANUFACTURE and CHLORATES), and Kellner and others have patented processes with this end in view. *Hydrogen* and *oxygen* may also be produced electrolytically as gases, and their respective reducing and oxidizing powers at the moment of deposition on the electrode are frequently used in the laboratory, and to some extent industrially, chiefly in the field of organic chemistry. Similarly, the formation of organic halogen products may be effected by electrolytic chlorine, as, for example, in the production of *chloral* by the gradual introduction of alcohol into an anode cell in which the electrolyte is a strong solution of potassium chloride. Again, anode reactions, such as are observed in the electrolysis of the fatty acids, may be utilized, as, for example, when the radical CH_3CO_2—deposited at the anode in the electrolysis of acetic acid—is dissociated, two of the groups react to give one molecule of *ethane*, C_2H_6, and two of carbon dioxide. This, which has long been recognized as a class-reaction, is obviously capable of endless variation. Many electrolytic methods have been proposed for the purification of *sugar*; in some of them soluble anodes are used for a few minutes in weak alkaline solutions, so that the caustic alkali from the cathode reaction may precipitate chemically the hydroxide of the anode metal dissolved in the liquid, the precipitate carrying with it mechanically some of the impurities present, and thus clarifying the solution. In others the current is applied for a longer time to the original sugar-solution with insoluble (*e.g.* carbon) anodes. F. Peters has found that with these methods the best results are obtained when ozone is employed in addition to electrolytic oxygen. Use has been made of electrolysis in *tanning* operations, the current being passed through the tan-liquors containing the hides. The current, by endosmosis, favours the passage of the solution into the hide-substance, and at the same time appears to assist the chemical combinations there occurring, hence a great reduction in the time required for the completion of the process. Many patents have been taken out in this direction, one of the best known being that of Groth, experimented upon by S. Rideal and A. P. Trotter (*Journ. Soc. Chem. Indust.*, 1891, vol. x. p. 425), who employed copper anodes, 4 sq. ft. in area, with current-densities of 0·375 to 1 (ranging in some cases to 7·5) ampere per sq. ft., the best results being obtained with the smaller current-densities. Electrochemical processes are often indirectly used, as for example in the Villon process (*Elec. Rev.*, New York, 1899, vol. xxxv. p. 375) applied in Russia to the manufacture of alcohol, by a series of chemical reactions starting from the production of acetylene by the action of water upon calcium carbide. The production of *ozone* in small quantities during electrolysis, and by the so-called silent discharge, has long been known, and the Siemens induction tube has been developed for use industrially. The Siemens and Halske ozonizer, in form somewhat resembling the old laboratory instrument, is largely used in Germany; working with an alternating current transformed up to 6500 volts, it has been found to give 280 grains or more of ozone per e. h. p. hour. E. Andreoli (whose first British ozone patent was No. 17,426 of 1891) uses flat aluminium plates and points, and working with an alternating current of 3000 volts is said to have obtained 1440 grains per e.h.p. hour. Yarnold's process, using corrugated glass plates coated on one side with gold or other metal leaf, is stated to have yielded as much as 2700 grains per e.h.p. hour. The ozone so prepared has numerous uses, as, for example, in bleaching oils, waxes, fabrics, &c., sterilizing drinking-water, maturing wines, cleansing foul beer-casks, oxidizing oil, and in the manufacture of vanillin.

For further information the following books, among others, may be consulted:—Haber, *Grundriss der technischen Elektrochemie* (München, 1898); Borchers and M'Millan, *Electric Smelting and Refining* (London, 1904); E. D. Peters, *Principles of Copper Smelting* (New York, 1907); F. Peters, *Angewandte Elektrochemie*, vols. ii. and iii. (Leipzig, 1900); Gore, *The Art of Electrolytic Separation of Metals* (London, 1890); Blount, *Practical Electro-Chemistry* (London, 1906); G. Langbein, *Vollständiges Handbuch der galvanischen Metall-Niederschläge* (Leipzig, 1903), Eng. trans. by W. T. Brannt (1909); A. Watt, *Electro-Plating and Electro-Refining of Metals* (London, 1902); W. H. Wahl, *Practical Guide to the Gold and Silver Electroplater, &c.* (Philadelphia, 1883); Wilson, *Stereotyping and Electrotyping* (London); Lunge, *Sulphuric Acid and Alkali*, vol. iii. (London, 1909). Also papers in various technical periodicals. The industrial aspect is treated in a Gartside Report, *Some Electro-Chemical Centres* (Manchester, 1908), by J. N. Pring. (W. G. M.)

ELECTROCUTION (an anomalous derivative from "electro-execution"; syn. "electrothanasia"), the popular name, invented in America, for the infliction of the death penalty on criminals (see CAPITAL PUNISHMENT) by passing through the body of the condemned a sufficient current of electricity to cause death. The method was first adopted by the state of New York, a law making this method obligatory having been passed and approved by the governor on the 4th of June 1888. The law provides that there shall be present, in addition to the warden, two physicians, twelve reputable citizens of full age, seven deputy sheriffs, and such ministers, priests or clergymen, not exceeding two, as the criminal may request. A post-mortem examination of the body of the convict is required, and the body, unless claimed by relatives, is interred in the prison cemetery with a sufficient quantity of quicklime to consume it. The law became effective in New York on the 1st of January 1889. The first criminal to be executed by electricity was William Kemmler, on the 6th of August 1890, at Auburn prison. The validity of the New York law had previously been attacked in regard to this case (*Re Kemmler*, 1889; 136 U.S. 436), as providing "a cruel and unusual punishment" and therefore being contrary to the Constitution; but it was sustained in the state courts and finally in the Federal courts. By 1906 about one hundred and fifteen murderers had been successfully executed by electricity in New York state in Sing Sing, Auburn and Dannemora prisons. The method has also been adopted by the states of Ohio (1896), Massachusetts (1898), New Jersey (1906), Virginia (1908) and North Carolina (1910).

The apparatus consists of a stationary engine, an alternating dynamo capable of generating a current at a pressure of 2000 volts, a "death-chair" with adjustable head-rest, binding straps and adjustable electrodes devised by E. F. Davis, the state electrician of New York. The voltmeter, ammeter and switch-board controlling the current are located in the execution-room; the dynamo-room is communicated with by electric signals. Before each execution the entire apparatus is thoroughly tested. When everything is in readiness the criminal is brought in and seats himself in the death-chair. His head, chest, arms and legs are secured by broad straps; one electrode thoroughly moistened with salt-solution is affixed to the head, and another to the calf of one leg, both electrodes being moulded so as to secure good contact. The application of the current is usually as follows: the contact is made with a high voltage (1700-1800 volts) for 5 to 7 seconds, reduced to 200 volts until a half-minute has elapsed; raised to high voltage for 3 to 5 seconds, again reduced to low voltage for 3 to 5 seconds, again reduced to a low voltage until one minute has elapsed, when it is again raised to the high voltage for a few seconds and the contact broken. The ammeter usually shows that from 7 to 10 amperes pass through the criminal's body. A second or even a third brief contact is sometimes made, partly as a precautionary measure, but rather the more completely to abolish reflexes in the dead body. Calculations have shown that by this method of execution from 7 to 10 h. p. of energy are liberated in the criminal's body. The time consumed by the strapping-in process is usually about 45 seconds, and the first contact is made about 70 seconds after the criminal has entered the death-chamber.

When properly performed the effect is painless and instantaneous death. The mechanism of life, circulation and respiration cease with the first contact. Consciousness is blotted out instantly, and the prolonged application of the current ensures permanent derangement of the vital functions beyond recovery. Occasionally the drying of the sponges through undue generation of heat causes desquamation or superficial blistering of the skin at the site of the electrodes. Post-mortem discoloration, or post-mortem lividity, often appears during the first contact. The pupils of the eyes dilate instantly and remain dilated after death.

The post-mortem examination of "electrocuted" criminals reveals a number of interesting phenomena. The temperature of the body rises promptly after death to a very high point. At the site of the leg electrode a temperature of over 128° F. was registered within fifteen minutes in many cases. After the removal of the brain the temperature recorded in the spinal canal was often over 120° F. The development of this high temperature is to be regarded as resulting from the active metabolism of tissues not (somatically) dead within a body where all vital mechanisms have been abolished, there being no circulation to carry off the generated heat. The heart, at first flaccid when exposed soon after death, gradually contracts and assumes a tetanized condition; it empties itself of all blood and takes the form of a heart in systole. The lungs are usually devoid of blood and weigh only 7 or 8 ounces (avoird.) each. The blood is profoundly altered biochemically; it is of a very dark colour and it rarely coagulates. (E. A. S.*)

ELECTROKINETICS, that part of electrical science which is concerned with the properties of electric currents.

Classification of Electric Currents.—Electric currents are classified into (*a*) conduction currents, (*b*) convection currents, (*c*) displacement or dielectric currents. In the case of conduction currents electricity flows or moves through a stationary material body called the conductor. In convection currents electricity is carried from place to place with and on moving material bodies or particles. In dielectric currents there is no continued movement of electricity, but merely a limited displacement through or in the mass of an insulator or dielectric. The path in which an electric current exists is called an electric circuit, and may consist wholly of a conducting body, or partly of a conductor and insulator or dielectric, or wholly of a dielectric. In cases in which the three classes of currents are present together the true current is the sum of each separately. In the case of conduction currents the circuit consists of a conductor immersed in a non-conductor, and may take the form of a thin wire or cylinder, a sheet, surface or solid. Electric conduction currents may take place in space of one, two or three dimensions, but for the most part the circuits we have to consider consist of thin cylindrical wires or tubes of conducting material surrounded with an insulator; hence the case which generally presents itself is that of electric flow in space of one dimension. Self-closed electric currents taking place in a sheet of conductor are called "eddy currents."

Although in ordinary language the current is said to flow in the conductor, yet according to modern views the real pathway of the energy transmitted is the surrounding dielectric, and the so-called conductor or wire merely guides the transmission of energy in a certain direction. The presence of an electric current is recognized by three qualities or powers: (1) by the production of a magnetic field, (2) in the case of conduction currents, by the production of heat in the conductor, and (3) if the conductor is an electrolyte and the current unidirectional, by the occurrence of chemical decomposition in it. An electric current may also be regarded as the result of a movement of electricity across each section of the circuit, and is then measured by the quantity conveyed per unit of time. Hence if dq is the quantity of electricity which flows across any section of the conductor in the element of time dt, the current $i=dq/dt$.

Electric currents may be also classified as constant or variable and as unidirectional or "direct," that is flowing always in the same direction, or "alternating," that is reversing their direction at regular intervals. In the last case the variation of current may follow any particular law. It is called a "periodic current" if the cycle of current values is repeated during a certain time called the periodic time, during which the current reaches a certain maximum value, first in one direction and then in the opposite, and in the intervals between has a zero value at certain instants. The frequency of the periodic current is the number of periods or cycles in one second, and alternating currents are described as low frequency or high frequency, in the latter case having some thousands of periods per second. A periodic current may be represented either by a wave diagram, or by a polar diagram.[1] In the first case we take a straight line to represent the uniform flow of time, and at small equidistant intervals set up perpendiculars above or below the time axis, representing to scale the current at that instant in one direction or the other; the extremities of these ordinates then define a wavy curve which is called the wave form of the current (fig. 1). It is obvious that this curve can only be a single valued curve. In one particular and important case the form of the current curve is a simple harmonic curve or simple sine curve. If T represents the periodic time in which the cycle of current values takes place, whilst n is the frequency or number of periods per second and p stands for $2\pi n$, and i is the value of the current at any instant t, and I its maximum value, then in this case we have $i=\mathrm{I}\sin pt$. Such a current is called a "sine current" or simple periodic current.

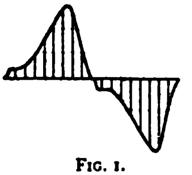


FIG. 1.

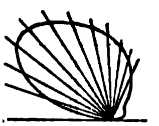


FIG. 2.

In a polar diagram (fig. 2) a number of radial lines are drawn from a point at small equiangular intervals, and on these lines are set off lengths proportional to the current value of a periodic current at corresponding intervals during one complete period represented by four right angles. The extremities of these radii delineate a polar curve. The polar form of a simple sine current is obviously a circle drawn through the origin. As a consequence of Fourier's theorem it follows that any periodic curve having any wave form can be imitated by the superposition of simple sine currents differing in maximum value and in phase.

Definitions of Unit Electric Current.—In electrokinetic investigations we are most commonly limited to the cases of unidirectional continuous and constant currents (C.C. or D.C.), or of simple periodic currents, or alternating currents of sine form (A.C.). A continuous electric current is measured either by the magnetic effect it produces at some point outside its circuit, or by the amount of electrochemical decomposition it can perform in a given time on a selected standard electrolyte. Limiting our consideration to the case of linear currents or currents flowing in thin cylindrical wires, a definition may be given in the first place of the unit electric current in the centimetre, gramme, second (C.G.S.) of electromagnetic measurement (see UNITS, PHYSICAL). H. C. Oersted discovered in 1820 that a straight wire conveying an electric current is surrounded by a magnetic field the lines of which are self-closed lines embracing the electric circuit (see ELECTRICITY and ELECTROMAGNETISM). The unit current in the electromagnetic system of measurement is defined as the current which, flowing in a thin wire bent into the form of a circle of one centimetre in radius, creates a magnetic field having a strength of 2π units at the centre of the circle, and therefore would exert a mechanical force of 2π dynes on a unit magnetic pole placed at that point (see MAGNETISM). Since the length of the circumference of the circle of unit radius is 2π units, this is equivalent to stating that the unit current on the electromagnetic C.G.S. system is a current such that unit length acts on unit magnetic pole with a unit force at a unit of distance. Another definition, called the electrostatic unit of current, is as follows: Let any conductor be charged with electricity and discharged through a thin wire at such a rate that one electrostatic unit of quantity (see ELECTROSTATICS) flows past any section of the wire in one unit of time. The electromagnetic unit of current defined as above is 3×10^{10} times larger than the electrostatic unit.

In the selection of a practical unit of current it was considered that the electromagnetic unit was too large for most purposes, whilst the electrostatic unit was too small; hence a practical unit of current called 1 ampere was selected, intended originally to be 1/10 of the absolute electromagnetic C.G.S. unit of current as above defined. The practical unit of current, called the international ampere, is, however, legally defined at the present time as the continuous unidirectional current which when flowing through a neutral solution of silver nitrate deposits in one second on the cathode or negative pole 0·001118 of a gramme of silver. There is reason to believe that the international unit is smaller by about one part in a thousand, or perhaps by one part in 800, than the theoretical ampere defined as 1/10 part of the absolute electromagnetic unit. A periodic or alternating current is said to have a value of 1 ampere if when passed through a fine wire it produces in the same time the same heat as a unidirectional continuous current of 1 ampere as above electrochemically defined. In the case of a simple periodic alternating current having a simple sine wave form, the maximum value is equal to that of the equiheating continuous current multiplied by $\surd 2$. This equiheating continuous current is called the effective or root-mean-square (R.M.S.) value of the alternating one.

Resistance.—A current flows in a circuit in virtue of an electromotive force (E.M.F.), and the numerical relation between the current and E.M.F. is determined by three qualities of the circuit called respectively, its resistance (R), inductance (L), and capacity (C). If we limit our consideration to the case of continuous unidirectional conduction currents, then the relation between current and E.M.F. is defined by Ohm's law, which states that the numerical value of the current is obtained as the quotient of the electromotive force by a certain constant of the circuit called its resistance, which is a function of the geometrical form of the circuit, of its nature, *i.e.* material, and of its temperature, but is independent of the electromotive force or current. The resistance (R) is measured in units called ohms and the electromotive force in volts (V); hence for a continuous current the value of the current in amperes (A) is obtained as the quotient of the electromotive force acting in the circuit reckoned in volts by the resistance in ohms, or $A=V/R$. Ohm established his law by a course of reasoning which was similar to that on which J. B. J. Fourier based his investigations on the uniform motion of heat in a conductor. As a matter of fact, however, Ohm's law merely states the direct proportionality of steady current to steady electromotive force in a circuit, and asserts that this ratio is governed by the numerical value of a quality of the conductor, called its resistance, which is independent of the current, provided that a correction is made for the change of temperature produced by the current. Our belief, however, in its universality and accuracy rests upon the close agreement between deductions made from it and observational results, and although it is not derivable from any more fundamental principle, it is yet one of the most certainly ascertained laws of electrokinetics.

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[1] See J. A. Fleming, *The Alternate Current Transformer*, vol. i. p. 519.

Ohm's law not only applies to the circuit as a whole but to any part of it, and provided the part selected does not contain a source of electromotive force it may be expressed as follows:—The difference of potential (P.D.) between any two points of a circuit including a resistance R, but not including any source of electromotive force, is proportional to the product of the resistance and the current i in the element, provided the conductor remains at the same temperature and the current is constant and unidirectional. If the current is varying we have, however, to take into account the electromotive force (E.M.F.) produced by this variation, and the product Ri is then equal to the difference between the observed P.D. and induced E.M.F.

We may otherwise define the resistance of a circuit by saying that it is that physical quality of it in virtue of which energy is dissipated as heat in the circuit when a current flows through it. The power communicated to any electric circuit when a current i is created in it by a continuous unidirectional electromotive force E is equal to Ei, and the energy dissipated as heat in that circuit by the conductor in a small interval of time dt is measured by $Ei\,dt$. Since by Ohm's law $E=Ri$, where R is the resistance of the circuit, it follows that the energy dissipated as heat per unit of time in any circuit is numerically represented by Ri^2, and therefore the resistance is measured by the heat produced per unit of current, provided the current is unvarying.

Inductance.—As soon as we turn our attention, however, to alternating or periodic currents we find ourselves compelled to take into account another quality of the circuit, called its "inductance." This may be defined as that quality in virtue of which energy is stored up in connexion with the circuit in a magnetic form. It can be experimentally shown that a current cannot be created instantaneously in a circuit by any finite electromotive force, and that when once created it cannot be annihilated instantaneously. The circuit possesses a quality analogous to the inertia of matter. If a current i is flowing in a circuit at any moment, the energy stored up in connexion with the circuit is measured by $\frac{1}{2}Li^2$, where L, the inductance of the circuit, is related to the current in the same manner as the quantity called the mass of a body is related to its velocity in the expression for the ordinary kinetic energy, viz. $\frac{1}{2}Mv^2$. The rate at which this conserved energy varies with the current is called the "electrokinetic momentum" of this circuit ($=Li$). Physically interpreted this quantity signifies the number of lines of magnetic flux due to the current itself which are self-linked with its own circuit.

Magnetic Force and Electric Currents.—In the case of every circuit conveying a current there is a certain magnetic force (see Magnetism) at external points which can in some instances be calculated. Laplace proved that the magnetic force due to an element of length dS of a circuit conveying a current I at a point P at a distance r from the element is expressed by $IdS\sin\theta/r^2$, where θ is the angle between the direction of the current element and that drawn between the element and the point. This force is in a direction perpendicular to the radius vector and to the plane containing it and the element of current. Hence the determination of the magnetic force due to any circuit is reduced to a summation of the effects due to all the elements of length. For instance, the magnetic force at the centre of a circular circuit of radius r carrying a steady current I is $2\pi I/r$, since all elements are at the same distance from the centre. In the same manner, if we take a point in a line at right angles to the plane of the circle through its centre and at a distance d, the magnetic force along this line is expressed by $2\pi r^2 I/(r^2+d^2)^{\frac{3}{2}}$ Another important case is that of an infinitely long straight current. By summing up the magnetic force due to each element at any point P outside the continuous straight current I, and at a distance d from it, we can show that it is equal to $2I/d$ or is inversely proportional to the distance of the point from the wire. In the above formula the current I is measured in absolute electromagnetic units. If we reckon the current in amperes A, then $I=A/10$.

It is possible to make use of this last formula, coupled with an experimental fact, to prove that the magnetic force due to an element of current varies inversely as the square of the distance. If a flat circular disk is suspended so as to be free to rotate round a straight current which passes through its centre, and two bar magnets are placed on it with their axes in line with the current, it is found that the disk has no tendency to rotate round the current. This proves that the force on each magnetic pole is inversely as its distance from the current. But it can be shown that this law of action of the whole infinitely long straight current is a mathematical consequence of the fact that each element of the current exerts a magnetic force which varies inversely as the square of the distance. If the current flows N times round the circuit instead of once, we have to insert NA/10 in place of I in all the above formulae. The quantity NA is called the "ampere-turns" on the circuit, and it is seen that the magnetic field at any point outside a circuit is proportional to the ampere-turns on it and to a function of its geometrical form and the distance of the point.

There is therefore a distribution of magnetic force in the field of every current-carrying conductor which can be delineated by lines of magnetic force and rendered visible to the eye by iron filings (see Magnetism). If a copper wire is passed vertically through a hole in a card on which iron filings are sprinkled, and a strong electric current is sent through the circuit, the filings arrange themselves in concentric circular lines making visible the paths of the lines of magnetic force (fig. 3). In the same manner, by passing a circular wire through a card and sending a strong current through the wire we can employ iron filings to delineate for us the form of the lines of magnetic force (fig. 4).

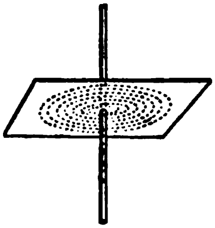

Fig. 3.

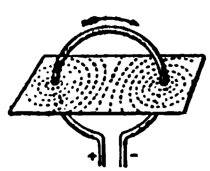

Fig. 4.

In all cases a magnetic pole of strength M, placed in the field of an electric current, is urged along the lines of force with a mechanical force equal to MH, where H is the magnetic force. If then we carry a unit magnetic pole against the direction in which it would naturally move we do *work*. The lines of magnetic force embracing a current-carrying conductor are always loops or endless lines.

The work done in carrying a unit magnetic pole once round a circuit conveying a current is called the "line integral of magnetic force" along that path. If, for instance, we carry a unit pole in a circular path of radius r once round an infinitely long straight filamentary current I, the line integral is $4\pi I$. It is easy to prove that this is a general law, and that if we have any currents flowing in a conductor the line integral of magnetic force taken once round a path linked with the current circuit is 4π times the total current flowing through the circuit. Let us apply this to the case of an endless solenoid. If a copper wire insulated or covered with cotton or silk is twisted round a thin rod so as to make a close spiral, this forms a "solenoid," and if the solenoid is bent round so that its two ends come together we have an endless solenoid. Consider such a solenoid of mean length l and N turns of wire. If it is made endless, the magnetic force H is the same everywhere along the central axis and the line integral along the axis is Hl. If the current is denoted by I, then NI is the total current, and accordingly $4\pi NI = Hl$, or $H = 4\pi NI/l$. For a thin endless solenoid the axial magnetic force is therefore 4π times the current-turns per unit of length. This holds good also for a long straight solenoid provided its length is large compared with its diameter. It can be shown that if insulated wire is wound round a sphere, the turns being all parallel to lines of latitude, the magnetic force in the interior is constant and the lines of force therefore parallel. The magnetic force at a point outside a conductor conveying a current can by various means be measured or compared with some other standard magnetic forces, and it becomes then a means of measuring the current. Instruments called galvanometers and ammeters for the most part operate on this principle.

Thermal Effects of Currents.—J. P. Joule proved that the heat produced by a constant current in a given time in a wire having a constant resistance is proportional to the square of the strength of the current. This is known as Joule's law, and it follows, as already shown, as an immediate consequence of Ohm's law and the fact that the power dissipated electrically in a conductor, when an electromotive force E is applied to its extremities, producing thereby a current I in it, is equal to EI.

If the current is alternating or periodic, the heat produced in any time T is obtained by taking the sum at equidistant intervals of time of all the values of the quantities $Ri^2 dt$, where dt represents a small interval of time and i is the current at that instant. The quantity $T^{-1}\int_0^T i^2 dt$ is called the mean-square-value of the variable current, i being the instantaneous value of the current, that is, its value at a particular instant or during a very small interval of time dt. The square root of the above quantity, or

$$\left[T^{-1}\int_0^T i^2 dt\right]^{\frac{1}{2}},$$

is called the root-mean-square-value, or the effective value of the current, and is denoted by the letters R.M.S.

Currents have equal heat-producing power in conductors of identical resistance when they have the same R.M.S. values. Hence periodic or alternating currents can be measured as regards their R.M.S. value by ascertaining the continuous current which produces in the same time the same heat in the same conductor as the periodic current considered. Current measuring instruments depending on this fact, called hot-wire ammeters, are in common use, especially for measuring alternating currents. The maximum value of the periodic current can only be determined from the R.M.S. value when we know the wave form of the current. The thermal effects of electric currents in conductors are dependent upon the production of a state of equilibrium between the heat produced electrically in the wire and the causes operative in removing it. If an ordinary round wire is heated by a current it loses heat, (1) by radiation, (2) by air convection or cooling, and (3) by conduction of heat out of the ends of the wire. Generally speaking, the greater part of the heat removal is effected by radiation and convection.

If a round sectioned metallic wire of uniform diameter d and length l made of a material of resistivity ρ has a current of A amperes passed through it, the heat in watts produced in any time t seconds is represented by the value of $4A^2\rho lt/10^9\pi d^2$, where d and l must be measured in centimetres and ρ in absolute C.G.S. electromagnetic units. The factor 10^9 enters because one ohm is 10^9 absolute electromagnetic C.G.S. units (see UNITS, PHYSICAL). If the wire has an emissivity e, by which is meant that e units of heat reckoned in joules or watt-seconds are radiated per second from unit of surface, then the power removed by radiation in the time t is expressed by $\pi dlet$. Hence when thermal equilibrium is established we have $4A^2\rho lt/10^9\pi d^2 = \pi dlet$, or $A^2 = 10^9\pi^2 ed^3/4\rho$. If the diameter of the wire is reckoned in mils (1 mil = ·001 in.), and if we take e to have a value 0·1, an emissivity which will generally bring the wire to about 60° C., we can put the above formula in the following forms for circular sectioned copper, iron or platinoid wires, viz.

$$A = \sqrt{d^3/500} \text{ for copper wires}$$

$$A = \sqrt{d^3/4000} \text{ for iron wires}$$

$$A = \sqrt{d^3/5000} \text{ for platinoid wires.}$$

These expressions give the ampere value of the current which will bring bare, straight or loosely coiled wires of d mils in diameter to about 60° C. when the steady state of temperature is reached. Thus, for instance, a bare straight copper wire 50 mils in diameter (= 0·05 in.) will be brought to a steady temperature of about 60° C. if a current of $\sqrt{50^3/500} = \sqrt{250} = 16$ amperes (nearly) is passed through it, whilst a current of $\sqrt{25} = 5$ amperes would bring a platinoid wire to about the same temperature.

A wire has therefore a certain safe current-carrying capacity which is determined by its specific resistance and emissivity, the latter being fixed by its form, surface and surroundings. The emissivity increases with the temperature, else no state of thermal equilibrium could be reached. It has been found experimentally that whilst for fairly thick wires from 8 to 60 mils in diameter the safe current varies approximately as the 1·5th power of the diameter, for fine wires of 1 to 3 mils it varies more nearly as the diameter.

Action of one Current on Another.—The investigations of Ampère in connexion with electric currents are of fundamental importance in electrokinetics. Starting from the discovery of Oersted, Ampère made known the correlative fact that not only is there a mechanical action between a current and a magnet, but that two conductors conveying electric currents exert mechanical forces on each other. Ampère devised ingenious methods of making one portion of a circuit movable so that he might observe effects of attraction or repulsion between this circuit and some other fixed current. He employed for this purpose an astatic circuit B, consisting of a wire bent into a double rectangle round which a current flowed first in one and then in the opposite direction (fig. 5). In this way the circuit was removed from the action of the earth's magnetic field, and yet one portion of it could be submitted to the action of any other circuit C. The astatic circuit was pivoted by suspending it in mercury cups q, p, one of which was in electrical connexion with the tubular support A, and the other with a strong insulated wire passing up it.

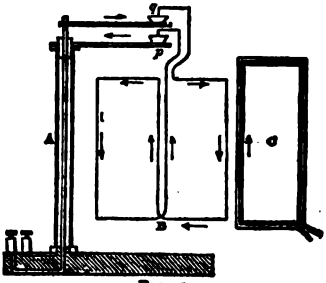

Fig. 5.

Ampère devised certain crucial experiments, and the theory deduced from them is based upon four facts and one assumption.[1] He showed (1) that wire conveying a current bent back on itself produced no action upon a proximate portion of a movable astatic circuit; (2) that if the return wire was bent zig-zag but close to the outgoing straight wire the circuit produced no action on the movable one, showing that the effect of an element of the circuit was proportional to its projected length; (3) that a closed circuit cannot cause motion in an element of another circuit free to move in the direction of its length; and (4) that the action of two circuits on one and the same movable circuit was null if one of the two fixed circuits was n times greater than the other but n times further removed from the movable circuit. From this last experiment by an ingenious line of reasoning he proved that the action of an element of current on another element of current varies inversely as a square of their distance. These experiments enabled him to construct a mathematical expression of the law of action between two elements of conductors conveying currents. They also enabled him to prove that an element of current may be resolved like a force into components in different directions, also that the force produced by any element of the circuit on an element of any other circuit was perpendicular to the line joining the elements and inversely as the square of their distance. Also he showed that this force was an attraction if the currents in the elements were in the same direction, but a repulsion if they were in opposite directions. From these experiments and deductions from them he built up a complete formula for the action of one element of a current of length dS

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[1] See Maxwell, *Electricity and Magnetism*, vol. ii. chap. ii.

of one conductor conveying a current I upon another element dS' of another circuit conveying another current I′ the elements being at a distance apart equal to r.

If θ and θ' are the angles the elements make with the line joining them, and ϕ the angle they make with one another, then Ampère's expression for the mechanical force f the elements exert on one another is

$$f=2II'r^{-2}\{\cos\phi-\tfrac{3}{2}\cos\theta\cos\theta'\}dSdS'.$$

This law, together with that of Laplace already mentioned, viz. that the magnetic force due to an element of length dS of a current I at a distance r, the element making an angle θ with the radius vector o is $IdS\sin\theta/r^2$, constitute the fundamental laws of electrokinetics.

Ampère applied these with great mathematical skill to elucidate the mechanical actions of currents on each other, and experimentally confirmed the following deductions: (1) Currents in parallel circuits flowing in the same direction attract each other, but if in opposite directions repel each other. (2) Currents in wires meeting at an angle attract each other more into parallelism if both flow either to or from the angle, but repel each other more widely apart if they are in opposite directions. (3) A current in a small circular conductor exerts a magnetic force in its centre perpendicular to its plane and is in all respects equivalent to a magnetic shell or a thin circular disk of steel so magnetized that one face is a north pole and the other a south pole, the product of the area of the circuit and the current flowing in it determining the magnetic moment of the element. (4) A closely wound spiral current is equivalent as regards external magnetic force to a polar magnet, such a circuit being called a finite solenoid. (5) Two finite solenoid circuits act on each other like two polar magnets, exhibiting actions of attraction or repulsion between their ends.

Ampère's theory was wholly built up on the assumption of action at a distance between elements of conductors conveying the electric currents. Faraday's researches and the discovery of the fact that the insulating medium is the real seat of the operations necessitates a change in the point of view from which we regard the facts discovered by Ampere. Maxwell showed that in any field of magnetic force there is a tension along the lines of force and a pressure at right angles to them; in other words, lines of magnetic force are like stretched elastic threads which tend to contract.[1] If, therefore, two conductors lie parallel and have currents in them in the same direction they are impressed by a certain number of lines of magnetic force which pass round the two conductors, and it is the tendency of these to contract which draws the circuits together. If, however, the currents are in opposite directions then the lateral pressure of the similarly contracted lines of force between them pushes the conductors apart. Practical application of Ampère's discoveries was made by W. E. Weber in inventing the electrodynamometer, and later Lord Kelvin devised ampere balances for the measurement of electric currents based on the attraction between coils conveying electric currents.

Induction of Electric Currents.—Faraday[2] in 1831 made the important discovery of the induction of electric currents (see Electricity). If two conductors are placed parallel to each other, and a current in one of them, called the primary, started or stopped or changed in strength, every such alteration causes a transitory current to appear in the other circuit, called the secondary. This is due to the fact that as the primary current increases or decreases, its own embracing magnetic field alters, and lines of magnetic force are added to or subtracted from its fields. These lines do not appear instantly in their place at a distance, but are propagated out from the wire with a velocity equal to that of light; hence in their outward progress they cut through the secondary circuit, just as ripples made on the surface of water in a lake by throwing a stone on to it expand and cut through a stick held vertically in the water at a distance from the place of origin of the ripples. Faraday confirmed this view of the phenomena by proving that the mere motion of a wire transversely to the lines of magnetic force of a permanent magnet gave rise to an induced electromotive force in the wire. He embraced all the facts in the single statement that if there be any circuit which by movement in a magnetic field, or by the creation or change in magnetic fields round it, experiences a change in the number of lines of force linked with it, then an electromotive force is set up in that circuit which is proportional at any instant to the rate at which the total magnetic flux linked with it is changing. Hence if Z represents the total number of lines of magnetic force linked with a circuit of N turns, then $-N(dZ/dt)$ represents the electromotive force set up in that circuit. The operation of the induction coil (*q.v.*) and the transformer (*q.v.*) are based on this discovery. Faraday also found that if a copper disk A (fig. 6) is rotated between the poles of a magnet NO so that the disk moves with its plane perpendicular to the lines of magnetic force of the field, it has created in it an electromotive force directed from the centre to the edge or vice versa. The action of the dynamo (*q.v.*) depends on similar processes, viz. the cutting of the lines of magnetic force of a constant field produced by certain magnets by certain moving conductors called armature bars or coils in which an electromotive force is thereby created.

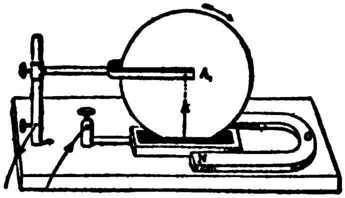

Fig. 6.

In 1834 H. F. E. Lenz enunciated a law which connects together the mechanical actions between electric circuits discovered by Ampère and the induction of electric currents discovered by Faraday. It is as follows: If a constant current flows in a primary circuit P, and if by motion of P a secondary current is created in a neighbouring circuit S, the direction of the secondary current will be such as to oppose the relative motion of the circuits. Starting from this, F. E. Neumann founded a mathematical theory of induced currents, discovering a quantity M, called the "potential of one circuit on another," or generally their "coefficient of mutual inductance." Mathematically M is obtained by taking the sum of all such quantities as $\iint dSdS'\cos\phi/r$, where dS and dS' are the elements of length of the two circuits, r is their distance, and ϕ is the angle which they make with one another; the summation or integration must be extended over every possible pair of elements. If we take pairs of elements in the same circuit, then Neumann's formula gives us the coefficient of self-induction of the circuit or the potential of the circuit on itself. For the results of such calculations on various forms of circuit the reader must be referred to special treatises.

H. von Helmholtz, and later on Lord Kelvin, showed that the facts of induction of electric currents discovered by Faraday could have been predicted from the electrodynamic actions discovered by Ampère assuming the principle of the conservation of energy. Helmholtz takes the case of a circuit of resistance R in which acts an electromotive force due to a battery or thermopile. Let a magnet be in the neighbourhood, and the potential of the magnet on the circuit be V, so that if a current I existed in the circuit the work done on the magnet in the time dt is $I(dV/dt)dt$. The source of electromotive force supplies in the time dt work equal to $EIdt$, and according to Joule's law energy is dissipated equal to RI^2dt. Hence, by the conservation of energy,

$$EIdt=RI^2dt+I(dV/dt)dt.$$

If then $E=O$, we have $I=-(dV/dt)/R$, or there will be a current due to an induced electromotive force expressed by $-dV/dt$. Hence if the magnet moves, it will create a current in the wire provided that such motion changes the potential of the magnet with respect to the circuit. This is the effect discovered by Faraday.[3]

Oscillatory Currents.—In considering the motion of electricity in conductors we find interesting phenomena connected with the discharge of a condenser or Leyden jar (*q.v.*). This problem was first mathematically treated by Lord Kelvin in 1853 (*Phil. Mag.*, 1853, 5, p. 292).

If a conductor of capacity C has its terminals connected by a wire of resistance R and inductance L, it becomes important to consider the subsequent motion of electricity in the wire. If Q is the quantity of electricity in the condenser initially, and q that at any time t after completing the circuit, then the energy stored up in the condenser at that instant is $\frac{1}{2}q^2/C$, and the energy associated with the circuit is $\frac{1}{2}L(dq/dt)^2$, and the rate of dissipation of energy by resistance is $R(dq/dt)^2$, since $dq/dt=i$ is the discharge current. Hence we can construct an equation of energy which expresses the fact that at any instant the power given out by the condenser is partly stored in the circuit and partly dissipated as heat in it. Mathematically this is expressed as follows:—

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[1] See Maxwell, *Electricity and Magnetism*, vol. ii. 642.

[2] *Experimental Researches*, vol. i. ser. 1.

[3] See Maxwell, *Electricity and Magnetism*, vol. ii. § 542, p. 178.

$$-\frac{d}{dt}\left[\frac{1}{2}\frac{q^2}{C}\right]=\frac{d}{dt}\left[\frac{1}{2}L\left(\frac{dq}{dt}\right)^2\right]+R\left(\frac{dq}{dt}\right)^2$$

or

$$\frac{d^2q}{dt^2}+\frac{R}{L}\frac{dq}{dt}+\frac{1}{LC}q=0.$$

The above equation has two solutions according as $R^2/4L^2$ is greater or less than $1\ LC$. In the first case the current i in the circuit can be expressed by the equation

$$i=Q\frac{\alpha^2+\beta^2}{2\beta}\epsilon^{-\alpha t}(\epsilon^{\beta t}-\epsilon^{-\beta t}),$$

where $\alpha=R/2L$, $\beta=\sqrt{\frac{R^2}{4L^2}-\frac{1}{LC}}$, Q is the value of q when $t=0$, and ϵ is the base of Napierian logarithms; and in the second case by the equation

$$i=Q\frac{\alpha^2+\beta^2}{\beta}\epsilon^{-\alpha t}\sin\beta t$$

where $\qquad \alpha=R/2L$, and $\beta=\sqrt{\frac{1}{LC}-\frac{R^2}{4L^2}}$.

These expressions show that in the first case the discharge current of the jar is always in the same direction and is a transient unidirectional current. In the second case, however, the current is an oscillatory current gradually decreasing in amplitude, the frequency n of the oscillation being given by the expression

$$n=\frac{1}{2\pi}\sqrt{\frac{1}{LC}-\frac{R^2}{4L^2}}$$

In those cases in which the resistance of the discharge circuit is very small, the expression for the frequency n and for the time period of oscillation R take the simple forms $n=1,\ 2\pi\sqrt{LC}$, or $T=1/n=2\pi\sqrt{LC}$.

The above investigation shows that if we construct a circuit consisting of a condenser and inductance placed in series with one another, such circuit has a natural electrical time period of its own in which the electrical charge in it oscillates if disturbed. It may therefore be compared with a pendulum of any kind which when displaced oscillates with a time period depending on its inertia and on its restoring force.

The study of these electrical oscillations received a great impetus after H. R. Hertz showed that when taking place in electric circuits of a certain kind they create electromagnetic waves (see ELECTRIC WAVES) in the dielectric surrounding the oscillator, and an additional interest was given to them by their application to telegraphy. If a Leyden jar and a circuit of low resistance but some inductance in series with it are connected across the secondary spark gap of an induction coil, then when the coil is set in action we have a series of bright noisy sparks, each of which consists of a train of oscillatory electric discharges from the jar. The condenser becomes charged as the secondary electromotive force of the coil is created at each break of the primary current, and when the potential difference of the condenser coatings reaches a certain value determined by the spark-ball distance a discharge happens. This discharge, however, is not a single movement of electricity in one direction but an oscillatory motion with gradually decreasing amplitude. If the oscillatory spark is photographed on a revolving plate or a rapidly moving film, we have evidence in the photograph that such a spark consists of numerous intermittent sparks gradually becoming feebler. As the coil continues to operate, these trains of electric discharges take place at regular intervals. We can cause a train of electric oscillations in one circuit to induce similar oscillations in a neighbouring circuit, and thus construct an oscillation transformer or high frequency induction coil.

Alternating Currents.—The study of alternating currents of electricity began to attract great attention towards the end of the 19th century by reason of their application in electrotechnics and especially to the transmission of power. A circuit in which a simple periodic alternating current flows is called a single phase circuit. The important difference between such a form of current flow and steady current flow arises from the fact that if the circuit has inductance then the periodic electric current in it is not in step with the terminal potential difference or electromotive force acting in the circuit, but the current lags behind the electromotive force by a certain fraction of the periodic time called the "phase difference." If two alternating currents having a fixed difference in phase flow in two connected separate but related circuits, the two are called a two-phase current. If three or more single-phase currents preserving a fixed difference of phase flow in various parts of a connected circuit, the whole taken together is called a polyphase current. Since an electric current is a vector quantity, that is, has direction as well as magnitude, it can most conveniently be represented by a line denoting its maximum value, and if the alternating current is a simple periodic current then the root-mean-square or effective value of the current is obtained by dividing the maximum value by $\sqrt{2}$. Accordingly when we have an electric circuit or circuits in which there are simple periodic currents we can draw a vector diagram, the lines of which represent the relative magnitudes and phase differences of these currents.

A vector can most conveniently be represented by a symbol such as $a+\iota b$, where a stands for any length of a units measured horizontally and b for a length b units measured vertically, and the smybol ι is a sign of perpendicularity, and equivalent analytically[1] to $\sqrt{-1}$. Accordingly if E represents the periodic electromotive force (maximum value) acting in a circuit of resistance R and inductance L and frequency n, and if the current considered as a vector is represented by I, it is easy to show that a vector equation exists between these quantities as follows:—

$$E=RI+\iota 2\pi nLI.$$

Since the absolute magnitude of a vector $a+\iota b$ is $\sqrt{(a^2+b^2)}$, it follows that considering merely magnitudes of current and electromotive force and denoting them by symbols (E) (I), we have the following equation connecting (I) and (E):—

$$(I)=(E)/\sqrt{R^2+p^2L^2},$$

where p stands for $2\pi n$. If the above equation is compared with the symbolic expression of Ohm's law, it will be seen that the quantity $\sqrt{(R^2+p^2L^2)}$ takes the place of resistance R in the expression of Ohm. This quantity $\sqrt{(R^2+p^2L^2)}$ is called the "impedance" of the alternating circuit. The quantity pL is called the "reactance" of the alternating circuit, and it is therefore obvious that the current in such a circuit lags behind the electromotive force by an angle, called the angle of lag, the tangent of which is pL/R.

Currents in Networks of Conductors.—In dealing with problems connected with electric currents we have to consider the laws which govern the flow of currents in linear conductors (wires), in plane conductors (sheets), and throughout the mass of a material conductor.[2] In the first case consider the collocation of a number of linear conductors, such as rods or wires of metal, joined at their ends to form a *network of conductors*. The network consists of a number of conductors joining certain points and forming meshes. In each conductor a current may exist, and along each conductor there is a fall of potential, or an active electromotive force may be acting in it. Each conductor has a certain resistance. To find the current in each conductor when the individual resistances and electromotive forces are given, proceed as follows:—Consider any one mesh. The sum of all the electromotive forces which exist in the branches bounding that mesh must be equal to the sum of all the products of the resistances into the currents flowing along them, or $\Sigma(E)=\Sigma(C.R.)$. Hence if we consider each mesh as traversed by imaginary currents all circulating in the same direction, the real currents are the sums or differences of these imaginary cyclic currents in each branch. Hence we may assign to each mesh a cycle symbol x, y, z, &c., and form a cycle equation. Write down the cycle symbol for a mesh and prefix as coefficient the sum of all the resistances which bound that cycle, then subtract the cycle symbols of each adjacent cycle, each multiplied by the value of the bounding or common resistances, and equate this sum to the total electromotive force acting round the cycle. Thus if $x\ y\ z$ are the cycle currents, and $a\ b\ c$ the resistances bounding the mesh x, and b and c those separating it from the meshes y and z, and E an electromotive force in the branch a, then we have formed the cycle equation $x(a+b+c)-by-cz=E$. For each mesh a similar equation may be formed. Hence we have as many linear equations as there are meshes, and we can obtain the solution for each cycle symbol, and therefore for the current in each branch. The solution giving the current in such branch of the network is therefore always in the form of the quotient of two determinants. The solution of the well-known problem of finding the current in the galvanometer circuit of the arrangement of linear conductors called Wheatstone's Bridge is thus easily obtained. For if we call the cycles (see fig. 7) $(x+y)$, y and z, and the resistances P, Q, R, S, G and B, and if E be the electromotive force in the battery circuit, we have the cycle equations

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[1] See W. G. Rhodes, *An Elementary Treatise on Alternating Currents* (London, 1902), chap. vii.

[2] See J. A. Fleming, "Problems on the Distribution of Electric Currents in Networks of Conductors," *Phil. Mag.* (1885), or *Proc. Phys. Soc. Lond.* (1885), 7; also Maxwell, *Electricity and Magnetism* (2nd ed.), vol. i. p. 374, § 280, 282*b*.

$$(P+G+R)(x+y)-Gy-Rz=0,$$
$$(Q+G+S)y-G(x+y)-Sz=0,$$
$$(R+S+B)z-R(x+y)-Sy=E.$$

From these we can easily obtain the solution for $(x+y)-y=x$, which is the current through the galvanometer circuit in the form

$$x=E(PS-RQ)\Delta.$$

where Δ is a certain function of P, Q, R, S, B and G.

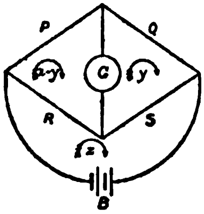

FIG. 7.

Currents in Sheets.—In the case of current flow in plane sheets, we have to consider certain points called sources at which the current flows into the sheet, and certain points called sinks at which it leaves. We may investigate, first, the simple case of one source and one sink in an infinite plane sheet of thickness δ and conductivity k. Take any point P in the plane at distances R and r from the source and sink respectively. The potential V at P is obviously given by

$$V=\frac{Q}{2\pi k\delta}\log_e\frac{r_1}{r_2},$$

where Q is the quantity of electricity supplied by the source per second. Hence the equation to the equipotential curve is $r_1r_2=$ a constant.

If we take a point half-way between the sink and the source as the origin of a system of rectangular co-ordinates, and if the distance between sink and source is equal to p, and the line joining them is taken as the axis of x, then the equation to the equipotential line is

$$\frac{y^2+(x+p)^2}{y^2+(x-p)^2}=\text{a constant.}$$

This is the equation of a family of circles having the axis of y for a common radical axis, one set of circles surrounding the sink and another set of circles surrounding the source. In order to discover the form of the stream of current lines we have to determine the orthogonal trajectories to this family of coaxial circles. It is easy to show that the orthogonal trajectory of the system of circles is another system of circles all passing through the sink and the source, and as a corollary of this fact, that the electric resistance of a circular disk of uniform thickness is the same between any two points taken anywhere on its circumference as sink and source. These equipotential lines may be delineated experimentally by attaching the terminals of a battery or batteries to small wires which touch at various places a sheet of tinfoil. Two wires attached to a galvanometer may then be placed on the tinfoil, and one may be kept stationary and the other may be moved about, so that the galvanometer is not traversed by any current. The moving terminal then traces out an equipotential curve. If there are n sinks and sources in a plane conducting sheet, and if r, r', r'' be the distances of any point from the sinks, and t, t', t'' the distances of the sources, then,

$$\frac{r\,r'\,r''\ldots}{t\,t'\,t''\ldots}=\text{a constant,}$$

is the equation to the equipotential lines. The orthogonal trajectories or stream lines have the equation

$$\Sigma(\theta-\theta')=\text{a constant,}$$

where θ and θ' are the angles which the lines drawn from any point in the plane to the sink and corresponding source make with the line joining that sink and source. Generally it may be shown that if there are any number of sinks and sources in an infinite plane-conducting sheet, and if r, θ are the polar co-ordinates of any one, then the equation to the equipotential surfaces is given by the equation

$$\Sigma(A\log_e r)=\text{a constant,}$$

where A is a constant; and the equation to the stream or current lines is

$$\Sigma(\theta)=\text{a constant.}$$

In the case of electric flow in three dimensions the electric potential must satisfy Laplace's equation, and a solution is therefore found in the form $\Sigma(A/r)=$ a constant, as the equation to an equipotential surface, where r is the distance of any point on that surface from a source or sink.

Convection Currents.—The subject of convection electric currents has risen to great importance in connexion with modern electrical investigations. The question whether a statically electrified body in motion creates a magnetic field is of fundamental importance. Experiments to settle it were first undertaken in the year 1876 by H. A. Rowland, at a suggestion of H. von Helmholtz.[1] After preliminary experiments, Rowland's first apparatus for testing this hypothesis was constructed, as follows:—An ebonite disk was covered with radial strips of gold-leaf and placed between two other metal plates which acted as screens. The disk was then charged with electricity and set in rapid rotation. It was found to affect a delicately suspended pair of astatic magnetic needles hung in proximity to the disk just as would, by Oersted's rule, a circular electric current coincident with the periphery of the disk. Hence the statically-charged but rotating disk becomes in effect a circular electric current.

The experiments were repeated and confirmed by W. C. Röntgen (*Wied. Ann.*, 1888, 35, p. 264; 1890, 40, p. 93) and by F. Himstedt (*Wied. Ann.*, 1889, 38, p. 560). Later V. Crémieu again repeated them and obtained negative results (*Com. rend.*, 1900, 130, p. 1544, and 131, pp. 578 and 797; 1901, 132, pp. 327 and 1108). They were again very carefully reconducted by H. Pender (*Phil. Mag.*, 1901, 2, p. 179) and by E. P. Adams (*id. ib.*, 285). Pender's work showed beyond any doubt that electric convection does produce a magnetic effect. Adams employed charged copper spheres rotating at a high speed in place of a disk, and was able to prove that the rotation of such spheres produced a magnetic field similar to that due to a circular current and agreeing numerically with the theoretical value. It has been shown by J. J. Thomson (*Phil. Mag.*, 1881, 2, p. 236) and O. Heaviside (*Electrical Papers*, vol. ii. p. 205) that an electrified sphere, moving with a velocity v and carrying a quantity of electricity q, should produce a magnetic force H, at a point at a distance ρ from the centre of the sphere, equal to $qv\sin\theta/\rho^2$, where θ is the angle between the direction of ρ and the motion of the sphere. Adams found the field produced by a known electric charge rotating at a known speed had a strength not very different from that predetermined by the above formula. An observation recorded by R. W. Wood (*Phil. Mag.*, 1902, 2, p. 659) provides a confirmatory fact. He noticed that if carbon-dioxide strongly compressed in a steel bottle is allowed to escape suddenly the cold produced solidifies some part of the gas, and the issuing jet is full of particles of carbon-dioxide snow. These by friction against the nozzle are electrified positively. Wood caused the jet of gas to pass through a glass tube 2·5 mm. in diameter, and found that these particles of electrified snow were blown through it with a velocity of 2000 ft. a second. Moreover, he found that a magnetic needle hung near the tube was deflected as if held near an electric current. Hence the positively electrified particles in motion in the tube create a magnetic field round it.

Nature of an Electric Current.—The question, What is an electric current? is involved in the larger question of the nature of electricity. Modern investigations have shown that negative electricity is identical with the electrons or corpuscles which are components of the chemical atom (see MATTER and ELECTRICITY). Certain lines of argument lead to the conclusion that a solid conductor is not only composed of chemical atoms, but that there is a certain proportion of free electrons present in it, the electronic density or number per unit of volume being determined by the material, its temperature and other physical conditions. If any cause operates to add or remove electrons at one point there is an immediate diffusion of electrons to re-establish equilibrium, and this electronic movement constitutes an electric current. This hypothesis explains the reason for the identity between the laws of diffusion of matter, of heat and of electricity. Electromotive force is then any cause making or tending to make an inequality of electronic density in conductors, and may arise from differences of temperature, *i.e.* thermoelectromotive force

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[1] See *Berl. Acad. Ber.*, 1876, p. 211; also H. A. Rowland and C. T. Hutchinson, "On the Electromagnetic Effect of Convection Currents," *Phil. Mag.*, 1889, 27, p. 445.

(see THERMOELECTRICITY), or from chemical action when part of the circuit is an electrolytic conductor, or from the movement of lines of magnetic force across the conductor.

BIBLIOGRAPHY.—For additional information the reader may be referred to the following books: M. Faraday, *Experimental Researches in Electricity* (3 vols., London, 1839, 1844, 1855); J. Clerk Maxwell, *Electricity and Magnetism* (2 vols., Oxford, 1892); W. Watson and S. H. Burbury, *Mathematical Theory of Electricity and Magnetism*, vol. ii. (Oxford, 1889); E. Mascart and J. Joubert, *A Treatise on Electricity and Magnetism* (2 vols., London, 1883); A. Hay, *Alternating Currents* (London, 1905); W. G. Rhodes, *An Elementary Treatise on Alternating Currents* (London, 1902); D. C. Jackson and J. P. Jackson, *Alternating Currents and Alternating Current Machinery* (1896, new ed. 1903); S. P. Thompson, *Polyphase Electric Currents* (London, 1900); *Dynamo-Electric Machinery*, vol. ii., "Alternating Currents" (London, 1905); E. E. Fournier d'Albe, *The Electron Theory* (London, 1906). (J. A. F.)

ELECTROLIER, a fixture, usually pendent from the ceiling, for holding electric lamps. The word is analogous to chandelier, from which indeed it was formed.

ELECTROLYSIS (formed from Gr. λύειν, to loosen). When the passage of an electric current through a substance is accompanied by definite chemical changes which are independent of the heating effects of the current, the process is known as *electrolysis*, and the substance is called an *electrolyte*. As an example we may take the case of a solution of a salt such as copper sulphate in water, through which an electric current is passed between copper plates. We shall then observe the following phenomena. (1) The bulk of the solution is unaltered, except that its temperature may be raised owing to the usual heating effect which is proportional to the square of the strength of the current. (2) The copper plate by which the current is said to enter the solution, *i.e.* the plate attached to the so-called positive terminal of the battery or other source of current, dissolves away, the copper going into solution as copper sulphate. (3) Copper is deposited on the surface of the other plate, being obtained from the solution. (4) Changes in concentration are produced in the neighbourhood of the two plates or electrodes. In the case we have chosen, the solution becomes stronger near the anode, or electrode at which the current enters, and weaker near the cathode, or electrode at which it leaves the solution. If, instead of using copper electrodes, we take plates of platinum, copper is still deposited on the cathode; but, instead of the anode dissolving, free sulphuric acid appears in the neighbouring solution, and oxygen gas is evolved at the surface of the platinum plate.

With other electrolytes similar phenomena appear, though the primary chemical changes may be masked by secondary actions. Thus, with a dilute solution of sulphuric acid and platinum electrodes, hydrogen gas is evolved at the cathode, while, as the result of a secondary action on the anode, sulphuric acid is there re-formed, and oxygen gas evolved. Again, with the solution of a salt such as sodium chloride, the sodium, which is primarily liberated at the cathode, decomposes the water and evolves hydrogen, while the chlorine may be evolved as such, may dissolve the anode, or may liberate oxygen from the water, according to the nature of the plate and the concentration of the solution.

Early History of Electrolysis.—Alessandro Volta of Pavia discovered the electric battery in the year 1800, and thus placed the means of maintaining a steady electric current in the hands of investigators, who, before that date, had been restricted to the study of the isolated electric charges given by frictional electric machines. Volta's cell consists essentially of two plates of different metals, such as zinc and copper, connected by an electrolyte such as a solution of salt or acid. Immediately on its discovery intense interest was aroused in the new invention, and the chemical effects of electric currents were speedily detected. W. Nicholson and Sir A. Carlisle found that hydrogen and oxygen were evolved at the surfaces of gold and platinum wires connected with the terminals of a battery and dipped in water. The volume of the hydrogen was about double that of the oxygen, and, since this is the ratio in which these elements are combined in water, it was concluded that the process consisted essentially in the decomposition of water. They also noticed that a similar kind of chemical action went on in the battery itself. Soon afterwards, William Cruickshank decomposed the magnesium, sodium and ammonium chlorides, and precipitated silver and copper from their solutions—an observation which led to the process of electroplating. He also found that the liquid round the anode became acid, and that round the cathode alkaline. In 1804 W. Hisinger and J. J. Berzelius stated that neutral salt solutions could be decomposed by electricity, the acid appearing at one pole and the metal at the other. This observation showed that nascent hydrogen was not, as had been supposed, the primary cause of the separation of metals from their solutions, but that the action consisted in a direct decomposition into metal and acid. During the earliest investigation of the subject it was thought that, since hydrogen and oxygen were usually evolved, the electrolysis of solutions of acids and alkalis was to be regarded as a direct decomposition of water. In 1806 Sir Humphry Davy proved that the formation of acid and alkali when water was electrolysed was due to saline impurities in the water. He had shown previously that decomposition of water could be effected although the two poles were placed in separate vessels connected by moistened threads. In 1807 he decomposed potash and soda, previously considered to be elements, by passing the current from a powerful battery through the moistened solids, and thus isolated the metals potassium and sodium.

The electromotive force of Volta's simple cell falls off rapidly when the cell is used, and this phenomenon was shown to be due to the accumulation at the metal plates of the products of chemical changes in the cell itself. This reverse electromotive force of polarization is produced in all electrolytes when the passage of the current changes the nature of the electrodes. In batteries which use acids as the electrolyte, a film of hydrogen tends to be deposited on the copper or platinum electrode, but, to obtain a constant electromotive force, several means were soon devised of preventing the formation of the film. Constant cells may be divided into two groups, according as their action is chemical (as in the bichromate cell, where the hydrogen is converted into water by an oxidizing agent placed in a porous pot round the carbon plate) or electrochemical (as in Daniell's cell, where a copper plate is surrounded by a solution of copper sulphate, and the hydrogen, instead of being liberated, replaces copper, which is deposited on the plate from the solution).

Faraday's Laws.—The first exact quantitative study of electrolytic phenomena was made about 1830 by Michael Faraday (*Experimental Researches*, 1833). When an electric current flows round a circuit, there is no accumulation of electricity anywhere in the circuit, hence the current strength is everywhere the same, and we may picture the current as analogous to the flow of an incompressible fluid. Acting on this view, Faraday set himself to examine the relation between the flow of electricity round the circuit and the amount of chemical decomposition. He passed the current driven by a voltaic battery ZnPt (fig. 1) through two branches containing the two electrolytic cells A and B. The reunited current was then led through another cell C, in which the strength of the current must be the sum of those in the arms A and B. Faraday found that the mass of substance liberated at the electrodes in the cell C was equal to the sum of the masses liberated in the cells A and B. He also found that, for the same current, the amount of chemical action was independent of the size of the electrodes and proportional to the time that the current flowed. Regarding the current as the passage of a certain amount of electricity per second, it will be seen that the results

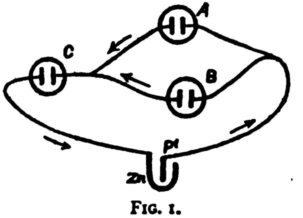

FIG. 1.

of all these experiments may be summed up in the statement that the amount of chemical action is proportional to the quantity of electricity which passes through the cell.

Faraday's next step was to pass the same current through different electrolytes in series. He found that the amounts of the substances liberated in each cell were proportional to the chemical equivalent weights of those substances. Thus, if the current be passed through dilute sulphuric acid between hydrogen electrodes, and through a solution of copper sulphate, it will be found that the mass of hydrogen evolved in the first cell is to the mass of copper deposited in the second as 1 is to 31·8. Now this ratio is the same as that which gives the relative chemical equivalents of hydrogen and copper, for 1 gramme of hydrogen and 31·8 grammes of copper unite chemically with the same weight of any acid radicle such as chlorine or the sulphuric group, SO_4. Faraday examined also the electrolysis of certain fused salts such as lead chloride and silver chloride. Similar relations were found to hold and the amounts of chemical change to be the same for the same electric transfer as in the case of solutions.

We may sum up the chief results of Faraday's work in the statements known as Faraday's laws: The mass of substance liberated from an electrolyte by the passage of a current is proportional (1) to the total quantity of electricity which passes through the electrolyte, and (2) to the chemical equivalent weight of the substance liberated.

Since Faraday's time his laws have been confirmed by modern research, and in favourable cases have been shown to hold good with an accuracy of at least one part in a thousand. The principal object of this more recent research has been the determination of the quantitative amount of chemical change associated with the passage for a given time of a current of strength known in electromagnetic units. It is found that the most accurate and convenient apparatus to use is a platinum bowl filled with a solution of silver nitrate containing about fifteen parts of the salt to one hundred of water. Into the solution dips a silver plate wrapped in filter paper, and the current is passed from the silver plate as anode to the bowl as cathode. The bowl is weighed before and after the passage of the current, and the increase gives the mass of silver deposited. The mean result of the best determinations shows that when a current of one ampere is passed for one second, a mass of silver is deposited equal to 0·001118 gramme. So accurate and convenient is this determination that it is now used conversely as a practical definition of the ampere, which (defined theoretically in terms of magnetic force) is defined practically as the current which in one second deposits 1·118 milligramme of silver.

Taking the chemical equivalent weight of silver, as determined by chemical experiments, to be 107·92, the result described gives as the electrochemical equivalent of an ion of unit chemical equivalent the value $1{\cdot}036 \times 10^{-5}$. If, as is now usual, we take the equivalent weight of oxygen as our standard and call it 16, the equivalent weight of hydrogen is 1·008, and its electrochemical equivalent is $1{\cdot}044 \times 10^{-5}$. The electrochemical equivalent of any other substance, whether element or compound, may be found by multiplying its chemical equivalent by $1{\cdot}036 \times 10^{-5}$. If, instead of the ampere, we take the C.G.S. electromagnetic unit of current, this number becomes $1{\cdot}036 \times 10^{-4}$.

Chemical Nature of the Ions.—A study of the products of decomposition does not necessarily lead directly to a knowledge of the ions actually employed in carrying the current through the electrolyte. Since the electric forces are active throughout the whole solution, all the ions must come under its influence and therefore move, but their separation from the electrodes is determined by the electromotive force needed to liberate them. Thus, as long as every ion of the solution is present in the layer of liquid next the electrode, the one which responds to the least electromotive force will alone be set free. When the amount of this ion in the surface layer becomes too small to carry all the current across the junction, other ions must also be used, and either they or their secondary products will appear also at the electrode. In aqueous solutions, for instance, a few hydrogen (H) and hydroxyl (OH) ions derived from the water are always present, and will be liberated if the other ions require a higher decomposition voltage and the current be kept so small that hydrogen and hydroxyl ions can be formed fast enough to carry all the current across the junction between solution and electrode.

The issue is also obscured in another way. When the ions are set free at the electrodes, they may unite with the substance of the electrode or with some constituent of the solution to form secondary products. Thus the hydroxyl mentioned above decomposes into water and oxygen, and the chlorine produced by the electrolysis of a chloride may attack the metal of the anode. This leads us to examine more closely the part played by water in the electrolysis of aqueous solutions. Distilled water is a very bad conductor, though, even when great care is taken to remove all dissolved bodies, there is evidence to show that some part of the trace of conductivity remaining is due to the water itself. By careful redistillation F. Kohlrausch has prepared water of which the conductivity compared with that of mercury was only $0{\cdot}40 \times 10^{-11}$ at 18° C. Even here some little impurity was present, and the conductivity of chemically pure water was estimated by thermodynamic reasoning as $0{\cdot}36 \times 10^{-11}$ at 18° C. As we shall see later, the conductivity of very dilute salt solutions is proportional to the concentration, so that it is probable that, in most cases, practically all the current is carried by the salt. At the electrodes, however, the small quantity of hydrogen and hydroxyl ions from the water are liberated first in cases where the ions of the salt have a higher decomposition voltage. The water being present in excess, the hydrogen and hydroxyl are re-formed at once and therefore are set free continuously. If the current be so strong that new hydrogen and hydroxyl ions cannot be formed in time, other substances are liberated; in a solution of sulphuric acid a strong current will evolve sulphur dioxide, the more readily as the concentration of the solution is increased. Similar phenomena are seen in the case of a solution of hydrochloric acid. When the solution is weak, hydrogen and oxygen are evolved; but, as the concentration is increased, and the current raised, more and more chlorine is liberated.

An interesting example of secondary action is shown by the common technical process of electroplating with silver from a bath of potassium silver cyanide. Here the ions are potassium and the group $Ag(CN)_2$.[1] Each potassium ion as it reaches the cathode precipitates silver by reacting with the solution in accordance with the chemical equation

$$K + KAg(CN)_2 = 2KCN + Ag,$$

while the anion $Ag(CN)_2$ dissolves an atom of silver from the anode, and re-forms the complex cyanide $KAg(CN)_2$ by combining with the 2KCN produced in the reaction described in the equation. If the anode consist of platinum, cyanogen gas is evolved thereat from the anion $Ag(CN)_2$, and the platinum becomes covered with the insoluble silver cyanide, AgCN, which soon stops the current. The coating of silver obtained by this process is coherent and homogeneous, while that deposited from a solution of silver nitrate, as the result of the primary action of the current, is crystalline and easily detached.

In the electrolysis of a concentrated solution of sodium acetate, hydrogen is evolved at the cathode and a mixture of ethane and carbon dioxide at the anode. According to H. Jahn,[2] the processes at the anode can be represented by the equations

$$2CH_3{\cdot}COO + H_2O = 2CH_3{\cdot}COOH + O$$
$$2CH_3{\cdot}COOH + O = C_2H_6 + 2CO_2 + H_2O.$$

The hydrogen at the cathode is developed by the secondary action

$$2Na + 2H_2O = 2NaOH + H_2.$$

Many organic compounds can be prepared by taking advantage of secondary actions at the electrodes, such as reduction by the cathodic hydrogen, or oxidation at the anode (see ELECTROCHEMISTRY).

It is possible to distinguish between double salts and salts of compound acids. Thus J. W. Hittorf showed that when a current was passed through a solution of sodium platino-chloride, the platinum appeared at the anode. The salt must therefore be derived from an acid, chloroplatinic acid, H_2PtCl_6, and have the formula Na_2PtCl_6, the ions being Na and $PtCl_6''$, for if it were a double salt it would decompose as a mixture of sodium chloride and platinum chloride and both metals would go to the cathode.

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[1] See Hittorf, *Pogg. Ann.* cvi. 517 (1859).

[2] *Grundriss der Elektrochemie* (1895), p. 292; see also F. Kaufler and C. Herzog, *Ber.*, 1909, 42, p. 3858.

Early Theories of Electrolysis.—The obvious phenomena to be explained by any theory of electrolysis are the liberation of the products of chemical decomposition at the two electrodes while the intervening liquid is unaltered. To explain these facts, Theodor Grotthus (1785–1822) in 1806 put forward an hypothesis which supposed that the opposite chemical constituents of an electrolyte interchanged partners all along the line between the electrodes when a current passed. Thus, if the molecule of a substance in solution is represented by AB, Grotthus considered a chain of AB molecules to exist from one electrode to the other. Under the influence of an applied electric force, he imagined that the B part of the first molecule was liberated at the anode, and that the A part thus isolated united with the B part of the second molecule, which, in its turn, passed on its A to the B of the third molecule. In this manner, the B part of the last molecule of the chain was seized by the A of the last molecule but one, and the A part of the last molecule liberated at the surface of the cathode.

Chemical phenomena throw further light on this question. If two solutions containing the salts AB and CD be mixed, double decomposition is found to occur, the salts AD and CB being formed till a certain part of the first pair of substances is transformed into an equivalent amount of the second pair. The proportions between the four salts AB, CD, AD and CB, which exist finally in solution, are found to be the same whether we begin with the pair AB and CD or with the pair AD and CB. To explain this result, chemists suppose that both changes can occur simultaneously, and that equilibrium results when the rate at which AB and CD are transformed into AD and CB is the same as the rate at which the reverse change goes on. A freedom of interchange is thus indicated between the opposite parts of the molecules of salts in solution, and it follows reasonably that with the solution of a single salt, say sodium chloride, continual interchanges go on between the sodium and chlorine parts of the different molecules.

These views were applied to the theory of electrolysis by R. J. E. Clausius. He pointed out that it followed that the electric forces did not cause the interchanges between the opposite parts of the dissolved molecules but only controlled their direction. Interchanges must be supposed to go on whether a current passes or not, the function of the electric forces in electrolysis being merely to determine in what direction the parts of the molecules shall work their way through the liquid and to effect actual separation of these parts (or their secondary products) at the electrodes. This conclusion is supported also by the evidence supplied by the phenomena of electrolytic conduction (see CONDUCTION, ELECTRIC, § II.). If we eliminate the reverse electromotive forces of polarization at the two electrodes, the conduction of electricity through electrolytes is found to conform to Ohm's law; that is, once the polarization is overcome, the current is proportional to the electromotive force applied to the bulk of the liquid. Hence there can be no reverse forces of polarization inside the liquid itself, such forces being confined to the surface of the electrodes. No work is done in separating the parts of the molecules from each other. This result again indicates that the parts of the molecules are effectively separate from each other, the function of the electric forces being merely directive.

Migration of the Ions.—The opposite parts of an electrolyte, which work their way through the liquid under the action of the electric forces, were named by Faraday the ions—the travellers. The changes of concentration which occur in the solution near the two electrodes were referred by W. Hittorf (1853) to the unequal speeds with which he supposed the two opposite ions to travel. It is clear that, when two opposite streams of ions move past each other, equivalent quantities are liberated at the two ends of the system. If the ions move at equal rates, the salt which is decomposed to supply the ions liberated must be taken equally from the neighbourhood of the two electrodes. But if one ion, say the anion, travels faster through the liquid than the other, the end of the solution from which it comes will be more exhausted of salt than the end towards which it goes. If we assume that no other cause is at work, it is easy to prove that, with non-dissolvable electrodes, the ratio of salt lost at the anode to the salt lost at the cathode must be equal to the ratio of the velocity of the cation to the velocity of the anion. This result may be illustrated by fig. 2. The black circles represent one ion and the white circles the other. If the black ions move twice as fast as the white ones, the state of things after the passage of a current will be represented by the lower part of the figure. Here the middle part of the solution is unaltered and the number of ions liberated is the same at either end, but the amount of salt left at one end is less than that at the other. On the right, towards which the faster ion travels, five molecules of salt are left, being a loss of two from the original seven. On the left, towards which the slower ion moves, only three molecules remain—a loss of four. Thus, the ratio of the losses at the two ends is two to one—the same as the ratio of the assumed ionic velocities. It should be noted, however, that another cause would be competent to explain the unequal dilution of the two solutions. If either ion carried with it some of the unaltered salt or some of the solvent, concentration or dilution of the liquid would be produced where the ion was liberated. There is reason to believe that in certain cases such complex ions do exist, and interfere with the results of the differing ionic velocities.

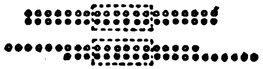

FIG. 2.

Hittorf and many other observers have made experiments to determine the unequal dilution of a solution round the two electrodes when a current passes. Various forms of apparatus have been used, the principle of them all being to secure efficient separation of the two volumes of solution in which the changes occur. In some cases porous diaphragms have been employed; but such diaphragms introduce a new complication, for the liquid as a whole is pushed through them by the action of the current, the phenomenon being known as electric endosmose. Hence experiments without separating diaphragms are to be preferred, and the apparatus may be considered effective when a considerable bulk of intervening solution is left unaltered in composition. It is usual to express the results in terms of what is called the migration constant of the anion, that is, the ratio of the amount of salt lost by the anode vessel to the whole amount lost by both vessels. Thus the statement that the migration constant or transport number for a decinormal solution of copper sulphate is 0·632 implies that of every gramme of copper sulphate lost by a solution containing originally one-tenth of a gramme equivalent per litre when a current is passed through it between platinum electrodes, 0·632 gramme is taken from the cathode vessel and 0·368 gramme from the anode vessel. For certain concentrated solutions the transport number is found to be greater than unity; thus for a normal solution of cadmium iodide its value is 1·12. On the theory that the phenomena are wholly due to unequal ionic velocities this result would mean that the cation like the anion moved against the conventional direction of the current. That a body carrying a positive electric charge should move against the direction of the electric intensity is contrary to all our notions of electric forces; and we are compelled to seek some other explanation. An alternative hypothesis is given by the idea of complex ions. If some of the anions, instead of being simple iodine ions represented chemically by the symbol I, are complex structures formed by the union of iodine with unaltered cadmium iodide—structures represented by some such chemical formula as $I(CdI_2)$, the concentration of the solution round the anode would be increased by the passage of an electric current, and the phenomena observed would be explained. It is found that, in such cases as this, where it seems necessary to imagine the existence of complex ions, the transport number changes rapidly as the concentration of the original solution is changed. Thus, diminishing the concentration of the cadmium iodine solution from normal to one-twentieth normal changes the transport number from 1·12 to 0·64. Hence it is probable that in cases where the transport number keeps constant with changing concentration the hypothesis of complex ions is unnecessary, and we may suppose that the transport number is a true migration constant from which the relative velocities of the two ions may be calculated in the matter suggested by Hittorf and illustrated in fig. 2. This conclusion is confirmed by the results of the direct visual determination of ionic velocities (see Conduction, Electric, § II.), which, in cases where the transport number remains constant, agree with the values calculated from those numbers. Many solutions in which the transport numbers vary at high concentration often become simple at greater dilution. For instance, to take the two solutions to which we have already referred, we have—

Concentration	2·0	1·5	1·0	0·5	0·2	0·1	0·05	0·02	0·01 normal
Copper sulphate transport numbers .	0·72	0·714	0·696	0·668	0·643	0·632	0·626	0·62	
Cadmium iodide „ „ . .	1·22	1·18	1·12	1·00	0·83	0·71	0·64	0·59	0·56

It is probable that in both these solutions complex ions exist at fairly high concentrations, but gradually gets less in number and finally disappear as the dilution is increased. In such salts as potassium chloride the ions seem to be simple throughout a wide range of concentration since the transport numbers for the same series of concentrations as those used above run—

Potassium chloride—

0·515, 0·515, 0·514, 0·513, 0·509, 0·508, 0·507, 0·507, 0·506.

The next important step in the theory of the subject was made by F. Kohlrausch in 1879. Kohlrausch formulated a theory of electrolytic conduction based on the idea that, under the action of the electric forces, the oppositely charged ions moved in opposite directions through the liquid, carrying their charges with them. If we eliminate the polarization at the electrodes, it can be shown that an electrolyte possesses a definite electric resistance and therefore a definite conductivity. The conductivity gives us the amount of electricity conveyed per second under a definite electromotive force. On the view of the process of conduction described above, the amount of electricity conveyed per second is measured by the product of the number of ions, known from the concentration of the solution, the charge carried by each of them, and the velocity with which, on the average, they move through the liquid. The concentration is known, and the conductivity can be measured experimentally; thus the average velocity with which the ions move past each other under the existent electromotive force can be estimated. The velocity with which the ions move past each other is equal to the sum of their individual velocities, which can therefore be calculated. Now Hittorf's transport number, in the case of simple salts in moderately dilute solution, gives us the ratio between the two ionic velocities. Hence the absolute velocities of the two ions can be determined, and we can calculate the actual speed with which a certain ion moves through a given liquid under the action of a given potential gradient or electromotive force. The details of the calculation are given in the article Conduction, Electric, § II., where also will be found an account of the methods which have been used to measure the velocities of many ions by direct visual observation. The results go to show that, where the existence of complex ions is not indicated by varying transport numbers, the observed velocities agree with those calculated on Kohlrausch's theory.

Dissociation Theory.—The verification of Kohlrausch's theory of ionic velocity verifies also the view of electrolysis which regards the electric current as due to streams of ions moving in opposite directions through the liquid and carrying their opposite electric charges with them. There remains the question how the necessary migratory freedom of the ions is secured. As we have seen, Grotthus imagined that it was the electric forces which sheared the ions past each other and loosened the chemical bonds holding the opposite parts of each dissolved molecule together. Clausius extended to electrolysis the chemical ideas which looked on the opposite parts of the molecule as always changing partners independently of any electric force, and regarded the function of the current as merely directive. Still, the necessary freedom was supposed to be secured by interchanges of ions between molecules at the instants of molecular collision only; during the rest of the life of the ions they were regarded as linked to each other to form electrically neutral molecules.

In 1887 Svante Arrhenius, professor of physics at Stockholm, put forward a new theory which supposed that the freedom of the opposite ions from each other was not a mere momentary freedom at the instants of molecular collision, but a more or less permanent freedom, the ions moving independently of each other through the liquid. The evidence which led Arrhenius to this conclusion was based on van 't Hoff's work on the osmotic pressure of solutions (see Solution). If a solution, let us say of sugar, be confined in a closed vessel through the walls of which the solvent can pass but the solution cannot, the solvent will enter till a certain equilibrium pressure is reached. This equilibrium pressure is called the osmotic pressure of the solution, and thermodynamic theory shows that, in an ideal case of perfect separation between solvent and solute, it should have the same value as the pressure which a number of molecules equal to the number of solute molecules in the solution would exert if they could exist as a gas in a space equal to the volume of the solution, provided that the space was large enough (*i.e.* the solution dilute enough) for the intermolecular forces between the dissolved particles to be inappreciable. Van 't Hoff pointed out that measurements of osmotic pressure confirmed this value in the case of dilute solutions of cane sugar.

Thermodynamic theory also indicates a connexion between the osmotic pressure of a solution and the depression of its freezing point and its vapour pressure compared with those of the pure solvent. The freezing points and vapour pressures of solutions of sugar are also in conformity with the theoretical numbers. But when we pass to solutions of mineral salts and acids—to solutions of electrolytes in fact—we find that the observed values of the osmotic pressures and of the allied phenomena are greater than the normal values. Arrhenius pointed out that these exceptions would be brought into line if the ions of electrolytes were imagined to be separate entities each capable of producing its own pressure effects just as would an ordinary dissolved molecule.

Two relations are suggested by Arrhenius' theory. (1) In very dilute solutions of simple substances, where only one kind of dissociation is possible and the dissociation of the ions is complete, the number of pressure-producing particles necessary to produce the observed osmotic effects should be equal to the number of ions given by a molecule of the salt as shown by its electrical properties. Thus the osmotic pressure, or the depression of the freezing point of a solution of potassium chloride should, at extreme dilution, be twice the normal value, but of a solution of sulphuric acid three times that value, since the potassium salt contains two ions and the acid three. (2) As the concentration of the solutions increases, the ionization as measured electrically and the dissociation as measured osmotically might decrease more or less together, though, since the thermodynamic theory only holds when the solution is so dilute that the dissolved particles are beyond each other's sphere of action, there is much doubt whether this second relation is valid through any appreciable range of concentration.

At present, measurements of freezing point are more convenient and accurate than those of osmotic pressure, and we may test the validity of Arrhenius' relations by their means. The theoretical value for the depression of the freezing point of a dilute solution per gramme-equivalent of solute per litre is 1·857° C. Completely ionized solutions of salts with two ions should give double this number or 3·714°, while electrolytes with three ions should have a value of 5·57°.

The following results are given by H. B. Loomis for the concentration of 0·01 gramme-molecule of salt to one thousand grammes of water. The salts tabulated are those of which the equivalent conductivity reaches a limiting value indicating that complete ionization is reached as dilution is increased. With such salts alone is a valid comparison possible.

Molecular Depressions of the Freezing Point.

Electrolytes with two Ions.

Potassium chloride .	3·60	Nitric acid . . .	3·73
Sodium chloride .	3·67	Potassium nitrate .	3·46
Potassium hydrate .	3·71	Sodium nitrate .	3·55
Hydrochloric acid .	3·61	Ammonium nitrate .	3·58

Electrolytes with three Ions.

Sulphuric acid . .	4·49	Calcium chloride . .	5·04
Sodium sulphate . .	5·09	Magnesium chloride .	5·08

At the concentration used by Loomis the electrical conductivity indicates that the ionization is not complete, particularly in the case of the salts with divalent ions in the second list. Allowing for incomplete ionization the general concordance of these numbers with the theoretical ones is very striking.

The measurements of freezing points of solutions at the extreme dilution necessary to secure complete ionization is a matter of great difficulty, and has been overcome only in a research initiated by E. H. Griffiths.[1] Results have been obtained for solutions of sugar, where the experimental number is 1·858, and for potassium chloride, which gives a depression of 3·720. These numbers agree with those indicated by theory, viz. 1·857 and 3·714, with astonishing exactitude. We may take Arrhenius' first relation as established for the case of potassium chloride.

The second relation, as we have seen, is not a strict consequence of theory, and experiments to examine it must be treated as an investigation of the limits within which solutions are dilute within the thermodynamic sense of the word, rather than as a test of the soundness of the theory. It is found that divergence has begun before the concentration has become great enough to enable freezing points to be measured with any ordinary apparatus. The freezing point curve usually lies below the electrical one, but approaches it as dilution is increased.[2]

Returning once more to the consideration of the first relation, which deals with the comparison between the number of ions and the number of pressure-producing particles in dilute solution, one caution is necessary. In simple substances like potassium chloride it seems evident that one kind of dissociation only is possible. The electrical phenomena show that there are two ions to the molecule, and that these ions are electrically charged. Corresponding with this result we find that the freezing point of dilute solutions indicates that two pressure-producing particles per molecule are present. But the converse relation does not necessarily follow. It would be possible for a body in solution to be dissociated into non-electrical parts, which would give osmotic pressure effects twice or three times the normal value, but, being uncharged, would not act as ions and impart electrical conductivity to the solution. L. Kahlenberg (*Jour. Phys. Chem.*, 1901, v. 344, 1902, vi. 43) has found that solutions of diphenylamine in methyl cyanide possess an excess of pressure-producing particles and yet are non-conductors of electricity. It is possible that in complicated organic substances we might have two kinds of dissociation, electrical and non-electrical, occurring simultaneously, while the possibility of the association of molecules accompanied by the electrical dissociation of some of them into new parts should not be overlooked. It should be pointed out that no measurements on osmotic pressures or freezing points can do more than tell us that an excess of particles is present; such experiments can throw no light on the question whether or not those particles are electrically charged. That question can only be answered by examining whether or not the particles move in an electric field.

The dissociation theory was originally suggested by the osmotic pressure relations. But not only has it explained satisfactorily the electrical properties of solutions, but it seems to be the only known hypothesis which is consistent with the experimental relation between the concentration of a solution and its electrical conductivity (see CONDUCTION, ELECTRIC, § II., "Nature of Electrolytes"). It is probable that the electrical effects constitute the strongest arguments in favour of the theory. It is necessary to point out that the dissociated ions of such a body as potassium chloride are not in the same condition as potassium and chlorine in the free state. The ions are associated with very large electric charges, and, whatever their exact relations with those charges may be, it is certain that the energy of a system in such a state must be different from its energy when unelectrified. It is not unlikely, therefore, that even a compound as stable in the solid form as potassium chloride should be thus dissociated when dissolved. Again, water, the best electrolytic solvent known, is also the body of the highest specific inductive capacity (dielectric constant), and this property, to whatever cause it may be due, will reduce the forces between electric charges in the neighbourhood, and may therefore enable two ions to separate.

This view of the nature of electrolytic solutions at once explains many well-known phenomena. Other physical properties of these solutions, such as density, colour, optical rotatory power, &c., like the conductivities, are *additive*, *i.e.* can be calculated by adding together the corresponding properties of the parts. This again suggests that these parts are independent of each other. For instance, the colour of a salt solution is the colour obtained by the superposition of the colours of the ions and the colour of any undissociated salt that may be present. All copper salts in dilute solution are blue, which is therefore the colour of the copper ion. Solid copper chloride is brown or yellow, so that its concentrated solution, which contains both ions and undissociated molecules, is green, but changes to blue as water is added and the ionization becomes complete. A series of equivalent solutions all containing the same coloured ion have absorption spectra which, when photographed, show identical absorption bands of equal intensity.[3] The colour changes shown by many substances which are used as indicators (*q.v.*) of acids or alkalis can be explained in a similar way. Thus para-nitrophenol has colourless molecules, but an intensely yellow negative ion. In neutral, and still more in acid solutions, the dissociation of the indicator is practically nothing, and the liquid is colourless. If an alkali is added, however, a highly dissociated salt of para-nitrophenol is formed, and the yellow colour is at once evident. In other cases, such as that of litmus, both the ion and the undissociated molecule are coloured, but in different ways.

Electrolytes possess the power of coagulating solutions of colloids such as albumen and arsenious sulphide. The mean values of the relative coagulative powers of sulphates of mono-, di-, and tri-valent metals have been shown experimentally to be approximately in the ratios 1 : 35 : 1023. The dissociation theory refers this to the action of electric charges carried by the free ions. If a certain minimum charge must be collected in order to start coagulation, it will need the conjunction of $6n$ monovalent, or $3n$ divalent, to equal the effect of $2n$ trivalent ions. The ratios of the coagulative powers can thus be calculated to be $1:x:x^2$, and putting $x=32$ we get 1 : 32 : 1024, a satisfactory agreement with the numbers observed.[4]

The question of the application of the dissociation theory to the case of fused salts remains. While it seems clear that the conduction in this case is carried on by ions similar to those of solutions, since Faraday's laws apply equally to both, it does not follow necessarily that semi-permanent dissociation is the only way to explain the phenomena. The evidence in favour of dissociation in the case of solutions does not apply to fused salts, and it is possible that, in their case, a series of molecular interchanges, somewhat like Grotthus's chain, may represent the mechanism of conduction.

An interesting relation appears when the electrolytic conductivity of solutions is compared with their chemical activity. The readiness and speed with which electrolytes react are in sharp contrast with the difficulty experienced in the case of non-electrolytes. Moreover, a study of the chemical relations of electrolytes indicates that it is always the electrolytic ions that are concerned in their reactions. The tests for a salt, potassium nitrate, for example, are the tests not for KNO_3, but for its ions K and NO_3, and in cases of double decomposition it is always these ions that are exchanged for those of other substances. If an element be present in a compound otherwise than as an ion, it is not interchangeable, and cannot be recognized by the usual tests. Thus neither a chlorate, which contains the ion ClO_3, nor monochloracetic acid, shows the reactions of chlorine, though it is, of course, present in both substances; again, the sulphates do not answer to the usual tests which indicate the presence of sulphur as sulphide. The chemical activity of a substance is a quantity which may be measured by different methods. For some substances it has been shown to be independent of the particular reaction used. It is then possible to assign to each body a specific coefficient of affinity. Arrhenius has pointed out that the coefficient of affinity of an acid is proportional to its electrolytic ionization.

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[1] *Brit. Ass. Rep.*, 1906, Section A, Presidential Address.

[2] See *Theory of Solution*, by W. C. D. Whetham (1902), p. 328.

[3] W. Ostwald, *Zeits. physikal. Chemie*, 1892, vol. ix. p. 579; T. Ewan, *Phil. Mag.* (5), 1892, vol. xxxiii. p. 317; G. D. Liveing, *Cambridge Phil. Trans.*, 1900, vol. xviii. p. 298.

[4] See W. B. Hardy, *Journal of Physiology*, 1899, vol. xxiv. p. 288; and W. C. D. Whetham *Phil. Mag.*, November 1899.

The affinities of acids have been compared in several ways. W. Ostwald (*Lehrbuch der allg. Chemie*, vol. ii., Leipzig, 1893) investigated the relative affinities of acids for potash, soda and ammonia, and proved them to be independent of the base used. The method employed was to measure the changes in volume caused by the action. His results are given in column I. of the following table, the affinity of hydrochloric acid being taken as one hundred. Another method is to allow an acid to act on an insoluble salt, and to measure the quantity which goes into solution. Determinations have been made with calcium oxalate, $CaC_2O_4+H_2O$, which is easily decomposed by acids, oxalic acid and a soluble calcium salt being formed. The affinities of acids relative to that of oxalic acid are thus found, so that the acids can be compared among themselves (column. II.). If an aqueous solution of methyl acetate be allowed to stand, a slow decomposition goes on. This is much quickened by the presence of a little dilute acid, though the acid itself remains unchanged. It is found that the influence of different acids on this action is proportional to their specific coefficients of affinity. The results of this method are given in column III. Finally, in column IV. the electrical conductivities of normal solutions of the acids have been tabulated. A better basis of comparison would be the ratio of the actual to the limiting conductivity, but since the conductivity of acids is chiefly due to the mobility of the hydrogen ions, its limiting value is nearly the same for all, and the general result of the comparison would be unchanged.

Acid.	I.	II.	III.	IV.
Hydrochloric	100	100	100	100
Nitric	102	110	92	99·6
Sulphuric	68	67	74	65·1
Formic	4·0	2·5	1·3	1·7
Acetic	1·2	1·0	0·3	0·4
Propionic	1·1	..	0·3	0·3
Monochloracetic . . .	7·2	5·1	4·3	4·9
Dichloracetic	34	18	23·0	25·3
Trichloracetic	82	63	68·2	62·3
Malic	3·0	5·0	1·2	1·3
Tartaric	5·3	6·3	2·3	2·3
Succinic	0·1	0·2	0·5	0·6

It must be remembered that, the solutions not being of quite the same strength, these numbers are not strictly comparable, and that the experimental difficulties involved in the chemical measurements are considerable. Nevertheless, the remarkable general agreement of the numbers in the four columns is quite enough to show the intimate connexion between chemical activity and electrical conductivity. We may take it, then, that only that portion of these bodies is chemically active which is electrolytically active—that ionization is necessary for such chemical activity as we are dealing with here, just as it is necessary for electrolytic conductivity.

The ordinary laws of chemical equilibrium have been applied to the case of the dissociation of a substance into its ions. Let x be the number of molecules which dissociate per second when the number of undissociated molecules in unit volume is unity, then in a dilute solution where the molecules do not interfere with each other, xp is the number when the concentration is p. Recombination can only occur when two ions meet, and since the frequency with which this will happen is, in dilute solution, proportional to the square of the ionic concentration, we shall get for the number of molecules re-formed in one second yq^2 where q is the number of dissociated molecules in one cubic centimetre. When there is equilibrium, $xp=yq^2$. If μ be the molecular conductivity, and μ_∞ its value at infinite dilution, the fractional number of molecules dissociated is μ/μ_∞, which we may write as α. The number of undissociated molecules is then $1-\alpha$, so that if V be the volume of the solution containing 1 gramme-molecule of the dissolved substance, we get

$$q=\alpha/V \text{ and } p=(1-\alpha)/V,$$

hence

$$x(1-\alpha)\ V=y\alpha^2/V^2,$$

and

$$\frac{\alpha^2}{V(1-\alpha)}=\frac{x}{y}=\text{constant}=k.$$

This constant k gives a numerical value for the chemical affinity and the equation should represent the effect of dilution on the molecular conductivity of binary electrolytes.

In the case of substances like ammonia and acetic acid, where the dissociation is very small, $1-\alpha$ is nearly equal to unity, and only varies slowly with dilution. The equation then becomes $\alpha^2/V=k$, or $\alpha=\sqrt{Vk}$, so that the molecular conductivity is proportional to the square root of the dilution. Ostwald has confirmed the equation by observation on an enormous number of weak acids (*Zeits. physikal. Chemie*, 1888, ii. p. 278; 1889, iii. pp. 170, 241, 369). Thus in the case of cyanacetic acid, while the volume V changed by doubling from 16 to 1024 litres, the values of k were 0·00 (376, 373, 374, 361, 362, 361, 368). The mean values of k for other common acids were—formic, 0·0000214; acetic, 0·0000180; monochloracetic, 0·00155; dichloracetic, 0·051; trichloracetic, 1·21; propionic, 0·0000134. From these numbers we can, by help of the equation, calculate the conductivity of the acids for any dilution. The value of k, however, does not keep constant so satisfactorily in the case of highly dissociated substances, and empirical formulae have been constructed to represent the effect of dilution on them. Thus the values of the expressions $\alpha^2/(1-\alpha\sqrt{V})$ (Rudolphi, *Zeits. physikal. Chemie*, 1895, vol. xvii. p. 385) and $\alpha^3/(1-\alpha)^2V$ (van 't Hoff, *ibid.*, 1895, vol. xviii. p. 300) are found to keep constant as V changes. Van 't Hoff's formula is equivalent to taking the frequency of dissociation as proportional to the square of the concentration of the molecules, and the frequency of recombination as proportional to the cube of the concentration of the ions. An explanation of the failure of the usual dilution law in these cases may be given if we remember that, while the electric forces between bodies like undissociated molecules, each associated with equal and opposite charges, will vary inversely as the fourth power of the distance, the forces between dissociated ions, each carrying one charge only, will be inversely proportional to the square of the distance. The forces between the ions of a strongly dissociated solution will thus be considerable at a dilution which makes forces between undissociated molecules quite insensible, and at the concentrations necessary to test Ostwald's formula an electrolyte will be far from dilute in the thermodynamic sense of the term, which implies no appreciable intermolecular or interionic forces.

When the solutions of two substances are mixed, similar considerations to those given above enable us to calculate the resultant changes in dissociation. (See Arrhenius, *loc. cit.*) The simplest and most important case is that of two electrolytes having one ion in common, such as two acids. It is evident that the undissociated part of each acid must eventually be in equilibrium with the free hydrogen ions, and, if the concentrations are not such as to secure this condition, readjustment must occur. In order that there should be no change in the states of dissociation on mixing, it is necessary, therefore, that the concentration of the hydrogen ions should be the same in each separate solution. Such solutions were called by Arrhenius "isohydric." The two solutions, then, will so act on each other when mixed that they become isohydric. Let us suppose that we have one very active acid like hydrochloric, in which dissociation is nearly complete, another like acetic, in which it is very small. In order that the solutions of these should be isohydric and the concentrations of the hydrogen ions the same, we must have a very large quantity of the feebly dissociated acetic acid, and a very small quantity of the strongly dissociated hydrochloric, and in such proportions alone will equilibrium be possible. This explains the action of a strong acid on the salt of a weak acid. Let us allow dilute sodium acetate to react with dilute hydrochloric acid. Some acetic acid is formed, and this process will go on till the solutions of the two acids are isohydric: that is, till the dissociated hydrogen ions are in equilibrium with both. In order that this should hold, we have seen that a considerable quantity of acetic acid must be present, so that a corresponding amount of the salt will be decomposed, the quantity being greater the less the acid is dissociated. This "replacement" of a "weak" acid by a "strong" one is a matter of common observation in the chemical laboratory. Similar investigations applied to the general case of chemical equilibrium lead to an expression of exactly the same form as that given by C. M. Guldberg and P. Waage, which is universally accepted as an accurate representation of the facts.

The temperature coefficient of conductivity has approximately the same value for most aqueous salt solutions. It decreases both as the temperature is raised and as the concentration is increased, ranging from about 3·5% per degree for extremely dilute solutions (*i.e.* practically pure water) at 0° to about 1·5 for concentrated solutions at 18°. For acids its value is usually rather less than for salts at equivalent concentrations. The influence of temperature on the conductivity of solutions depends on (1) the ionization, and (2) the frictional resistance of the liquid to the passage of the ions, the reciprocal of which is called the ionic fluidity. At extreme dilution, when the ionization is complete, a variation in temperature cannot change its amount. The rise of conductivity with temperature, therefore, shows that the fluidity becomes greater when the solution is heated. As the concentration is increased and un-ionized molecules are formed, a change in temperature begins to affect the ionization as well as the fluidity. But the temperature coefficient of conductivity is now generally less than before; thus the effect of temperature on ionization must be of opposite sign to its effect on fluidity. The ionization of a solution, then, is usually diminished by raising the temperature, the rise in conductivity being due to the greater increase in fluidity. Nevertheless, in certain cases, the temperature coefficient of conductivity becomes negative at high temperatures, a solution of phosphoric acid, for example, reaching a maximum conductivity at 75° C.

The dissociation theory gives an immediate explanation of the fact that, in general, no heat-change occurs when two neutral salt solutions are mixed. Since the salts, both before and after mixture, exist mainly as dissociated ions, it is obvious that large thermal effects can only appear when the state of dissociation of the products is very different from that of the reagents. Let us consider the case of the neutralization of a base by an acid in the light of the dissociation theory. In dilute solution such substances as hydrochloric acid and potash are almost completely dissociated, so that, instead of representing the reaction as

$$HCl+KOH=KCl+H_2O,$$

we must write

$$\overset{+}{H}+\overset{-}{Cl}+\overset{+}{K}+\overset{-}{OH}=\overset{+}{K}+\overset{-}{Cl}+H_2O.$$

The ions K and Cl suffer no change, but the hydrogen of the acid and the hydroxyl (OH) of the potash unite to form water, which is only very slightly dissociated. The heat liberated, then, is almost exclusively that produced by the formation of water from its ions. An exactly similar process occurs when any strongly dissociated acid acts on any strongly dissociated base, so that in all such cases the heat evolution should be approximately the same. This is fully borne out by the experiments of Julius Thomsen, who found that the heat of neutralization of one gramme-molecule of a strong base by an equivalent quantity of a strong acid was nearly constant, and equal to 13,700 or 13,800 calories. In the case of weaker acids, the dissociation of which is less complete, divergences from this constant value will occur, for some of the molecules have to be separated into their ions. For instance, sulphuric acid, which in the fairly strong solutions used by Thomsen is only about half dissociated, gives a higher value for the heat of neutralization, so that heat must be evolved when it is ionized. The heat of formation of a substance from its ions is, of course, very different from that evolved when it is formed from its elements in the usual way, since the energy associated with an ion is different from that possessed by the atoms of the element in their normal state. We can calculate the heat of formation from its ions for any substance dissolved in a given liquid, from a knowledge of the temperature coefficient of ionization, by means of an application of the well-known thermodynamical process, which also gives the latent heat of evaporation of a liquid when the temperature coefficient of its vapour pressure is known. The heats of formation thus obtained may be either positive or negative, and by using them to supplement the heat of formation of water, Arrhenius calculated the total heats of neutralization of soda by different acids, some of them only slightly dissociated, and found values agreeing well with observation (*Zeits. physikal. Chemie*, 1889, 4, p. 96; and 1892, 9, p. 339).

Voltaic Cells.—When two metallic conductors are placed in an electrolyte, a current will flow through a wire connecting them provided that a difference of any kind exists between the two conductors in the nature either of the metals or of the portions of the electrolyte which surround them. A current can be obtained by the combination of two metals in the same electrolyte, of two metals in different electrolytes, of the same metal in different electrolytes, or of the same metal in solutions of the same electrolyte at different concentrations. In accordance with the principles of energetics (*q.v.*), any change which involves a decrease in the total available energy of the system will tend to occur, and thus the necessary and sufficient condition for the production of electromotive force is that the available energy of the system should decrease when the current flows.

In order that the current should be maintained, and the electromotive force of the cell remain constant during action, it is necessary to ensure that the changes in the cell, chemical or other, which produce the current, should neither destroy the difference between the electrodes, nor coat either electrode with a non-conducting layer through which the current cannot pass. As an example of a fairly constant cell we may take that of Daniell, which consists of the electrical arrangement—zinc | zinc sulphate solution | copper sulphate solution | copper,—the two solutions being usually separated by a pot of porous earthenware. When the zinc and copper plates are connected through a wire, a current flows, the conventionally positive electricity passing from copper to zinc in the wire and from zinc to copper in the cell. Zinc dissolves at the anode, an equal amount of zinc replaces an equivalent amount of copper on the other side of the porous partition, and the same amount of copper is deposited on the cathode. This process involves a decrease in the available energy of the system, for the dissolution of zinc gives out more energy than the separation of copper absorbs. But the internal rearrangements which accompany the production of a current do not cause any change in the original nature of the electrodes, fresh zinc being exposed at the anode, and copper being deposited on copper at the cathode. Thus as long as a moderate current flows, the only variation in the cell is the appearance of zinc sulphate in the liquid on the copper side of the porous wall. In spite of this appearance, however, while the supply of copper is maintained, copper, being more easily separated from the solution than zinc, is deposited alone at the cathode, and the cell remains constant.

It is necessary to observe that the condition for change in a system is that the total available energy of the whole system should be decreased by the change. We must consider what change is allowed by the mechanism of the system, and deal with the sum of all the alterations in energy. Thus in the Daniell cell the dissolution of copper as well as of zinc would increase the loss in available energy. But when zinc dissolves, the zinc ions carry their electric charges with them, and the liquid tends to become positively electrified. The electric forces then soon stop further action unless an equivalent quantity of positive ions are removed from the solution. Hence zinc can only dissolve when some more easily separable substance is present in solution to be removed *pari passu* with the dissolution of zinc. The mechanism of such systems is well illustrated by an experiment devised by W. Ostwald. Plates of platinum and pure or amalgamated zinc are separated by a porous pot, and each surrounded by some of the same solution of a salt of a metal more oxidizable than zinc, such as potassium. When the plates are connected together by means of a wire, no current flows, and no appreciable amount of zinc dissolves, for the dissolution of zinc would involve the separation of potassium and a gain in available energy. If sulphuric acid be added to the vessel containing the zinc, these conditions are unaltered and still no zinc is dissolved. But, on the other hand, if a few drops of acid be placed in the vessel with the platinum, bubbles of hydrogen appear, and a current flows, zinc dissolving at the anode, and hydrogen being liberated at the cathode. In order that positively electrified ions may enter a solution, an equivalent amount of other positive ions must be removed or negative ions be added, and, for the process to occur spontaneously, the possible action at the two electrodes must involve a decrease in the total available energy of the system.

Considered thermodynamically, voltaic cells must be divided into reversible and non-reversible systems. If the slow processes of diffusion be ignored, the Daniell cell already described may be taken as a type of a reversible cell. Let an electromotive force exactly equal to that of the cell be applied to it in the reverse direction. When the applied electromotive force is diminished by an infinitesimal amount, the cell produces a current in the usual direction, and the ordinary chemical changes occur. If the external electromotive force exceed that of the cell by ever so little, a current flows in the opposite direction, and all the former chemical changes are reversed, copper dissolving from the copper plate, while zinc is deposited on the zinc plate. The cell, together with this balancing electromotive force, is thus a reversible system in true equilibrium, and the thermodynamical reasoning applicable to such systems can be used to examine its properties.

Now a well-known relation connects the available energy of a reversible system with the corresponding change in its total internal energy.

The available energy A is the amount of external work obtainable by an infinitesimal, reversible change in the system which occurs at a constant temperature T. If I be the change in the internal energy, the relation referred to gives us the equation

$$A = I + T(dA/dT),$$

where dA/dT denotes the rate of change of the available energy of the system per degree change in temperature. During a small electric transfer through the cell, the external work done is Ee, where E is the electromotive force. If the chemical changes which occur in the cell were allowed to take place in a closed vessel without the performance of electrical or other work, the change in energy would be measured by the heat evolved. Since the final state of the system would be the same as in the actual processes of the cell, the same amount of heat must give a measure of the change in internal energy when the cell is in action. Thus, if L denote the heat corresponding with the chemical changes associated with unit electric transfer, Le will be the heat corresponding with an electric transfer e, and will also be equal to the change in internal energy of the cell. Hence we get the equation

$$Ee = Le + Te(dE/dT) \text{ or } E = L + T(dE/dT),$$

as a particular case of the general thermodynamic equation of available energy. This equation was obtained in different ways by J. Willard Gibbs and H. von Helmholtz.

It will be noticed that when dE/dT is zero, that is, when the electromotive force of the cell does not change with temperature, the electromotive force is measured by the heat of reaction per unit of electrochemical change. The earliest formulation of the subject, due to Lord Kelvin, assumed that this relation was true in all cases, and, calculated in this way, the electromotive force of Daniell's cell, which happens to possess a very small temperature coefficient, was found to agree with observation.

When one gramme of zinc is dissolved in dilute sulphuric acid, 1670 thermal units or calories are evolved. Hence for the electrochemical unit of zinc or 0·003388 gramme, the thermal evolution is 5·66 calories. Similarly, the heat which accompanies the dissolution of one electrochemical unit of copper is 3·00 calories. Thus, the thermal equivalent of the unit of resultant electrochemical change in Daniell's cell is $5{\cdot}66 - 3{\cdot}00 = 2{\cdot}66$ calories. The dynamical equivalent of the calorie is $4{\cdot}18 \times 10^7$ ergs or C.G.S. units of work, and therefore the electromotive force of the cell should be $1{\cdot}112 \times 10^8$ C.G.S. units or 1·112 volts—a close agreement with the experimental result of about 1·08 volts. For cells in which the electromotive force varies with temperature, the full equation given by Gibbs and Helmholtz has also been confirmed experimentally.

As stated above, an electromotive force is set up whenever there is a difference of any kind at two electrodes immersed in electrolytes. In ordinary cells the difference is secured by using two dissimilar metals, but an electromotive force exists if two plates of the same metal are placed in solutions of different substances, or of the same substance at different concentrations. In the latter case, the tendency of the metal to dissolve in the more dilute solution is greater than its tendency to dissolve in the more concentrated solution, and thus there is a decrease in available energy when metal dissolves in the dilute solution and separates in equivalent quantity from the concentrated solution. An electromotive force is therefore set up in this direction, and, if we can calculate the change in available energy due to the processes of the cell, we can foretell the value of the electromotive force. Now the effective change produced by the action of the current is the concentration of the more dilute solution by the dissolution of metal in it, and the dilution of the originally stronger solution by the separation of metal from it. We may imagine these changes reversed in two ways. We may evaporate some of the solvent from the solution which has become weaker and thus reconcentrate it, condensing the vapour on the solution which had become stronger. By this reasoning Helmholtz showed how to obtain an expression for the work done. On the other hand, we may imagine the processes due to the electrical transfer to be reversed by an osmotic operation. Solvent may be supposed to be squeezed out from the solution which has become more dilute through a semi-permeable wall, and through another such wall allowed to mix with the solution which in the electrical operation had become more concentrated. Again, we may calculate the osmotic work done, and, if the whole cycle of operations be supposed to occur at the same temperature, the osmotic work must be equal and opposite to the electrical work of the first operation.

The result of the investigation shows that the electrical work Ee is given by the equation

$$Ee = \int_{p_1}^{p_2} v\,dp,$$

where v is the volume of the solution used and p its osmotic pressure. When the solutions may be taken as effectively dilute, so that the gas laws apply to the osmotic pressure, this relation reduces to

$$E = \frac{nrRT}{ey} \log_e \frac{c_1}{c_2}$$

where n is the number of ions given by one molecule of the salt, r the transport ratio of the anion, R the gas constant, T the absolute temperature, y the total valency of the anions obtained from one molecule, and c_1 and c_2 the concentrations of the two solutions.

If we take as an example a concentration cell in which silver plates are placed in solutions of silver nitrate, one of which is ten times as strong as the other, this equation gives

$$E = 0{\cdot}060 \times 10^8 \text{ C.G.S. units}$$
$$= 0{\cdot}060 \text{ volts.}$$

W. Nernst, to whom this theory is due, determined the electromotive force of this cell experimentally, and found the value 0·055 volt.

The logarithmic formulae for these concentration cells indicate that theoretically their electromotive force can be increased to any extent by diminishing without limit the concentration of the more dilute solution, $\log c_1/c_2$ then becoming very great. This condition may be realized to some extent in a manner that throws light on the general theory of the voltaic cell. Let us consider the arrangement—silver | silver chloride with potassium chloride solution | potassium nitrate solution | silver nitrate solution | silver. Silver chloride is a very insoluble substance, and here the amount in solution is still further reduced by the presence of excess of chlorine ions of the potassium salt. Thus silver, at one end of the cell in contact with many silver ions of the silver nitrate solution, at the other end is in contact with a liquid in which the concentration of those ions is very small indeed. The result is that a high electromotive force is set up, which has been calculated as 0·52 volt, and observed as 0·51 volt. Again, Hittorf has shown that the effect of a cyanide round a copper electrode is to combine with the copper ions. The concentration of the simple copper ions is then so much diminished that the copper plate becomes an anode with regard to zinc. Thus the cell—copper | potassium cyanide solution | potassium sulphate solution—zinc sulphate solution | zinc—gives a current which carries copper into solution and deposits zinc. In a similar way silver could be made to act as anode with respect to cadmium.

It is now evident that the electromotive force of an ordinary chemical cell such as that of Daniell depends on the concentration of the solutions as well as on the nature of the metals. In ordinary cases possible changes in the concentrations only affect the electromotive force by a few parts in a hundred, but, by means such as those indicated above, it is possible to produce such immense differences in the concentrations that the electromotive force of the cell is not only changed appreciably but even reversed in direction. Once more we see that it is the total impending change in the available energy of the system which controls the electromotive force.

Any reversible cell can theoretically be employed as an accumulator, though, in practice, conditions of general convenience are more sought after than thermodynamic efficiency.

The effective electromotive force of the common lead accumulator (*q.v.*) is less than that required to charge it. This drop in the electromotive force has led to the belief that the cell is not reversible. F. Dolezalek, however, has attributed the difference to mechanical hindrances, which prevent the equalization of acid concentration in the neighbourhood of the electrodes, rather than to any essentially irreversible chemical action. The fact that the Gibbs-Helmholtz equation is found to apply also indicates that the lead accumulator is approximately reversible in the thermodynamic sense of the term.

Polarization and Contact Difference of Potential.—If we connect together in series a single Daniell's cell, a galvanometer, and two platinum electrodes dipping into acidulated water, no visible chemical decomposition ensues. At first a considerable current is indicated by the galvanometer; the deflexion soon diminishes, however, and finally becomes very small. If, instead of using a single Daniell's cell, we employ some source of electromotive force which can be varied as we please, and gradually raise its intensity, we shall find that, when it exceeds a certain value, about 1·7 volt, a permanent current of considerable strength flows through the solution, and, after the initial period, shows no signs of decrease. This current is accompanied by chemical decomposition. Now let us disconnect the platinum plates from the battery and join them directly with the galvanometer. A current will flow for a while in the reverse direction; the system of plates and acidulated water through which a current has been passed, acts as an accumulator, and will itself yield a current in return. These phenomena are explained by the existence of a reverse electromotive force at the surface of the platinum plates. Only when the applied electromotive force exceeds this reverse force of polarization, will a permanent steady current pass through the liquid, and visible chemical decomposition proceed. It seems that this reverse electromotive force of polarization is due to the deposit on the electrodes of minute quantities of the products of chemical decomposition. Differences between the two electrodes are thus set up, and, as we have seen above, an electromotive force will therefore exist between them. To pass a steady current in the direction opposite to this electromotive force of polarization, the applied electromotive force E must exceed that of polarization E', and the excess $E - E'$ is the effective electromotive force of the circuit, the current being, in accordance with Ohm's law, proportional to the applied electromotive force and represented by $(E - E')/R$, where R is a constant called the resistance of the circuit.

When we use platinum electrodes in acidulated water, hydrogen and oxygen are evolved. The opposing force of polarization is about 1·7 volt, but, when the plates are disconnected and used as a source of current, the electromotive force they give is only about 1·07 volt. This irreversibility is due to the work required to evolve bubbles of gas at the surface of bright platinum plates. If the plates be covered with a deposit of platinum black, in which the gases are absorbed as fast as they are produced, the minimum decomposition point is 1·07 volt, and the process is reversible. If secondary effects are eliminated, the deposition of metals also is a reversible process; the decomposition voltage is equal to the electromotive force which the metal itself gives when going into solution. The phenomena of polarization are thus seen to be due to the changes of surface produced, and are correlated with the differences of potential which exist at any surface of separation between a metal and an electrolyte.

Many experiments have been made with a view of separating the two potential-differences which must exist in any cell made of two metals and a liquid, and of determining each one individually. If we regard the thermal effect at each junction as a measure of the potential-difference there, as the total thermal effect in the cell undoubtedly is of the sum of its potential-differences, in cases where the temperature coefficient is negligible, the heat evolved on solution of a metal should give the electrical potential-difference at its surface. Hence, if we assume that, in the Daniell's cell, the temperature coefficients are negligible at the individual contacts as well as in the cell as a whole, the sign of the potential-difference ought to be the same at the surface of the zinc as it is at the surface of the copper. Since zinc goes into solution and copper comes out, the electromotive force of the cell will be the difference between the two effects. On the other hand, it is commonly thought that the single potential-differences at the surface of metals and electrolytes have been determined by methods based on the use of the capillary electrometer and on others depending on what is called a dropping electrode, that is, mercury dropping rapidly into an electrolyte and forming a cell with the mercury at rest in the bottom of the vessel. By both these methods the single potential-differences found at the surfaces of the zinc and copper have opposite signs, and the effective electromotive force of a Daniell's cell is the sum of the two effects. Which of these conflicting views represents the truth still remains uncertain.

Diffusion of Electrolytes and Contact Difference of Potential between Liquids.—An application of the theory of ionic velocity due to W. Nernst[1] and M. Planck[2] enables us to calculate the diffusion constant of dissolved electrolytes. According to the molecular theory, diffusion is due to the motion of the molecules of the dissolved substance through the liquid. When the dissolved molecules are uniformly distributed, the osmotic pressure will be the same everywhere throughout the solution, but, if the concentration vary from point to point, the pressure will vary also. There must, then, be a relation between the rate of change of the concentration and the osmotic pressure gradient, and thus we may consider the osmotic pressure gradient as a force driving the solute through a viscous medium. In the case of non-electrolytes and of all non-ionized molecules this analogy completely represents the facts, and the phenomena of diffusion can be deduced from it alone. But the ions of an electrolytic solution can move independently through the liquid, even when no current flows, as the consequences of Ohm's law indicate. The ions will therefore diffuse independently, and the faster ion will travel quicker into pure water in contact with a solution. The ions carry their charges with them, and, as a matter of fact, it is found that water in contact with a solution takes with respect to it a positive or negative potential, according as the positive or negative ion travels the faster. This process will go on until the simultaneous separation of electric charges produces an electrostatic force strong enough to prevent further separation of ions. We can therefore calculate the rate at which the salt as a whole will diffuse by examining the conditions for a steady transfer, in which the ions diffuse at an equal rate, the faster one being restrained and the slower one urged forward by the electric forces. In this manner the diffusion constant can be calculated in absolute units ($HCl = 2{\cdot}49$, $HNO_3 = 2{\cdot}27$, $NaCl = 1{\cdot}12$), the unit of time being the day. By experiments on diffusion this constant has been found by Scheffer, and the numbers observed agree with those calculated ($HCl = 2{\cdot}30$, $HNO_3 = 2{\cdot}22$, $NaCl = 1{\cdot}11$).

As we have seen above, when a solution is placed in contact with water the water will take a positive or negative potential with regard to the solution, according as the cation or anion has the greater specific velocity, and therefore the greater initial rate of diffusion. The difference of potential between two solutions of a substance at different concentrations can be calculated from the equations used to give the diffusion constants. The results give equations of the same logarithmic form as those obtained in a somewhat different manner in the theory of concentration cells described above, and have been verified by experiment.

The contact differences of potential at the interfaces of metals and electrolytes have been co-ordinated by Nernst with those at the surfaces of separation between different liquids. In contact with a solvent a metal is supposed to possess a definite solution pressure, analogous to the vapour pressure of a liquid. Metal goes into solution in the form of electrified ions. The liquid thus acquires a positive charge, and the metal a negative charge. The electric forces set up tend to prevent further separation, and finally a state of equilibrium is reached, when no more ions can go into solution unless an equivalent number are removed by voltaic action. On the analogy between this case and that of the interface between two solutions, Nernst has arrived at similar logarithmic expressions for the difference of potential, which becomes proportional to log (P_1/P_2) where P_2 is taken to mean the osmotic pressure of the cations in the solution, and P_1 the osmotic pressure of the cations in the substance of the metal itself. On these lines the equations of concentration cells, deduced above on less hypothetical grounds, may be regained.

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[1] *Zeits. physikal. Chem.* 2, p. 613.

[2] *Wied. Ann.*, 1890, 40, p. 561.

Theory of Electrons.—Our views of the nature of the ions of electrolytes have been extended by the application of the ideas of the relations between matter and electricity obtained by the study of electric conduction through gases. The interpretation of the phenomena of gaseous conduction was rendered possible by the knowledge previously acquired of conduction through liquids; the newer subject is now reaching a position whence it can repay its debt to the older.

Sir J. J. Thomson has shown (see Conduction, Electric, § III.) that the negative ions in certain cases of gaseous conduction are much more mobile than the corresponding positive ions, and possess a mass of about the one-thousandth part of that of a hydrogen atom. These negative particles or corpuscles seem to be the ultimate units of negative electricity, and may be identified with the electrons required by the theories of H. A. Lorentz and Sir J. Larmor. A body containing an excess of these particles is negatively electrified, and is positively electrified if it has parted with some of its normal number. An electric current consists of a moving stream of electrons. In gases the electrons sometimes travel alone, but in liquids they are always attached to matter, and their motion involves the movement of chemical atoms or groups of atoms. An atom with an extra corpuscle is a univalent negative ion, an atom with one corpuscle detached is a univalent positive ion. In metals the electrons can slip from one atom to the next, since a current can pass without chemical action. When a current passes from an electrolyte to a metal, the electron must be detached from the atom it was accompanying and chemical action be manifested at the electrode.

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Some of the more important papers on the subject have been reprinted for Harper's *Series of Scientific Memoirs in Electrolytic Conduction* (1899) and the *Modern Theory of Solution* (1899). Several journals are published specially to deal with physical chemistry, of which electrochemistry forms an important part. Among them may be mentioned the *Zeitschrift für physikalische Chemie* (Leipzig); and the *Journal of Physical Chemistry* (Cornell University). In these periodicals will be found new work on the subject and abstracts of papers which appear in other physical and chemical publications.

(W. C. D. W.)

ELECTROMAGNETISM, that branch of physical science which is concerned with the interconnexion of electricity and magnetism, and with the production of magnetism by means of electric currents by devices called electromagnets.

History.—The foundation was laid by the observation first made by Hans Christian Oersted (1777–1851), professor of natural philosophy in Copenhagen, who discovered in 1820 that a wire uniting the poles or terminal plates of a voltaic pile has the property of affecting a magnetic needle[1] (see Electricity). Oersted carefully ascertained that the nature of the wire itself did not influence the result but saw that it was due to the electric conflict, as he called it, round the wire; or in modern language, to the magnetic force or magnetic flux round the conductor. If a straight wire through which an electric current is flowing is placed above and parallel to a magnetic compass needle, it is found that if the current is flowing in the conductor in a direction from south to north, the north pole of the needle under the conductor deviates to the left hand, whereas if the conductor is placed under the needle, the north pole deviates to the right hand; if the conductor is doubled back over the needle, the effects of the two sides of the loop are added together and the deflection is increased. These results are summed up in the mnemonic rule: *Imagine yourself swimming in the conductor with the current, that is, moving in the direction of the positive electricity, with your face towards the magnetic needle; the north pole will then deviate to your left hand.* The deflection of the magnetic needle can therefore reveal the existence of an electric current in a neighbouring circuit, and this fact was soon utilized in the construction of instruments called galvanometers (*q.v.*).

Immediately after Oersted's discovery was announced, D. F. J. Arago and A. M. Ampère began investigations on the subject of electromagnetism. On the 18th of September 1820, Ampère read a paper before the Academy of Sciences in Paris, in which he announced that the voltaic pile itself affected a magnetic needle as did the uniting wire, and he showed that the effects in both cases were consistent with the theory that electric current was a circulation round a circuit, and equivalent in magnetic effect to a very short magnet with axis placed at right angles to the plane of the circuit. He then propounded his brilliant hypothesis that the magnetization of iron was due to molecular electric currents. This suggested to Arago that wire wound into a helix carrying electric current should magnetize a steel needle placed in the interior. In the *Ann. Chim.* (1820, 15, p. 94), Arago published a paper entitled "Expériences relatives à l'aimantation du fer et de l'acier par l'action du courant voltaïque," announcing that the wire conveying the current, even though of copper, could magnetize steel needles placed across it, and if plunged into iron filings it attracted them. About the same time Sir Humphry Davy sent a communication to Dr W. H. Wollaston, read at the Royal Society on the 16th of November 1820 (reproduced in the *Annals of Philosophy* for August 1821, p. 81), "On the Magnetic Phenomena produced by Electricity," in which he announced his independent discovery of the same fact. With a large battery of 100 pairs of plates at the Royal Institution, he found in October 1820 that the uniting wire became strongly magnetic and that iron filings clung to it; also that steel needles placed across the wire were permanently magnetized. He placed a sheet of glass over the wire and sprinkling iron filings on it saw that they arranged themselves in straight lines at right angles to the wire. He then proved that Leyden jar discharges could produce the same effects. Ampère and Arago then seem to have experimented together and magnetized a steel needle wrapped in paper which was enclosed in a helical wire conveying a current. All these facts were rendered intelligible when it was seen that a wire when conveying an electric current becomes surrounded by a magnetic field. If the wire is a long straight one, the lines of magnetic force are circular and concentric with centres on the wire axis, and if the wire is bent into a circle the lines of magnetic force are endless loops surrounding and linked with the electric circuit. Since a magnetic pole tends to move along a line of magnetic force it was obvious that it should revolve round a wire conveying a current. To exhibit this fact involved, however, much ingenuity. It was first accomplished by Faraday in October 1821 (*Exper. Res.* ii. p. 127). Since the action is reciprocal a current free to move tends to revolve round a magnetic pole. The fact is most easily shown by a small piece of apparatus made as follows: In a glass cylinder (see fig. 1) like a lamp chimney are fitted two corks. Through the bottom one is passed the north end of a bar magnet which projects up above a little mercury lying in the cork. Through the top cork is passed one end of a wire from a battery, and a piece of wire in the cylinder is flexibly connected to it, the lower end of this last piece just touching the mercury. When a current is passed in at the top wire and out at the lower end of the bar magnet, the loose wire revolves round the magnet pole. All text-books on physics contain in their chapters on electromagnetism full accounts of various forms of this experiment.

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[1] In the *Annals of Philosophy* for November 1821 is a long article entitled "Electromagnetism" by Oersted, in which he gives a detailed account of his discovery. He had his thoughts turned to it as far back as 1813, but not until the 20th of July 1820 had he actually made his discovery. He seems to have been arranging a compass needle to observe any deflections during a storm, and placed near it a platinum wire through which a galvanic current was passed.

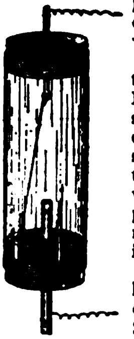

FIG. 1.

In 1825 another important step forward was taken when William Sturgeon (1783–1850) of London produced the electromagnet. It consisted of a horseshoe-shaped bar of soft iron, coated with varnish, on which was wrapped a spiral coil of bare copper wire, the turns not touching each other. When a voltaic current was passed through the wire the iron became a powerful magnet, but on severing the connexion with the battery, the soft iron lost immediately nearly all its magnetism.[1]

At that date Ohm had not announced his law of the electric circuit, and it was a matter of some surprise to investigators to find that Sturgeon's electromagnet could not be operated at a distance through a long circuit of wire with such good results as when close to the battery. Peter Barlow, in January 1825, published in the *Edinburgh Philosophical Journal*, a description of such an experiment made with a view of applying Sturgeon's electromagnet to telegraphy, with results which were unfavourable. Sturgeon's experiments, however, stimulated Joseph Henry (*q.v.*) in the United States, and in 1831 he gave a description of a method of winding electromagnets which at once put a new face upon matters (*Silliman's Journal*, 1831, 19, p. 400). Instead of insulating the iron core, he wrapped the copper wire round with silk and wound in numerous turns and many layers upon the iron horseshoe in such fashion that the current went round the iron always in the same direction. He then found that such an electromagnet wound with a long fine wire, if worked with a battery consisting of a large number of cells in series, could be operated at a considerable distance, and he thus produced what were called at that time *intensity electromagnets*, and which subsequently rendered the electric telegraph a possibility. In fact, Henry established in 1831, in Albany, U.S.A., an electromagnetic telegraph, and in 1835 at Princeton even used an earth return, thereby anticipating the discovery (1838) of C. A. Steinheil (1801–1870) of Munich.

Inventors were then incited to construct powerful electromagnets as tested by the weight they could carry from their armatures. Joseph Henry made a magnet for Yale College, U.S.A., which lifted 3000 lb (*Silliman's Journal*, 1831, 20, p. 201), and one for Princeton which lifted 3000 with a very small battery. Amongst others J. P. Joule, ever memorable for his investigations on the mechanical equivalent of heat, gave much attention about 1838–1840 to the construction of electromagnets and succeeded in devising some forms remarkable for their lifting power. One form was constructed by cutting a thick soft iron tube longitudinally into two equal parts. Insulated copper wire was then wound longitudinally over one of both parts (see fig. 2) and a current sent through the wire. In another form two iron disks with teeth at right angles to the disk had insulated wire wound zigzag between the teeth; when a current was sent through the wire, the teeth were so magnetized that they were alternately N. and S. poles. If two such similar disks were placed with teeth of opposite polarity in contact, a very large force was required to detach them, and with a magnet and armature weighing in all 11·575 lb Joule found that a weight of 2718 was supported. Joule's papers on this subject will be found in his *Collected Papers* published by the Physical Society of London, and in *Sturgeon's Annals of Electricity*, 1838–1841, vols. 2–6.

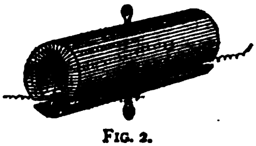

FIG. 2.

The Magnetic Circuit.—The phenomena presented by the electromagnet are interpreted by the aid of the notion of the magnetic circuit. Let us consider a thin circular sectioned ring of iron wire wound over with a solenoid or spiral of insulated copper wire through which a current of electricity can be passed. If the solenoid or wire windings existed alone, a current having a strength A amperes passed through it would create in the interior of the solenoid a magnetic force H, numerically equal to $4\pi/10$ multiplied by the number of windings N on the solenoid, and by the current in amperes A, and divided by the mean length of the solenoid l, or $H=4\pi AN/10l$. The product AN is called the "ampere-turns" on the solenoid. The product Hl of the magnetic force H and the length l of the magnetic circuit is called the "magnetomotive force" in the magnetic circuit, and from the above formula it is seen that the magnetomotive force denoted by (M.M.F.) is equal to 4π 10(=1·25 nearly) times the ampere-turns (A.N.) on the exciting coil or solenoid. Otherwise (A.N.)=0·8(M.M.F.). The magnetomotive force is regarded as creating an effect called magnetic flux (Z) in the magnetic circuit, just as electromotive force E.M.F. produces electric current (A) in the electric circuit, and as by Ohm's law (see ELECTROKINETICS) the current varies as the E.M.F. and inversely as a quality of the electric circuit called its "resistance," so in the magnetic circuit the magnetic flux varies as the magnetomotive force and inversely as a quality of the magnetic circuit called its "reluctance." The great difference between the electric circuit and the magnetic circuit lies in the fact that whereas the electric resistance of a solid or liquid conductor is independent of the current and affected only by the temperature, the magnetic reluctance varies with the magnetic flux and cannot be defined except by means of a curve which shows its value for different flux densities. The quotient of the total magnetic flux, Z, in a circuit by the cross section, S, of the circuit is called the mean "flux density," and the reluctance of a magnetic circuit one centimetre long and one square centimetre in cross section is called the "reluctivity" of the material. The relation between reluctivity $\rho=1/\mu$ magnetic force H, and flux density B, is defined by the equation $H=\rho B$, from which we have $Hl=Z(\rho l/S)=$ M.M.F. acting on the circuit. Again, since the ampere-turns (AN) on the circuit are equal to 0·8 times the M.M.F., we have finally $AN/l=0{\cdot}8(Z/\mu S)$. This equation tells us the exciting force reckoned in ampere-turns, AN, which must be put on the ring core to create a total magnetic flux Z in it, the ring core having a mean perimeter l and cross section S and reluctivity $\rho=1/\mu$ corresponding to a flux density Z/S. Hence before we can make use of the equation for practical purposes we need to possess a curve for the particular material showing us the value of the reluctivity corresponding to various values of the possible flux density. The reciprocal of ρ is usually called the "permeability" of the material and denoted by μ. Curves showing the relation of $1/\rho$ and Z S or μ and B, are called "permeability curves." For air and all other non-magnetic matter the permeability has the same value, taken arbitrarily as unity. On the other hand, for iron, nickel and cobalt the permeability may in some cases reach a value of 2000 or 2500 for a value of B=5000 in C.G.S. measure (see UNITS, PHYSICAL). The process of taking these curves consists in sending a current of known strength through a solenoid of known number of turns wound on a circular iron ring of known dimensions, and observing the time-integral of the secondary current produced in a secondary circuit of known turns and resistance R wound over the iron core N times. The secondary electromotive force is by Faraday's law (see ELECTROKINETICS) equal to the time rate of change of the total flux, or $E=NdZ/dt$. But by Ohm's law $E=Rdq/dt$, where q is the quantity of electricity set flowing in the secondary circuit by a change dZ in the co-linked total flux. Hence if 2Q represents this total quantity of electricity set flowing in the secondary circuit by suddenly reversing the direction of the magnetic flux Z in the iron core we must have

$$RQ=NZ \text{ or } Z=RQ/N.$$

The measurement of the total quantity of electricity Q can be made by means of a ballistic galvanometer (*q.v.*), and the resistance R of the secondary circuit includes that of the coil wound on the iron core and the galvanometer as well. In this manner the value of the total flux Z and therefore of Z/S=B or the flux density, can be found for a given magnetizing force H, and this last quantity is determined when we know the magnetizing current in the solenoid and its turns and dimensions. The curve which delineates the relation of H and B is called the magnetization curve for the material in question. For examples of these curves see MAGNETISM.

The fundamental law of the non-homogeneous magnetic circuit traversed by one and the same total magnetic flux Z is that the sum of all the magnetomotive forces acting in the circuit is numerically equal to the product of the factor 0·8, the total flux in the circuit, and the sum of all the reluctances of the various parts of the circuit. If then the circuit consists of materials of different permeability and it is desired to know the ampere-turns required to produce a given total of flux round the circuit, we have to calculate from the magnetization curves of the material of each part the necessary magnetomotive forces and add these forces together. The practical application of this principle to the predetermination of the field windings of dynamo magnets was first made by Drs J. and E. Hopkinson (*Phil. Trans.*, 1886, 177, p. 331).

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[1] See *Trans. Soc. Arts*, 1825, 43, p. 38, in which a figure of Sturgeon's electromagnet is given as well as of other pieces of apparatus for which the Society granted him a premium and a silver medal.

We may illustrate the principles of this predetermination by a simple example. Suppose a ring of iron has a mean diameter of 10 cms. and a cross section of 2 sq. cms., and a transverse cut on air gap made in it 1 mm. wide. Let us inquire the ampere-turns to be put upon the ring to create in it a total flux of 24,000 C.G.S. units. The total length of the iron part of the circuit is $(10\pi - 0\cdot1)$ cms., and its section is 2 sq. cms., and the flux density in it is to be 12,000. From Table II. below we see that the permeability of pure iron corresponding to a flux density of 12,000 is 2760. Hence the reluctance of the iron circuits is equal to

$$\frac{10\pi - 0\cdot1}{2760 \times 2} = \frac{220}{38640}\text{C.G.S. units.}$$

The length of the air gap is 0·1 cm., its section 2 sq. cms., and its permeability is unity. Hence the reluctance of the air gap is

$$\frac{0\cdot1}{1 \times 2} = \frac{1}{20}\text{C.G.S. unit.}$$

Accordingly the magnetomotive force in ampere-turns required to produce the required flux is equal to

$$0\cdot8(24{,}000)\left(\frac{1}{20} + \frac{220}{38640}\right) = 1070 \text{ nearly.}$$

It follows that the part of the magnetomotive force required to overcome the reluctance of the narrow air gap is about nine times that required for the iron alone.

In the above example we have for simplicity assumed that the flux in passing across the air gap does not spread out at all. In dealing with electromagnet design in dynamo construction we have, however, to take into consideration the spreading as well as the leakage of flux across the circuit (see DYNAMO). It will be seen, therefore, that in order that we may predict the effect of a certain kind of iron or steel when used as the core of an electromagnet, we must be provided with tables or curves showing the reluctivity or permeability corresponding to various flux densities or—which comes to the same thing—with (B, H) curves for the sample.

Iron and Steel for Electromagnetic Machinery.—In connexion with the technical application of electromagnets such as those used in the field magnets of dynamos (*q.v.*), the testing of different kinds of iron and steel for magnetic permeability has therefore become very important. Various instruments called permeameters and hysteresis meters have been designed for this purpose, but much of the work has been done by means of a ballistic galvanometer and test ring as above described. The "hysteresis" of an iron or steel is that quality of it in virtue of which energy is dissipated as heat when the magnetization is reversed or carried through a cycle (see MAGNETISM), and it is generally measured either in ergs per cubic centimetre of metal per cycle of magnetization, or in watts per ℔ per 50 or 100 cycles per second at or corresponding to a certain maximum flux density, say 2500 or 600 C.G.S. units. For the details of various forms of permeameter and hysteresis meter technical books must be consulted.[1]

An immense number of observations have been carried out on the magnetic permeability of different kinds of iron and steel, and in the following tables are given some typical results, mostly from experiments made by J. A. Ewing (see *Proc. Inst. C.E.*, 1896, 126, p. 185) in which the ballistic method was employed to determine the flux density corresponding to various magnetizing forces acting upon samples of iron and steel in the form of rings.

The figures under heading I. are values given in a paper by A. W. S. Pocklington and F. Lydall (*Proc. Roy. Soc.*, 1892–1893, 52, pp. 164 and 228) as the results of a magnetic test of an exceptionally pure iron supplied for the purpose of experiment by Colonel Dyer, of the Elswick Works. The substances other than iron in this sample were stated to be: carbon, *trace*; silicon, *trace*; phosphorus, *none*; sulphur, 0·013%; manganese, 0·1%. The other five specimens, II. to VI., are samples of commercial iron or steel. No. II. is a sample of Low Moor bar iron forged into a ring, annealed and turned. No. III. is a steel forging furnished by Mr R. Jenkins as a sample of forged ingot-metal for dynamo magnets. No. IV. is a steel casting for dynamo magnets, unforged, made by Messrs Edgar Allen & Company by a special pneumatic process under the patents of Mr A. Tropenas. No. V. is also an unforged steel casting for dynamo magnets, made by Messrs Samuel Osborne & Company by the Siemens process. No. VI. is also an unforged steel casting for dynamo magnets, made by Messrs Fried. Krupp, of Essen.

TABLE I.—*Magnetic Flux Density corresponding to various Magnetising Forces in the case of certain Samples of Iron and Steel (Ewing).*

Magnetizing Force H (C.G.S. Units).	Magnetic Flux Density B (C.G.S. Units).					
	I.	II.	III.	IV.	V.	VI.
5	12,700	10,900	12,300	4,700	9,600	10,900
10	14,980	13,120	14,920	12,250	13,050	13,320
15	15,800	14,010	15,800	14,000	14,600	14,350
20	16,300	14,580	16,280	15,050	15,310	14,950
30	16,950	15,280	16,810	16,200	16,000	15,660
40	17,350	15,760	17,190	16,800	16,510	16,150
50	..	16,060	17,500	17,140	16,900	16,480
60	..	16,340	17,750	17,450	17,180	16,780
70	..	16,580	17,970	17,750	17,400	17,000
80	..	16,800	18,180	18,040	17,620	17,200
90	..	17,000	18,390	18,230	17,830	17,400
100	..	17,200	18,600	18,420	18,030	17,600

It will be seen from the figures and the description of the materials that the steel forgings and castings have a remarkably high permeability under small magnetizing force.

Table II. shows the magnetic qualities of some of these materials as found by Ewing when tested with small magnetizing forces.

TABLE II.—*Magnetic Permeability of Samples of Iron and Steel under Weak Magnetising Forces.*

Magnetic Flux Density B. (C.G.S. Units).	I. Pure Iron.		III. Steel Forging.		VI. Steel Casting.	
	H	μ	H	μ	H	μ
2,000	0·90	2220	1·38	1450	1·18	1690
4,000	1·40	2850	1·91	2090	1·66	2410
6,000	1·85	3240	2·38	2520	2·15	2790
8,000	2·30	3480	2·92	2740	2·83	2830
10,000	3·10	3220	3·62	2760	4·05	2470
12,000	4·40	2760	4·80	2500	6·65	1810

The numbers I., III. and VI. in the above table refer to the samples mentioned in connexion with Table I.

It is a remarkable fact that certain varieties of low carbon steel (commonly called mild steel) have a higher permeability than even annealed Swedish wrought iron under large magnetizing forces. The term *steel*, however, here used has reference rather to the mode of production than the final chemical nature of the material. In some of the mild-steel castings used for dynamo electromagnets it appears that the total foreign matter, including carbon, manganese and silicon, is not more than 0.3% of the whole, the material being 99.7% pure iron. This valuable magnetic property of steel capable of being cast is, however, of great utility in modern dynamo building, as it enables field magnets of very high permeability to be constructed, which can be fashioned into shape by casting instead of being built up as formerly out of masses of forged wrought iron. The curves in fig. 3 illustrate the manner in which the flux density or, as it is usually called, the magnetization curve of this mild cast steel crosses that of Swedish wrought iron, and enables us to obtain a higher flux density corresponding to a given magnetizing force with the steel than with the iron.

From the same paper by Ewing we extract a number of results relating to permeability tests of thin sheet iron and sheet steel, such as is used in the construction of dynamo armatures and transformer cores.

No. VII. is a specimen of good transformer-plate, 0·301 millimetre thick, rolled from Swedish iron by Messrs Sankey of Bilston. No. VIII. is a specimen of specially thin transformer-plate rolled from scrap iron. No. IX. is a specimen of transformer-plate rolled from ingot-steel. No. X. is a specimen of the wire which was used by J. Swinburne to form the core of his "hedgehog" transformers. Its diameter was 0·602 millimetre. All these samples were tested in the form of rings by the ballistic method, the rings of sheet-metal being stamped or turned in the flat. The wire ring No. X. was coiled and annealed after coiling.

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[1] See S. P. Thompson, *The Electromagnet* (London, 1891); J. A. Fleming, *A Handbook for the Electrical Laboratory and Testing Room*, vol. 2 (London, 1903); J. A. Ewing, *Magnetic Induction in Iron and other Metals* (London, 1903, 3rd ed.).

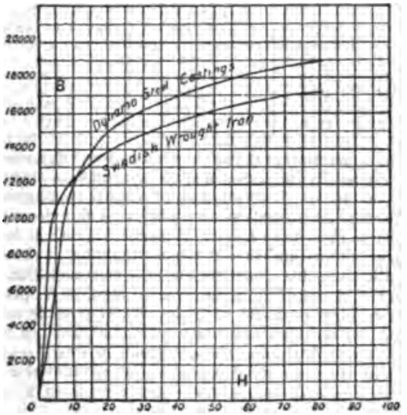

FIG. 3.

TABLE III.—*Permeability Tests of Transformer Plate and Wire.*

Magnetic Flux Density B (C.G.S. Units).	VII. Transformer-plate of Swedish Iron.		VIII. Transformer-plate of Scrap Iron.		IX. Transformer-plate of Steel.		X. Transformer-wire.	
	H	μ	H	μ	H	μ	H	μ
1,000	0·81	1230	1·08	920	0·60	1470	1·71	590
2,000	1·05	1900	1·46	1370	0·90	2230	2·10	950
3,000	1·26	2320	1·77	1690	1·04	2880	2·30	1300
4,000	1·54	2600	2·10	1900	1·19	3360	2·50	1600
5,000	1·82	2750	2·53	1980	1·38	3620	2·70	1850
6,000	2·14	2800	3·04	1970	1·59	3770	2·92	2070
7,000	2·54	2760	3·62	1930	1·89	3700	3·16	2210
8,000	3·09	2590	4·37	1830	2·25	3600	3·43	2330
9,000	3·77	2390	5·3	1700	2·72	3310	3·77	2390
10,000	4·6	2170	6·5	1540	3·33	3000	4·17	2400
11,000	5·7	1930	7·9	1390	4·15	2650	4·70	2340
12,000	7·0	1710	9·8	1220	5·40	2220	5·45	2200
13,000	8·5	1530	11·9	1190	7·1	1830	6·5	2000
14,000	11·0	1270	15·0	930	10·0	1400	8·4	1670
15,000	15·1	990	19·5	770	..	..	11·9	1260
16,000	21·4	750	27·5	580	..	..	21·0	760

Some typical flux-density curves of iron and steel as used in dynamo and transformer building are given in fig. 4.

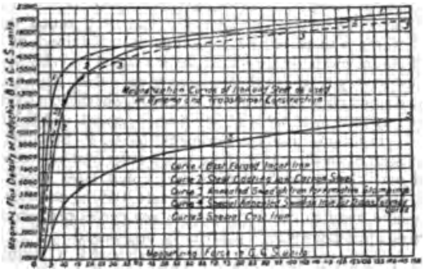

FIG. 4.

The numbers in Table III. well illustrate the fact that the permeability $\mu = B/H$ has a maximum value corresponding to a certain flux density. The tables are also explanatory of the fact that mild steel has gradually replaced iron in the manufacture of dynamo electromagnets and transformer-cores.

Broadly speaking, the materials which are now employed in the manufacture of the cores of electromagnets for technical purposes of various kinds may be said to fall into three classes, namely, forgings, castings and stampings. In some cases the iron or steel core which is to be magnetized is simply a mass of iron hammered or pressed into shape by hydraulic pressure; in other cases it has to be fused and cast; and for certain other purposes it must be rolled first into thin sheets, which are subsequently stamped out into the required forms.

For particular purposes it is necessary to obtain the highest possible magnetic permeability corresponding to a high, or the highest attainable flux density. This is generally the case in the electromagnets which are employed as the field magnets in dynamo machines. It may generally be said that whilst the best wrought iron, such as annealed Low Moor or Swedish iron, is more permeable for low flux densities than steel castings, the cast steel may surpass the wrought metal for high flux density. For most electro-technical purposes the best magnetic results are given by the employment of forged ingot-iron. This material is probably the most permeable throughout the whole scale of attainable flux densities. It is slightly superior to wrought iron, and it only becomes inferior to the highest class of cast steel when the flux density is pressed above 18,000 C.G.S. units (see fig. 5). For flux densities above 13,000 the forged ingot-iron has now practically replaced for electric engineering purposes the Low Moor or Swedish iron. Owing to the method of its production, it might in truth be called a soft steel with a very small percentage of combined carbon. The best description of this material is conveyed by the German term "Flusseisen," but its nearest British equivalent is "ingot-iron." Chemically speaking, the material is for all practical purposes very nearly pure iron. The same may be said of the cast steels now much employed for the production of dynamo magnet cores. The cast steel which is in demand for this purpose has a slightly lower permeability than the ingot-iron for low flux densities, but for flux densities above 16,000 the required result may be more cheaply obtained with a steel casting than with a forging. When high tensile strength is required in addition to considerable magnetic permeability, it has been found advantageous to employ a steel containing 5% of nickel. The rolled sheet iron and sheet steel which is in request for the construction of magnet cores, especially those in which the exciting current is an alternating current, are, generally speaking, produced from Swedish iron. Owing to the mechanical treatment necessary to reduce the material to a thin sheet, the permeability at low flux densities is rather higher than, although at high flux densities it is inferior

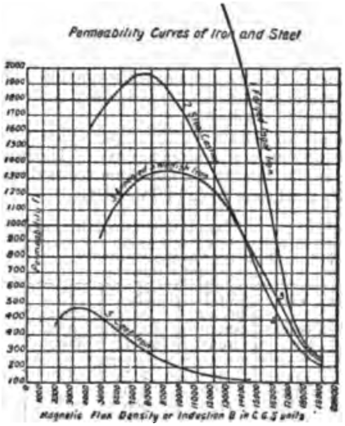

FIG. 5.

to, the same iron and steel when tested in bulk. For most purposes, however, where a laminated iron magnet core is required, the flux density is not pressed up above 6000 units, and it is then more important to secure small hysteresis loss than high permeability. The magnetic permeability of cast iron is much inferior to that of wrought or ingot-iron, or the mild steels taken at the same flux densities.

The following Table IV. gives the flux density and permeability of a typical cast iron taken by J. A. Fleming by the ballistic method:—

Table IV.—*Magnetic Permeability and Magnetization Curve of Cast Iron.*

H	B	μ	H	B	μ	H	B	μ
·19	27	139	8·84	4030	456	44·65	8,071	181
·41	62	150	10·60	4491	424	56·57	8,548	151
1·11	206	176	12·33	4884	396	71·98	9,097	126
2·53	768	303	13·95	5276	378	88·99	9,600	108
3·41	1251	367	15·61	5504	353	106·35	10,066	95
4·45	1898	427	18·21	5829	320	120·60	10,375	86
5·67	2589	456	26·37	6814	258	140·37	10,725	76
7·16	3350	468	36·54	7580	207	152·73	10,985	72

The metal of which the tests are given in Table IV. contained 2% of silicon, 2·85% of total carbon, and 0·5% of manganese. It will be seen that a magnetizing force of about 5 C.G.S. units is sufficient to impart to a wrought-iron ring a flux density of 18,000 C.G.S. units, but the same force hardly produces more than one-tenth of this flux density in cast iron.

The testing of sheet iron and steel for magnetic hysteresis loss has developed into an important factory process, giving as it does a means of ascertaining the suitability of the metal for use in the manufacture of transformers and cores of alternating-current electromagnets.

In Table V. are given the results of hysteresis tests by Ewing on samples of commercial sheet iron and steel. The numbers VII., VIII., IX. and X. refer to the same samples as those for which permeability results are given in Table III.

Table V.—*Hysteresis Loss in Transformer-iron.*

Maximum Flux Density B.	Ergs per Cubic Centimetre per Cycle.				Watts per lb at a Frequency of 100.			
	VII. Swedish Iron	VIII. Forged Scrap-iron	IX. Ingot-steel.	X. Soft Iron Wire.	VII.	VIII.	IX.	X.
2000	240	400	215	600	0·141	0·236	0·127	0·356
3000	520	790	430	1150	0·306	0·465	0·253	0·630
4000	830	1220	700	1780	0·490	0·720	0·410	1·050
5000	1190	1710	1000	2640	0·700	1·010	0·590	1·550
6000	1600	2260	1350	3360	0·940	1·330	0·790	1·980
7000	2020	2940	1730	4300	1·200	1·730	1·020	2·530
8000	2510	3710	2150	5300	1·480	2·180	1·270	3·120
9000	3050	4560	2620	6380	1·800	2·680	1·540	3·750

In Table VI. are given the results of a magnetic test of some exceedingly good transformer-sheet rolled from Swedish iron.

Table VI.—*Hysteresis Loss in Strip of Transformer-plate rolled Swedish Iron.*

Maximum Flux Density B.	Ergs per Cubic Centimetre per Cycle.	Watts per lb at a Frequency of 100.
2000	220	0·129
3000	410	0·242
4000	640	0·376
5000	910	0·535
6000	1200	0·710
7000	1520	0·890
8000	1900	1·120
9000	2310	1·360

In Table VII. are given some values obtained by Fleming for the hysteresis loss in the sample of cast iron, the permeability test of which is recorded in Table IV.

Table VII.—*Observations on the Magnetic Hysteresis of Cast Iron.*

Loop.	B (max.)	Hysteresis Loss.	
		Ergs per cc. per Cycle.	Watts per lb per 100 Cycles per sec.
I.	1475	466	·300
II.	2545	1,288	·829
III.	3865	2,997	1·934
IV.	5972	7.397	4·765
V.	8930	13,423	8·658

For most practical purposes the constructor of electromagnetic machinery requires his iron or steel to have some one of the following characteristics. If for dynamo or magnet making, it should have the highest possible permeability at a flux density corresponding to practically maximum magnetization. If for transformer or alternating-current magnet building, it should have the smallest possible hysteresis loss at a maximum flux density of 2500 C.G.S. units during the cycle. If required for permanent magnet making, it should have the highest possible coercivity combined with a high retentivity. Manufacturers of iron and steel are now able to meet these demands in a very remarkable manner by the commercial production of material of a quality which at one time would have been considered a scientific curiosity.

It is usual to specify iron and steel for the first purpose by naming the minimum permeability it should possess corresponding to a flux density of 18,000 C.G.S. units; for the second, by stating the hysteresis loss in watts per lb per 100 cycles per second, corresponding to a maximum flux density of 2500 C.G.S. units during the cycle; and for the third, by mentioning the coercive force required to reduce to zero magnetization a sample of the metal in the form of a long bar magnetized to a stated magnetization. In the cyclical reversal of magnetization of iron we have two modes to consider. In the first case, which is that of the core of the alternating transformer, the magnetic force passes through a cycle of values, the iron remaining stationary, and the direction of the magnetic force being always the same. In the other case, that of the dynamo armature core, the direction of the magnetic force in the iron is constantly changing, and at the same time undergoing a change in magnitude.

It has been shown by F. G. Baily (*Proc. Roy. Soc.*, 1896) that if a mass of laminated iron is rotating in a magnetic field which remains constant in direction and magnitude in any one experiment, the hysteresis loss rises to a maximum as the magnitude of the flux density in the iron is increased and then falls away again to nearly zero value. These observations have been confirmed by other observers. The question has been much debated whether the values of the hysteresis loss obtained by these two different methods are identical for magnetic cycles in which the flux density reaches the same maximum value. This question is also connected with another one, namely, whether the hysteresis loss per cycle is or is not a function of the speed with which the cycle is traversed. Early experiments by C. P. Steinmetz and others seemed to show that there was a difference between slow-speed and high-speed hysteresis cycles, but later experiments by J. Hopkinson and by A. Tanakadaté, though not absolutely exhaustive, tend to prove that up to 400 cycles per second the hysteresis loss per cycle is practically unchanged.

Experiments made in 1896 by R. Beattie and R. C. Clinker on magnetic hysteresis in rotating fields were partly directed to determine whether the hysteresis loss at moderate flux densities, such as are employed in transformer work, was the same as that found by measurements made with alternating-current fields on the same iron and steel specimens (see *The Electrician*, 1896, 37, p. 723). These experiments showed that over moderate ranges of induction, such as may be expected in electro-technical work, the hysteresis loss per cycle per cubic centimetre was practically the same when the iron was tested in an alternating field with a periodicity of 100, the field remaining constant in direction, and when the iron was tested in a rotating field giving the same maximum flux density.

With respect to the variation of hysteresis loss in magnetic cycles having different maximum values for the flux density, Steinmetz found that the hysteresis loss (W), as measured by the area of the complete (B, H) cycle and expressed in ergs per centimetre-cube per cycle, varies proportionately to a constant called the *hysteretic constant*, and to the 1·6th power of the maximum flux density (B), or $W = \eta B^{1\cdot6}$.

The hysteretic constants (η) for various kinds of iron and steel are given in the table below:—

Metal.	Hysteretic Constant.
Swedish wrought iron, well annealed .	·0010 to ·0017
Annealed cast steel of good quality; small percentage of carbon	·0017 to ·0029
Cast Siemens-Martin steel	·0019 to ·0028
Cast ingot-iron	·0021 to ·0026
Cast steel, with higher percentages of carbon, or inferior qualities of wrought iron	·0031 to ·0054

Steinmetz's law, though not strictly true for very low or very high maximum flux densities, is yet a convenient empirical rule for obtaining approximately the hysteresis loss at any one maximum flux density and knowing it at another, provided these values fall within a range varying say from 1 to 9000 C.G.S. units. (See MAGNETISM.)

The standard maximum flux density which is adopted in electro-technical work is 2500, hence in the construction of the cores of alternating-current electromagnets and transformers iron has to be employed having a known hysteretic constant at the standard flux density. It is generally expressed by stating the number of watts per lb of metal which would be dissipated for a frequency of 100 cycles, and a maximum flux density (B max.) during the cycle of 2500. In the case of good iron or steel for transformer-core making, it should not exceed 1·25 watt per lb per 100 cycles per 2500 B (maximum value).

It has been found that if the sheet iron employed for cores of alternating electromagnets or transformers is heated to a temperature somewhere in the neighbourhood of 200° C. the hysteresis loss is very greatly increased. It was noticed in 1894 by G. W. Partridge that alternating-current transformers which had been in use some time had a very considerably augmented core loss when compared with their initial condition. O. T. Bláthy and W. M. Mordey in 1895 showed that this augmentation in hysteresis loss in iron was due to heating. H. F. Parshall investigated the effect up to moderate temperatures, such as 140° C., and an extensive series of experiments was made in 1898 by S. R. Roget (*Proc. Roy. Soc.*, 1898, 63, p. 258, and 64, p. 150). Roget found that below 40° C. a rise in temperature did not produce any augmentation in the hysteresis loss in iron, but if it is heated to between 40° C. and 135° C. the hysteresis loss increases continuously with time, and this increase is now called "ageing" of the iron. It proceeds more slowly as the temperature is higher If heated to above 135° C., the hysteresis loss soon attains a maximum, but then begins to decrease. Certain specimens heated to 160° C. were found to have their hysteresis loss doubled in a few days. The effect seems to come to a maximum at about 180° C. or 200° C. Mere lapse of time does not remove the increase, but if the iron is reannealed the augmentation in hysteresis disappears. If the iron is heated to a higher temperature, say between 300° C. and 700° C., Roget found the initial rise of hysteresis happens more quickly, but that the metal soon settles down into a state in which the hysteresis loss has a small but still augmented constant value. The augmentation in value, however, becomes more nearly zero as the temperature approaches 700° C. Brands of steel are now obtainable which do not age in this manner, but these *non-ageing* varieties of steel have not generally such low initial hysteresis values as the "Swedish Iron," commonly considered best for the cores of transformers and alternating-current magnets.

The following conclusions have been reached in the matter:—(1) Iron and mild steel in the annealed state are more liable to change their hysteresis value by heating than when in the harder condition; (2) all changes are removed by re-annealing; (3) the changes thus produced by heating affect not only the amount of the hysteresis loss, but also the form of the lower part of the (B,H) curve.

Forms of Electromagnet.—The form which an electromagnet must take will greatly depend upon the purposes for which it is to be used. A design or form of electromagnet which will be very suitable for some purposes will be useless for others. Supposing it is desired to make an electromagnet which shall be capable of undergoing very rapid changes of strength, it must have such a form that the coercivity of the material is overcome by a self-demagnetizing force. This can be achieved by making the magnet in the form of a short and stout bar rather than a long thin one. It has already been explained that the ends or poles of a polar magnet exert a demagnetizing power upon the mass of the metal in the interior of the bar. If then the electromagnet has the form of a long thin bar, the length of which is several hundred times its diameter, the poles are very far removed from the centre of the bar, and the demagnetizing action will be very feeble; such a long thin electromagnet, although made of very soft iron, retains a considerable amount of magnetism after the magnetizing force is withdrawn. On the other hand, a very thick bar very quickly demagnetizes itself, because no part of the metal is far removed from the action of the free poles. Hence when, as in many telegraphic instruments, a piece of soft iron, called an armature, has to be attracted to the poles of a horseshoe-shaped electromagnet, this armature should be prevented from quite touching the polar surfaces of the magnet. If a soft iron mass does quite touch the poles, then it completes the magnetic circuit and abolishes the free poles, and the magnet is to a very large extent deprived of its self-demagnetizing power. This is the explanation of the well-known fact that after exciting the electromagnet and then stopping the current, it still requires a good pull to detach the "keeper"; but when once the keeper has been detached, the magnetism is found to have nearly disappeared. An excellent form of electromagnet for the production of very powerful fields has been designed by H. du Bois (fig. 6).

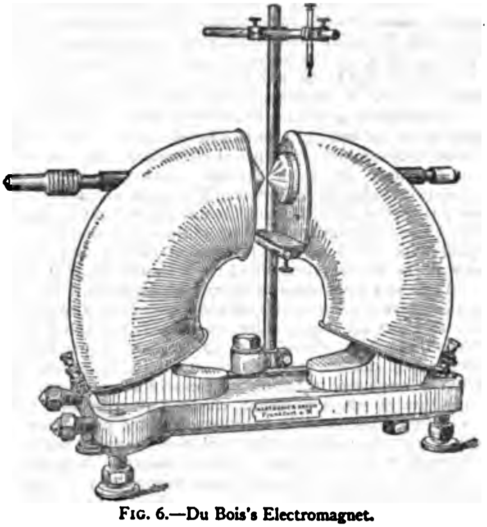

FIG. 6.—Du Bois's Electromagnet.

Various forms of electromagnets used in connexion with dynamo machines are considered in the article DYNAMO, and there is, therefore, no necessity to refer particularly to the numerous different shapes and types employed in electrotechnics.

BIBLIOGRAPHY.—For additional information on the above subject the reader may be referred to the following works and original papers:—

H. du Bois, *The Magnetic Circuit in Theory and Practice*; S. P. Thompson, *The Electromagnet*; J. A. Fleming, *Magnets and Electric Currents*; J. A. Ewing, *Magnetic Induction in Iron and other Metals*; J. A. Fleming, "The Ferromagnetic Properties of Iron and Steel," *Proceedings of Sheffield Society of Engineers and Metallurgists* (Oct. 1897); J. A. Ewing, "The Magnetic Testing of Iron and Steel," *Proc. Inst. Civ. Eng.*, 1896, 126, p. 185; H. F Parshall, "The Magnetic Data of Iron and Steel," *Proc. Inst. Civ. Eng.*, 1896, 126, p. 220; J. A. Ewing, "The Molecular Theory of Induced Magnetism," *Phil. Mag.*, Sept. 1890; W. M. Mordey, "Slow Changes in the Permeability of Iron," *Proc. Roy. Soc.* 57, p. 224; J. A. Ewing, "Magnetism," James Forrest Lecture, *Proc. Inst. Civ. Eng.* 138; S. P. Thompson, "Electromagnetic Mechanism," *Electrician*, 26, pp. 238, 269, 293; J. A. Ewing, "Experimental Researches in Magnetism," *Phil. Trans.*, 1885, part ii.; Ewing and Klassen, "Magnetic Qualities of Iron," *Proc. Roy. Soc.*, 1893. (J. A. F.)

ELECTROMETALLURGY. The present article, as explained under ELECTROCHEMISTRY, treats only of those processes in which electricity is applied to the production of chemical reactions or molecular changes at furnace temperatures. In many of these the application of heat is necessary to bring the substances used into the liquid state for the purpose of electrolysis, aqueous solutions being unsuitable. Among the earliest experiments in this branch of the subject were those of Sir H. Davy, who in 1807 (*Phil. Trans.*, 1808, p. 1), produced the alkali metals by passing an intense current of electricity from a platinum wire to a platinum dish, through a mass of fused caustic alkali. The action was started in the cold, the alkali being slightly moistened to render it a conductor; then, as the current passed, heat was produced and the alkali fused, the metal being deposited in the liquid condition. Later, A. Matthiessen (*Quarterly Journ. Chem. Soc.* viii. 30) obtained potassium by the electrolysis of a mixture of potassium and calcium chlorides fused over a lamp. There are here foreshadowed two types of electrolytic furnace-operations: (*a*) those in which external heating maintains the electrolyte in the fused condition, and (*b*) those in which a current-density is applied sufficiently high to develop the heat necessary to effect this object unaided. Much of the earlier electrometallurgical work was done with furnaces of the (*a*) type, while nearly all the later developments have been with those of class (*b*). There is a third class of operations, exemplified by the manufacture of calcium carbide, in which electricity is employed solely as a heating agent; these are termed *electrothermal*, as distinguished from *electrolytic*. In certain electrothermal processes (*e.g.* calcium carbide production) the heat from the current is employed in raising mixtures of substances to the temperature at which a desired chemical reaction will take place between them, while in others (*e.g.* the production of graphite from coke or gas-carbon) the heat is applied solely to the production of molecular or physical changes. In ordinary electrolytic work only the continuous current may of course be used, but in electrothermal work an alternating current is equally available.

Electric Furnaces.—Independently of the question of the application of external heating, the furnaces used in electrometallurgy may be broadly classified into (i.) arc furnaces, in which the intense heat of the electric arc is utilized, and (ii.) resistance and incandescence furnaces, in which the heat is generated by an electric current overcoming the resistance of an inferior conductor.

Arc furnaces.

Excepting such experimental arrangements as that of C. M. Despretz (*C.R.*, 1849, 29) for use on a small scale in the laboratory, Pichou in France and J. H. Johnson in England appear, in 1853, to have introduced the earliest practical form of furnace. In these arrangements, which were similar if not identical, the furnace charge was crushed to a fine powder and passed through two or more electric arcs in succession. When used for ore smelting, the reduced metal and the accompanying slag were to be caught, after leaving the arc and while still liquid, in a hearth fired with ordinary fuel. Although this primitive furnace could be made to act, its efficiency was low, and the use of a separate fire was disadvantageous. In 1878 Sir William Siemens patented a form of furnace[1] which is the type of a very large number of those designed by later inventors.

In the best-known form a plumbago crucible was used with a hole cut in the bottom to receive a carbon rod, which was ground in so as to make a tight joint. This rod was connected with the positive pole of the dynamo or electric generator. The crucible was fitted with a cover in which were two holes; one at the side to serve at once as sight-hole and charging door, the other in the centre to allow a second carbon rod to pass freely (without touching) into the interior. This rod was connected with the negative pole of the generator, and was suspended from one arm of a balance-beam, while from the other end of the beam was suspended a vertical hollow iron cylinder, which could be moved into or out of a wire coil or solenoid joined as a shunt across the two carbon rods of the furnace. The solenoid was above the iron cylinder, the supporting rod of which passed through it as a core. When the furnace with this well-known regulating device was to be used, say, for the melting of metals or other conductors of electricity, the fragments of metal were placed in the crucible and the positive electrode was brought near them. Immediately the current passed through the solenoid it caused the iron cylinder to rise; and, by means of its supporting rod, forced the end of the balance beam upwards, so depressing the other end that the negative carbon rod was forced downwards into contact with the metal in the crucible. This action completed the furnace-circuit, and current passed freely from the positive carbon through the fragments of metal to the negative carbon, thereby reducing the current through the shunt. At once the attractive force of the solenoid on the iron cylinder was automatically reduced, and the falling of the latter caused the negative carbon to rise, starting an arc between it and the metal in the crucible. A counterpoise was placed on the solenoid end of the balance beam to act against the attraction of the solenoid, the position of the counterpoise determining the length of the arc in the crucible. Any change in the resistance of the arc, either by lengthening, due to the sinking of the charge in the crucible, or by the burning of the carbon, affected the proportion of current flowing in the two shunt circuits, and so altered the position of the iron cylinder in the solenoid that the length of arc was, within limits, automatically regulated. Were it not for the use of some such device the arc would be liable to constant fluctuation and to frequent extinction. The crucible was surrounded with a bad conductor of heat to minimize loss by radiation. The positive carbon was in some cases replaced by a water-cooled metal tube, or ferrule, closed, of course, at the end inserted in the crucible. Several modifications were proposed, in one of which, intended for the heating of non-conducting substances, the electrodes were passed horizontally through perforations in the upper part of the crucible walls, and the charge in the lower part of the crucible was heated by radiation.

The furnace used by Henri Moissan in his experiments on reactions at high temperatures, on the fusion and volatilization of refractory materials, and on the formation of carbides, silicides and borides of various metals, consisted, in its simplest form, of two superposed blocks of lime or of limestone with a central cavity cut in the lower block, and with a corresponding but much shallower inverted cavity in the upper block, which thus formed the lid of the furnace. Horizontal channels were cut on opposite walls, through which the carbon poles or electrodes were passed into the upper part of the cavity. Such a furnace, to take a current of 4 H.P. (say, of 60 amperes and 50 volts), measured externally about 6 by 6 by 7 in., and the electrodes were about 0·4 in. in diameter, while for a current of 100 H.P. (say, of 746 amperes and 100 volts) it measured about 14 by 12 by 14 in., and the electrodes were about 1·5 in. in diameter. In the latter case the crucible, which was placed in the cavity immediately beneath the arc, was about 3 in. in diameter (internally), and about 3½ in. in height. The fact that energy is being used at so high a rate as 100 H.P. on so small a charge of material sufficiently indicates that the furnace is only used for experimental work, or for the fusion of metals which, like tungsten or chromium, can only be melted at temperatures attainable by electrical means. Moissan succeeded in fusing about ¾ lb of either of these metals in 5 or 6 minutes in a furnace similar to that last described. He also arranged an experimental tube-furnace by passing a carbon tube horizontally beneath the arc in the cavity of the lime blocks. When prolonged heating is required at very high temperatures it is found necessary to line the furnace-cavity with alternate layers of magnesia and carbon, taking care that the lamina next to the lime is of magnesia; if this were not done the lime in contact with the carbon crucible would form calcium carbide and would slag down, but magnesia does not yield a carbide in this way. Chaplet has patented a muffle or tube furnace, similar in principle, for use on a larger scale, with a number of electrodes placed above and below the muffle-tube. The arc furnaces now widely used in the manufacture of calcium carbide on a large scale are chiefly developments of the Siemens furnace. But whereas, from its construction, the Siemens furnace was intermittent in operation, necessitating stoppage of the current while the contents of the crucible were poured out, many of the newer forms are specially designed either to minimize the time required in effecting the withdrawal of one charge and the introduction of the next, or to ensure absolute continuity of action, raw material being constantly charged in at the top and the finished substance and by-products (slag, &c.) withdrawn either continuously or at intervals, as sufficient quantity shall have accumulated. In the King furnace, for example, the crucible, or lowest part of the furnace, is made detachable, so that when full it may be removed and an empty crucible substituted. In the United States a revolving furnace is used which is quite continuous in action.

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[1] Cf. Siemens's account of the use of this furnace for experimental purposes in *British Association Report* for 1882.

Incandescence furnaces.

The class of furnaces heated by electrically incandescent materials has been divided by Borchers into two groups: (1) those in which the substance is heated by contact with a substance offering a high resistance to the current passing through it, and (2) those in which the substance to be heated itself affords the resistance to the passage of the current whereby electric energy is converted into heat. Practically the first of these furnaces was that of Despretz, in which the mixture to be heated was placed in a carbon tube rendered incandescent by the passage of a current through its substance from end to end. In 1880 W. Borchers introduced his resistance-furnace, which, in one sense, is the converse of the Despretz apparatus. A thin carbon pencil, forming a bridge between two stout carbon rods, is set in the midst of the mixture to be heated. On passing a current through the carbon the small rod is heated to incandescence, and imparts heat to the surrounding mass. On a larger scale several pencils are used to make the connexions between carbon blocks which form the end walls of the furnace, while the side walls are of fire-brick laid upon one another without mortar. Many of the furnaces now in constant use depend mainly on this principle, a core of granular carbon fragments stamped together in the direct line between the electrodes, as in Acheson's carborundum furnace, being substituted for the carbon pencils. In other cases carbon fragments are mixed throughout the charge, as in E.H. and A.H. Cowles's zinc-smelting retort. In practice, in these furnaces, it is possible for small local arcs to be temporarily set up by the shifting of the charge, and these would contribute to the heating of the mass. In the remaining class of furnace, in which the electrical resistance of the charge itself is utilized, are the continuous-current furnaces, such as are used for the smelting of aluminium, and those alternating-current furnaces, (*e.g.* for the production of calcium carbide) in which a portion of the charge is first actually fused, and then maintained in the molten condition by the current passing through it, while the reaction between further portions of the charge is proceeding.

Uses and advantages.

For ordinary metallurgical work the electric furnace requiring as it does (excepting where waterfalls or other cheap sources of power are available) the intervention of the boiler and steam-engine, or of the gas or oil engine, with a consequent loss of energy, has not usually proved so economical as an ordinary direct fired furnace. But in some cases in which the current is used for electrolysis and for the production of extremely high temperatures, for which the calorific intensity of ordinary fuel is insufficient, the electric furnace is employed with advantage. The temperature of the electric furnace, whether of the arc or incandescence type, is practically limited to that at which the least easily vaporized material available for electrodes is converted into vapour. This material is carbon, and as its vaporizing point is (estimated at) over 3500° C., and less than 4000° C., the temperature of the electric furnace cannot rise much above 3500° C. (6330° F.); but H. Moissan showed that at this temperature the most stable of mineral combinations are dissociated, and the most refractory elements are converted into vapour, only certain borides, silicides and metallic carbides having been found to resist the action of the heat. It is not necessary that all electric furnaces shall be run at these high temperatures; obviously, those of the incandescence or resistance type may be worked at any convenient temperature below the maximum. The electric furnace has several advantages as compared with some of the ordinary types of furnace, arising from the fact that the heat is generated from within the mass of material operated upon, and (unlike the blast-furnace, which presents the same advantage) without a large volume of gaseous products of combustion and atmospheric nitrogen being passed through it. In ordinary reverberatory and other heating furnaces the burning fuel is without the mass, so that the vessel containing the charge, and other parts of the plant, are raised to a higher temperature than would otherwise be necessary, in order to compensate for losses by radiation, convection and conduction. This advantage is especially observed in some cases in which the charge of the furnace is liable to attack the containing vessel at high temperatures, as it is often possible to maintain the outer walls of the electric furnace relatively cool, and even to keep them lined with a protecting crust of unfused charge. Again, the construction of electric furnaces may often be exceedingly crude and simple; in the carborundum furnace, for example, the outer walls are of loosely piled bricks, and in one type of furnace the charge is simply heaped on the ground around the carbon resistance used for heating, without containing-walls of any kind. There is, however, one (not insuperable) drawback in the use of the electric furnace for the smelting of pure metals. Ordinarily carbon is used as the electrode material, but when carbon comes in contact at high temperatures with any metal that is capable of forming a carbide a certain amount of combination between them is inevitable, and the carbon thus introduced impairs the mechanical properties of the ultimate metallic product. Aluminium, iron, platinum and many other metals may thus take up so much carbon as to become brittle and unforgeable. It is for this reason that Siemens, Borchers and others substituted a hollow water-cooled metal block for the carbon cathode upon which the melted metal rests while in the furnace. Liquid metal coming in contact with such a surface forms a crust of solidified metal over it, and this crust thickens up to a certain point, namely, until the heat from within the furnace just overbalances that lost by conduction through the solidified crust and the cathode material to the flowing water. In such an arrangement, after the first instant, the melted metal in the furnace does not come in contact with the cathode material.

Electrothermal Processes.—In these processes the electric current is used solely to generate heat, either to induce chemical reactions between admixed substances, or to produce a physical (allotropic) modification of a given substance. Borchers predicted that, at the high temperatures available with the electric furnace, every oxide would prove to be reducible by the action of carbon, and this prediction has in most instances been justified. Alumina and lime, for example, which cannot be reduced at ordinary furnace temperatures, readily give up their oxygen to carbon in the electric furnace, and then combine with an excess of carbon to form metallic carbides. In 1885 the brothers Cowles patented a process for the electrothermal reduction of oxidized ores by exposure to an intense current of electricity when admixed with carbon in a retort. Later in that year they patented a process for the reduction of aluminium by carbon, and in 1886 an electric furnace with sliding carbon rods passed through the end walls to the centre of a rectangular furnace. The impossibility of working with just sufficient carbon to reduce the alumina, without using any excess which would be free to

Aluminium alloys.

form at least so much carbide as would suffice, when diffused through the metal, to render it brittle, practically restricts the use of such processes to the production of aluminium alloys. Aluminium bronze (aluminium and copper) and ferro-aluminium (aluminium and iron) have been made in this way; the latter is the more satisfactory product, because a certain proportion of carbon is expected in an alloy of this character, as in ferromanganese and cast iron, and its presence is not objectionable. The furnace is built of fire-brick, and may measure (internally) 5 ft. in length by 1 ft. 8 in. in width, and 3 ft. in height. Into each end wall is built a short iron tube sloping downwards towards the centre, and through this is passed a bundle of five 3-in. carbon rods, bound together at the outer end by being cast into a head of cast iron for use with iron alloys, or of cast copper for aluminium bronze. This head slides freely in the cast iron tubes, and is connected by a copper rod with one of the terminals of the dynamo supplying the current. The carbons can thus, by the application of suitable mechanism, be withdrawn from or plunged into the furnace at will. In starting the furnace, the bottom is prepared by ramming it with charcoal-powder that has been soaked in milk of lime and dried, so that each particle is coated with a film of lime, which serves to reduce the loss of current by conduction through the lining when the furnace becomes hot. A sheet iron case is then placed within the furnace, and the space between it and the walls rammed with limed charcoal; the interior is filled with fragments of the iron or copper to be alloyed, mixed with alumina and coarse charcoal, broken pieces of carbon being placed in position to connect the electrodes. The iron case is then removed, the whole is covered with charcoal, and a cast iron cover with a central flue is placed above all. The current, either continuous or alternating, is then started, and continued for about 1 to 1½ hours, until the operation is complete, the carbon rods being gradually withdrawn as the action proceeds. In such a furnace a continuous current, for example, of 3000 amperes, at 50 to 60 volts, may be used at first, increasing to 5000 amperes in about half an hour. The reduction is not due to electrolysis, but to the action of carbon on alumina, a part of the carbon in the charge being consumed and evolved as carbon monoxide gas, which burns at the orifice in the cover so long as reduction is taking place. The reduced aluminium alloys itself immediately with the fused globules of metal in its midst, and as the charge becomes reduced the globules of alloy unite until, in the end, they are run out of the tap-hole after the current has been diverted to another furnace. It was found in practice (in 1889) that the expenditure of energy per pound of reduced aluminium was about 23 H.P.-hours, a number considerably in excess of that required at the present time for the production of pure aluminium by the electrolytic process described in the article ALUMINIUM. Calcium carbide, graphite (*q.v.*), phosphorus (*q.v.*) and carborundum (*q.v.*) are now extensively manufactured by the operations outlined above.

Electrolytic Processes.—The isolation of the metals sodium and potassium by Sir Humphry Davy in 1807 by the electrolysis of the fused hydroxides was one of the earliest applications of the electric current to the extraction of metals. This pioneering work showed little development until about the middle of the 19th century. In 1852 magnesium was isolated electrolytically by R. Bunsen, and this process subsequently received much attention at the hands of Moissan and Borchers. Two years later Bunsen and H. E. Sainte Claire Deville working independently obtained aluminium (*q.v.*) by the electrolysis of the fused double sodium aluminium chloride. Since that date other processes have been devised and the electrolytic processes have entirely replaced the older methods of reduction with sodium. Methods have also been discovered for the electrolytic manufacture of calcium (*q.v.*), which have had the effect of converting a laboratory curiosity into a product of commercial importance. Barium and strontium have also been produced by electrometallurgical methods, but the processes have only a laboratory interest at present. Lead, zinc and other metals have also been reduced in this manner.

For further information the following books, in addition to those mentioned at the end of the article ELECTROCHEMISTRY, may be consulted: Borchers, *Handbuch der Elektrochemie; Electric Furnaces* (Eng. trans. by H. G. Solomon, 1908); Moissan, *The Electric Furnace* (1904); J. Escard, *Fours électriques* (1905); *Les Industries électrochimiques* (1907). (W. G. M.)

ELECTROMETER, an instrument for measuring difference of potential, which operates by means of electrostatic force and gives the measurement either in arbitrary or in absolute units (see UNITS, PHYSICAL). In the last case the instrument is called an absolute electrometer. Lord Kelvin has classified electrometers into (1) Repulsion, (2) Attracted disk, and (3) Symmetrical electrometers (see W. Thomson, *Brit. Assoc. Report*, 1867, or *Reprinted Papers on Electrostatics and Magnetization*, p. 261).

Repulsion Electrometers.—The simplest form of repulsion electrometer is W. Henley's pith ball electrometer (*Phil. Trans.*, 1772, 63, p. 359) in which the repulsion of a straw ending in a pith ball from a fixed stem is indicated on a graduated arc (see ELECTROSCOPE). A double pith ball repulsion electrometer was employed by T. Cavallo in 1777.

It may be pointed out that such an arrangement is not merely an arbitrary electrometer, but may become an absolute electrometer within certain rough limits. Let two spherical pith balls of radius r and weight W, covered with gold-leaf so as to be conducting, be suspended by parallel silk threads of length l so as just to touch each other. If then the balls are both charged to a potential V they will repel each other, and the threads will stand out at an angle 2θ, which can be observed on a protractor. Since the electrical repulsion of the balls is equal to $C^2V^2/4l^2 \sin^2\theta$ dynes, where $C = r$ is the capacity of either ball, and this force is balanced by the restoring force due to their weight, Wg dynes, where g is the acceleration of gravity, it is easy to show that we have

$$V = \frac{2l \sin\theta}{r}\sqrt{Wg \tan\theta}$$

as an expression for their common potential V, provided that the balls are small and their distance sufficiently great not sensibly to disturb the uniformity of electric charge upon them. Observation of θ with measurement of the value of l and r reckoned in centimetres and W in grammes gives us the potential difference of the balls in absolute C.G.S. or electrostatic units. The gold-leaf electroscope invented by Abraham Bennet (see ELECTROSCOPE) can in like manner, by the addition of a scale to observe the divergence of the gold-leaves, be made a repulsion electrometer.

Attracted Disk Electrometers.—A form of attracted disk absolute electrometer was devised by A. Volta. It consisted of a plane conducting plate forming one pan of a balance which was suspended over another insulated plate which could be electrified. The attraction between the two plates was balanced by a weight put in the opposite pan. A similar electric balance was subsequently devised by Sir W. Snow-Harris,[1] one of whose instruments is shown in fig. 1. C is an insulated disk over which is suspended another disk attached to the arm of a balance. A weight is put in the opposite scale pan and a measured charge of electricity is given to the disk C just sufficient to tip over the balance. Snow-Harris found that this charge varied as the square root of the weight in the opposite pan, thus showing that the

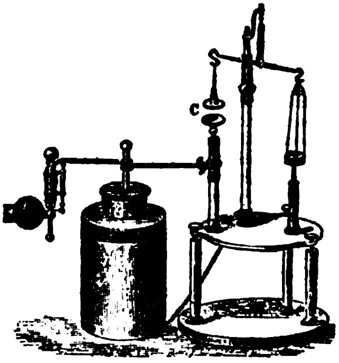

FIG. 1.—Snow-Harris's Disk Electrometer.

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[1] It is probable that an experiment of this kind had been made as far back as 1746 by Daniel Gralath, of Danzig, who has some claims to have suggested the word "electrometer" in connexion with it. See Park Benjamin, *The Intellectual Rise in Electricity* (London, 1895), p. 542.

attraction between the disks at given distance apart varies as the square of their difference of potential.

The most important improvements in connexion with electrometers are due, however, to Lord Kelvin, who introduced the guard plate and used gravity or the torsion of a wire as a means for evaluating the electrical forces.

His portable electrometer is shown in fig. 2. H H (see fig. 3) is a plane disk of metal called the guard plate, fixed to the inner coating of a small Leyden jar (see fig. 2). At F a square hole is cut out of H H, and into this fits loosely without touching, like a trap door, a square piece of aluminium foil having a projecting tail, which carries at its end a stirrup L, crossed by a fine hair (see fig. 3). The square piece of aluminium is pivoted round a horizontal stretched wire. If then another horizontal disk G is placed over the disk H H and a difference of potential made between G and H H, the movable aluminium trap door F will be attracted by the fixed plate G. Matters are so arranged by giving a torsion to the wire carrying the aluminium disk F that for a certain potential difference between the plates H and G, the movable part F comes into a definite sighted position, which is observed by means of a small lens. The plate G (see fig. 2) is moved up and down, parallel to itself, by means of a screw. In using the instrument the conductor, whose potential is to be tested, is connected to the plate G. Let this potential be denoted by V, and let v be the potential of the guard plate and the aluminium flap. This last potential is maintained constant by guard plate and flap being part of the interior coating of a charged Leyden jar. Since the distribution of electricity may be considered to be constant over the surface S of the attracted disk, the mechanical force f on it is given by the expression,[1]

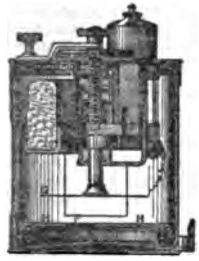

FIG. 2.—Kelvin's Portable Electrometer.

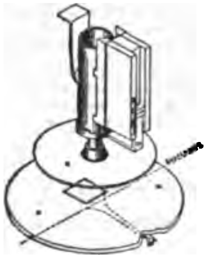

FIG. 3.

$$f=\frac{S(V-v)^2}{8\pi d^2},$$

where d is the distance between the two plates. If this distance is varied until the attracted disk comes into a definite sighted position as seen by observing the end of the index through the lens, then since the force f is constant, being due to the torque applied by the wire for a definite angle of twist, it follows that the difference of potential of the two plates varies as their distance. If then two experiments are made, first with the upper plate connected to earth, and secondly, connected to the object being tested, we get an expression for the potential V of this conductor in the form

$$V=A(d'-d),$$

where d and d' are the distances of the fixed and movable plates from one another in the two cases, and A is some constant. We thus find V in terms of the constant and the difference of the two screw readings.

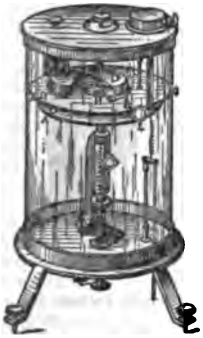

FIG. 4.—Kelvin's Absolute Electrometer.

Lord Kelvin's absolute electrometer (fig. 4) involves the same principle. There is a certain fixed guard disk B having a hole in it which is loosely occupied by an aluminium trap door plate, shielded by D and suspended on springs, so that its surface is parallel with that of the guard plate. Parallel to this is a second movable plate A, the distances between the two being measurable by means of a screw. The movable plate can be drawn down into a definite sighted position when a difference of potential is made between the two plates. This sighted position is such that the surface of the trap door plate is level with that of the guard plate, and is determined by observations made with the lenses H and L. The movable plate can be thus depressed by placing on it a certain standard weight W grammes.

Suppose it is required to measure the difference of potentials V and V' of two conductors. First one and then the other conductor is connected with the electrode of the lower or movable plate, which is moved by the screw until the index attached to the attracted disk shows it to be in the sighted position. Let the screw readings in the two cases be d and d'. If W is the weight required to depress the attracted disk into the same sighted position when the plates are unelectrified and g is the acceleration of gravity, then the difference of potentials of the conductors tested is expressed by the formula

$$V-V'=(d-d')\sqrt{\frac{8\pi g W}{S}},$$

where S denotes the area of the attracted disk..

The difference of potentials is thus determined in terms of a weight, an area and a distance, in absolute C.G.S. measure or electrostatic units.

Symmetrical Electrometers include the dry pile electrometer and Kelvin's quadrant electrometer. The principle underlying these instruments is that we can measure differences of potential by means of the motion of an electrified body in a symmetrical field of electric force. In the dry pile electrometer a single gold-leaf is hung up between two plates which are connected to the opposite terminals of a dry pile so that a certain constant difference of potential exists between these plates. The original inventor of this instrument was T. G. B. Behrens (*Gilb. Ann.*, 1806, 23), but it generally bears the name of J. G. F. von Bohnenberger, who slightly modified its form. G. T. Fechner introduced the important improvement of using only one pile, which he removed from the immediate neighbourhood of the suspended leaf. W. G. Hankel still further improved the dry pile electrometer by giving a slow motion movement to the two plates, and substituted a galvanic battery with a large number of cells for the dry pile, and also employed a divided scale to measure the movements of the gold-leaf (*Pogg. Ann.*, 1858, 103). If the gold-leaf is unelectrified, it is not acted upon by the two plates placed at equal distances on either side of it, but if its potential is raised or lowered it is attracted by one disk and repelled by the other, and the displacement becomes a measure of its potential.

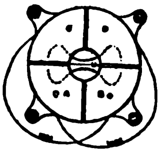

FIG. 5.

A vast improvement in this instrument was made by the invention of the quadrant electrometer by Lord Kelvin, which is the most sensitive form of electrometer yet devised. In this instrument (see fig. 5) a flat paddle-shaped needle of aluminium foil U is supported by a bifilar suspension consisting of two cocoon fibres. This needle is suspended in the interior of a glass vessel partly coated with tin-foil on the outside and inside, forming therefore a Leyden jar (see fig. 6). In the bottom of the vessel is placed some sulphuric acid, and a platinum wire attached to the suspended needle dips into this acid. By giving a charge to this Leyden jar the needle can thus be maintained at a certain constant high potential. The needle is enclosed by a sort of flat box divided into four insulated quadrants A, B, C, D (fig. 5), whence the name. The opposite quadrants are connected together by thin platinum wires. These quadrants are insulated

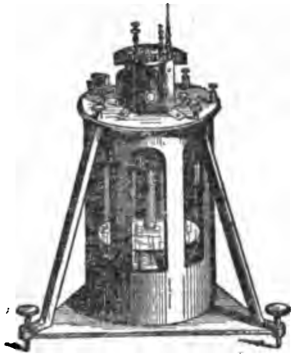

FIG. 6.—Kelvin's Quadrant Electrometer.

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[1] See Maxwell, *Treatise on Electricity and Magnetism* (2nd ed.), i. 308.

from the needle and from the case, and the two pairs are connected to two electrodes. When the instrument is to be used to determine the potential difference between two conductors, they are connected to the two opposite pairs of quadrants. The needle in its normal position is symmetrically placed with regard to the quadrants, and carries a mirror by means of which its displacement can be observed in the usual manner by reflecting the ray of light from it. If the two quadrants are at different potentials, the needle moves from one quadrant towards the other, and the image of a spot of light on the scale is therefore displaced. Lord Kelvin provided the instrument with two necessary adjuncts, viz. a replenisher or rotating electrophorus (*q.v.*), by means of which the charge of the Leyden jar which forms the enclosing vessel can be increased or diminished, and also a small aluminium balance plate or gauge, which is in principle the same as the attracted disk portable electrometer by means of which the potential of the inner coating of the Leyden jar is preserved at a known value.

According to the mathematical theory of the instrument,[1] if V and V′ are the potentials of the quadrants and v is the potential of the needle, then the torque acting upon the needle to cause rotation is given by the expression,

$$C(V-V')\{v-\tfrac{1}{2}(V+V')\},$$

where C is some constant. If v is very large compared with the mean value of the potentials of the two quadrants, as it usually is, then the above expression indicates that the couple varies as the difference of the potentials between the quadrants.

Dr J. Hopkinson found, however, before 1885, that the above formula does not agree with observed facts (*Proc. Phys. Soc. Lond.*, 1885, 7, p. 7). The formula indicates that the sensibility of the instrument should increase with the charge of the Leyden jar or needle, whereas Hopkinson found that as the potential of the needle was increased by working the replenisher of the jar, the deflection due to three volts difference between the quadrants first increased and then diminished. He found that when the potential of the needle exceeded a certain value, of about 200 volts, for the particular instrument he was using (made by White of Glasgow), the above formula did not hold good. W. E. Ayrton, J. Perry and W. E. Sumpner, who in 1886 had noticed the same fact as Hopkinson, investigated the matter in 1891 (*Proc. Roy. Soc.*, 1891, 50, p. 52; *Phil. Trans.*, 1891, 182, p. 519). Hopkinson had been inclined to attribute the anomaly to an increase in the tension of the bifilar threads, owing to a downward pull on the needle, but they showed that this theory would not account for the discrepancy. They found from observations that the particular quadrant electrometer they used might be made to follow one or other of three distinct laws. If the quadrants were near together there were certain limits between which the potential of the needle might vary without producing more than a small change in the deflection corresponding with the fixed potential difference of the quadrants. For example, when the quadrants were about 2·5 mm. apart and the suspended fibres near together at the top, the deflection produced by a P.D. of 1·45 volts between the quadrants only varied about 11 % when the potential of the needle varied from 896 to 3586 volts. When the fibres were far apart at the top a similar flatness was obtained in the curve with the quadrants about 1 mm. apart. In this case the deflection of the needle was practically quite constant when its potential varied from 2152 to 3227 volts. When the quadrants were about 3·9 mm. apart, the deflection for a given P.D. between the quadrants was almost directly proportional to the potential of the needle. In other words, the electrometer nearly obeyed the theoretical law. Lastly, when the quadrants were 4 mm. or more apart, the deflection increased much more rapidly than the potential, so that a maximum sensibility bordering on instability was obtained. Finally, these observers traced the variation to the fact that the wire supporting the aluminium needle as well as the wire which connects the needle with the sulphuric acid in the Leyden jar in the White pattern of Leyden jar is enclosed in a metallic guard tube to screen the wire from external action. In order that the needle may project outside the guard tube, openings are made in its two sides; hence the moment the needle is deflected each half of it becomes unsymmetrically placed relatively to the two metallic pieces which join the upper and lower half of the guard tube. Guided by these experiments, Ayrton, Perry and Sumpner constructed an improved unifilar quadrant electrometer which was not only more sensitive than the White pattern, but fulfilled the theoretical law of working. The bifilar suspension was abandoned, and instead a new form of adjustable magnetic control was adopted. All the working parts of the instrument were supported on the base, so that on removing a glass shade which serves as a Leyden jar they can be got at and adjusted in position. The conclusion to which the above observers came was that any quadrant electrometer made in any manner does not necessarily obey a law of deflection making the deflections proportional to the potential difference of the quadrants, but that an electrometer can be constructed which does fulfil the above law.

The importance of this investigation resides in the fact that an electrometer of the above pattern can be used as a wattmeter (*q.v.*), provided that the deflection of the needle is proportional to the potential difference of the quadrants. This use of the instrument was proposed simultaneously in 1881 by Professors Ayrton and G. F. Fitzgerald and M. A. Potier. Suppose we have an inductive and a non-inductive circuit in series, which is traversed by a periodic current, and that we desire to know the power being absorbed to the inductive circuit. Let v_1, v_2, v_3 be the instantaneous potentials of the two ends and middle of the circuit; let a quadrant electrometer be connected first with the quadrants to the two ends of the inductive circuit and the needle to the far end of the non-inductive circuit, and then secondly with the needle connected to one of the quadrants (see fig. 5). Assuming the electrometer to obey the above-mentioned theoretical law, the first reading is proportional to

$$v_1-v_2\left\{v_3-\frac{v_1+v_2}{2}\right\}$$

and the second to $$v_1-v_2\left\{v_2-\frac{v_1+v_2}{2}\right\}$$

The difference of the readings is then proportional to

$$(v_1-v_2)(v_3-v_2).$$

But this last expression is proportional to the instantaneous power taken up in the inductive circuit, and hence the difference of the two readings of the electrometer is proportional to the mean power taken up in the circuit (*Phil. Mag.*, 1891, 32, p. 206). Ayrton and Perry and also P. R. Blondlot and P. Curie afterwards suggested that a single electrometer could be constructed with two pairs of quadrants and a duplicate needle on one stem, so as to make two readings simultaneously and produce a deflection proportional at once to the power being taken up in the inductive circuit.

Quadrant electrometers have also been designed especially for measuring extremely small potential differences. An instrument of this kind has been constructed by Dr. F. Dolezalek (fig. 7). The needle and quadrants are of small size, and the electrostatic capacity is correspondingly small. The quadrants are mounted on pillars of amber which afford a very high insulation. The needle, a piece of paddle-shaped paper thinly coated with silver foil, is suspended by a quartz fibre, its extreme lightness making it possible to use a very feeble controlling force without rendering the period of oscillation unduly great. The resistance offered by the air to a needle of such light construction suffices to render the motion nearly dead-beat. Throughout a wide range the deflections are proportional to the potential difference producing them. The needle is charged to a potential

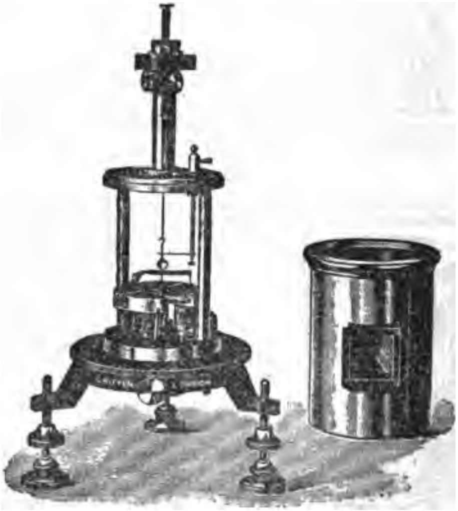

FIG. 7.—Quadrant Electrometer. Dolezalek Pattern.

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[1] See Maxwell, *Electricity and Magnetism* (2nd ed., Oxford, 1881), vol. i. p. 311.

of 50 to 200 volts by means of a dry pile or voltaic battery, or from a lighting circuit. To facilitate the communication of the charge to the needle, the quartz fibre and its attachments are rendered conductive by a thin film of solution of hygroscopic salt such as calcium chloride. The lightness of the needle enables the instrument to be moved without fear of damaging the suspension. The upper end of the quartz fibre is rotated by a torsion head, and a metal cover serves to screen the instrument from stray electrostatic fields. With a quartz fibre 0·009 mm. thick and 60 mm. long, the needle being charged to 110 volts, the period and swing of the needle was 18 seconds. With the scale at a distance of two metres, a deflection of 130 mm. was produced by an electromotive force of 0·1 volt. By using a quartz fibre of about half the above diameter the sensitiveness was much increased. An instrument of this form is valuable in measuring small alternating currents by the fall of potential produced down a known resistance. In the same way it may be employed to measure high potentials by measuring the fall of potential down a fraction of a known non-inductive resistance. In this last case, however, the capacity of the electrometer used must be small, otherwise an error is introduced.[1]

See, in addition to references already given, A. Gray, *Absolute Measurements in Electricity and Magnetism* (London, 1888), vol. i. p. 254; A. Winkelmann, *Handbuch der Physik* (Breslau, 1905), pp. 58-70, which contains a large number of references to original papers on electrometers. (J. A. F.)

ELECTRON, the name suggested by Dr G. Johnstone Stoney in 1891 for the natural unit of electricity to which he had drawn attention in 1874, and subsequently applied to the ultra-atomic particles carrying negative charges of electricity, of which Professor Sir J. J. Thomson proved in 1897 that the cathode rays consisted. The electrons, which Thomson at first called corpuscles, are point charges of negative electricity, their inertia showing them to have a mass equal to about $\frac{1}{1800}$ that of the hydrogen atom. They are apparently derivable from all kinds of matter, and are believed to be components at any rate of the chemical atom. The electronic theory of the chemical atom supposes, in fact, that atoms are congeries of electrons in rapid orbital motion. The size of the electron is to that of an atom roughly in the ratio of a pin's head to the dome of St Paul's cathedral. The electron is always associated with the unit charge of negative electricity, and it has been suggested that its inertia is wholly electrical. For further details see the articles on ELECTRICITY; MAGNETISM; MATTER; RADIOACTIVITY; CONDUCTION, ELECTRIC; *The Electron Theory*, E. Fournier d'Albe (London, 1907); and the original papers of Dr G. Johnstone Stoney, *Proc. Brit. Ass.* (Belfast, August 1874), "On the Physical Units of Nature," and *Trans. Royal Dublin Society* (1891), 4, p. 583.

ELECTROPHORUS, an instrument invented by Alessandro Volta in 1775, by which mechanical work is transformed into electrostatic charge by the aid of a small initial charge of electricity. The operation depends on the facts of electrostatic induction discovered by John Canton in 1753, and, independently, by J. K. Wilcke in 1762 (see ELECTRICITY). Volta, in a letter to J. Priestley on the 10th of June 1775 (see *Collezione dell' opere*, ed. 1816, vol. i. p. 118), described the invention of a device he called an *elettroforo perpetuo*, based on the fact that a conductor held near an electrified body and touched by the finger was found, when withdrawn, to possess an electric charge of opposite sign to that of the electrified body. His electrophorus in one form consisted of a disk of non-conducting material, such as pitch or resin, placed between two metal sheets, one being provided with an insulating handle. For the pitch or resin may be substituted a sheet of glass, ebonite, indiarubber or any other good dielectric placed upon a metallic sheet, called the sole-plate. To use the apparatus the surface of the dielectric is rubbed with a piece of warm flannel, silk or catskin, so as to electrify it, and the upper metal plate is then placed upon it. Owing to the irregularities in the surfaces of the dielectric and upper plate the two are only in contact at a few points, and owing to the insulating quality of the dielectric its surface electrical charge cannot move over it. It therefore acts inductively upon the upper plate and induces on the adjacent surface an electric charge of opposite sign. Suppose, for instance, that the dielectric is a plate of resin rubbed with catskin, it will then be negatively electrified and will act by induction on the upper plate across the film of air separating the upper resin surface and lower surface of the upper metal plate. If the upper plate is touched with the finger or connected to earth for a moment, a negative charge will escape from the metal plate to earth at that moment. The arrangement thus constitutes a condenser; the upper plate on its under surface carries a charge of positive electricity and the resin plate a charge of negative electricity on its upper surface, the air film between them being the dielectric of the condenser. If, therefore, the upper plate is elevated, mechanical work has to be done to separate the two electric charges. Accordingly on raising the upper plate, the charge on it, in old-fashioned nomenclature, becomes *free* and can be communicated to any other insulated conductor at a lower potential, the upper plate thereby becoming more or less discharged. On placing the upper plate again on the resin and touching it for a moment, the process can be repeated, and so at the expense of mechanical work done in lifting the upper plate against the mutual attraction of two electric charges of opposite sign, an indefinitely large electric charge can be accumulated and given to any other suitable conductor. In course of time, however, the surface charge of the resin becomes dissipated and it then has to be again excited. To avoid the necessity for touching the upper plate every time it is put down on the resin, a metal pin may be brought through the insulator from the sole-plate so that each time that the upper plate is put down on the resin it is automatically connected to earth. We are thus able by a process of merely lifting the upper plate repeatedly to convey a large electrical charge to some conductor starting from the small charge produced by friction on the resin. The above explanation does not take into account the function of the sole-plate, which is important. The sole-plate serves to increase the electrical capacity of the upper plate when placed down upon the resin or excited insulator. Hence when so placed it takes a larger charge. When touched by the finger the upper plate is brought to zero potential. If then the upper plate is lifted by its insulating handle its capacity becomes diminished. Since, however, it carries with it the charge it had when resting on the resin, its potential becomes increased as its capacity becomes less, and it therefore rises to a high potential, and will give a spark if the knuckle is approached to it when it is lifted after having been touched and raised.

The study of Volta's electrophorus at once suggested the performance of these cyclical operations by some form of rotation instead of elevation, and led to the invention of various forms of doubler or multiplier. The instrument was thus the first of a long series of machines for converting mechanical work into electrostatic energy, and the predecessor of the modern type of influence machine (see ELECTRICAL MACHINE). Volta himself devised a double and reciprocal electrophorus and also made mention of the subject of multiplying condensers in a paper published in the *Phil. Trans.* for 1782 (p. 237, and appendix, p. vii.). He states, however, that the use of a condenser in connexion with an electrophorus to make evident and multiply weak charges was due to T. Cavallo (*Phil. Trans.*, 1788).

For further information see S. P. Thompson, "The Influence Machine from 1788 to 1888," *Journ. Inst. Tel. Eng.*, 1888, 17, p. 569. Many references to original papers connected with the electrophorus will be found in A. Winkelmann's *Handbuch der Physik* (Breslau, 1905), vol. iv. p. 48. (J. A. F.)

ELECTROPLATING, the art of depositing metals by the electric current. In the article ELECTROLYSIS it is shown how the passage of an electric current through a solution containing metallic ions involves the deposition of the metal on the cathode. Sometimes the metal is deposited in a pulverulent form, at others as a firm tenacious film, the nature of the deposit being dependent upon the particular metal, the concentration of the solution, the difference of potential between the electrodes, and other experimental conditions. As the durability of the electro-deposited coat on plated wares of all kinds is of the utmost importance, the greatest care must be taken to ensure its complete adhesion. This can only be effected if the surface of the metal on which the deposit is to be made is chemically clean. Grease must be removed by potash, whiting or other means, and tarnish by an acid or potassium cyanide, washing in plenty of water being resorted to after each operation. The vats for depositing may be of enamelled iron, slate, glazed earthenware, glass, lead-lined wood, &c. The current densities and potential differences frequently used for some of the commoner metals are given in the following table, taken from M'Millan's *Treatise on Electrometallurgy*. It must be remembered, however, that variations in conditions modify the electromotive force required for any given process. For example, a rise in temperature of the bath causes an increase in its conductivity, so that a lower E.M.F. will suffice to give the required current density; on the other hand, an abnormally great distance between the electrodes, or a diminution in acidity of an acid bath, or in the strength of the solution used, will increase the resistance, and so require the application of a higher E.M.F.

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[1] See J. A. Fleming, *Handbook for the Electrical Laboratory and Testing Room*, vol. i. p. 448 (London, 1901).

Metal.	Amperes.		Volts between Anode and Cathode.
	Per sq. decimetre of Cathode Surface.	Per sq. in. of Cathode Surface.	
Antimony	0·4-0·5	0·02-0·03	1·0-1·2
Brass	0·5-0·8	0·03-0·05	3·0-4·0
Copper, acid bath .	1·0-1·5	0·065-0·10	0·5-1·5
,, alkaline bath .	0·3-0·5	0·02-0·03	3·0-5·0
Gold	0·1	0·006	0·5-4·0
Iron	0·5	0·03	1·0
Nickel, at first . .	1·4-1·5	0·09-0·10	5·0
,, after . .	0·2-0·3	0·015 0·02	1·5-2·0
,, on zinc . .	0·4	0·025	4·0-5·0
Silver	0·2-0·5	0·015-0·03	0·75-1·0
Zinc	0·3-0·6	0·02-0·04	2·5-3·0

Large objects are suspended in the tanks by hooks or wires, care being taken to shift their position and so avoid wire-marks. Small objects are often heaped together in perforated trays or ladles, the cathode connecting-rod being buried in the midst of them. These require constant shifting because the objects are in contact at many points, and because the top ones shield those below from the depositing action of the current. Hence processes have been patented in which the objects to be plated are suspended in revolving drums between the anodes, the rotation of the drum causing the constant renewal of surfaces and affording a burnishing action at the same time. Care must be taken not to expose goods in the plating bath to too high a current density, else they may be "burnt"; they must never be exposed one at a time to the full anode surface, with the current flowing in an empty bath, but either one piece at a time should be replaced, or some of the anodes should be transferred temporarily to the place of the cathodes, in order to distribute the current over a sufficient cathode-area. Burnt deposits are dark-coloured, or even pulverulent and useless. The strength of the current may also be regulated by introducing lengths of German silver or iron wire, carbon rod, or other inferior conductors in the path of the current, and a series of such resistances should always be provided close to the tanks. Ammeters to measure the volume, and voltmeters to determine the pressure of current supplied to the baths, should also be provided. Very irregular surfaces may require the use of specially shaped anodes in order that the distance between the electrodes may be fairly uniform, otherwise the portion of the cathode lying nearest to the anode may receive an undue share of the current, and therefore a greater thickness of coat. Supplementary anodes are sometimes used in difficult cases of this kind. Large metallic surfaces (especially external surfaces) are sometimes plated by means of a "doctor," which, in its simplest form, is a brush constantly wetted with the electrolyte, with a wire anode buried amid the hairs or bristles; this brush is painted slowly over the surface of the metal to be coated, which must be connected to the negative terminal of the electrical generator. Under these conditions electrolysis of the solution in the brush takes place. Iron ships' plates have recently been coated with copper in sections (to prevent the adhesion of barnacles), by building up a temporary trough against the side of the ship, making the thoroughly cleansed plate act both as cathode and as one side of the trough. Decorative plating-work in several colours (*e.g.* "parcel-gilding") is effected by painting a portion of an object with a stopping-out (*i.e.* a non-conducting) varnish, such as copal varnish, so that this portion is not coated. The varnish is then removed, a different design stopped out, and another metal deposited. By varying this process, designs in metals of different colours may readily be obtained.

Reference must be made to the textbooks (see ELECTRO-CHEMISTRY) for a fuller account of the very varied solutions and methods employed for electroplating with silver, gold, copper, iron and nickel. It should be mentioned here, however, that solutions which would deposit their metal on any object by simple immersion should not be generally used for electroplating that object, as the resulting deposit is usually non-adhesive. For this reason the acid copper-bath is not used for iron or zinc objects, a bath containing copper cyanide or oxide dissolved in potassium cyanide being substituted. This solution, being an inferior conductor of electricity, requires a much higher electromotive force to drive the current through it, and is therefore more costly in use. It is, however, commonly employed hot, whereby its resistance is reduced. *Zinc* is commonly deposited by electrolysis on iron or steel goods which would ordinarily be "galvanized," but which for any reason may not conveniently be treated by the method of immersion in fused zinc. The zinc cyanide bath may be used for small objects, but for heavy goods the sulphate bath is employed. Sherard Cowper-Coles patented a process in which, working with a high current density, a lead anode is used, and powdered zinc is kept suspended in the solution to maintain the proportion of zinc in the electrolyte, and so to guard against the gradual acidification of the bath. *Cobalt* is deposited by a method analogous to that used for its sister-metal nickel. *Platinum*, *palladium* and *tin* are occasionally deposited for special purposes. In the deposition of *gold* the colour of the deposit is influenced by the presence of impurities in the solution; when copper is present, some is deposited with the gold, imparting to it a reddish colour, whilst a little silver gives it a greenish shade. Thus so-called coloured-gold deposits may be produced by the judicious introduction of suitable impurities. Even pure gold, it may be noted, is darker or lighter in colour according as a stronger or a weaker current is used. The electro-deposition of *brass*—mainly on iron ware, such as bedstead tubes—is now very widely practised, the bath employed being a mixture of copper, zinc and potassium cyanides, the proportions of which vary according to the character of the brass required, and to the mode of treatment. The colour depends in part upon the proportion of copper and zinc, and in part upon the current density, weaker currents tending to produce a redder or yellower metal. Other alloys may be produced, such as bronze, or German silver, by selecting solutions (usually cyanides) from which the current is able to deposit the constituent metals simultaneously.

Electrolysis has in a few instances been applied to processes of manufacture. For example, Wilde produced copper printing surfaces for calico printing-rollers and the like by immersing rotating iron cylinders as cathodes in a copper bath. Elmore, Dumoulin, Cowper-Coles and others have prepared copper cylinders and plates by depositing copper on rotating mandrels with special arrangements. Others have arranged a means of obtaining high conductivity wire from cathode-copper without fusion, by depositing the metal in the form of a spiral strip on a cylinder, the strip being subsequently drawn down in the usual way; at present, however, the ordinary methods of wire production are found to be cheaper. J. W. Swan (*Journ. Inst. Elec. Eng.*, 1898, vol. xxvii. p. 16) also worked out, but did not proceed with, a process in which a copper wire whilst receiving a deposit of copper was continuously passed through the draw-plate, and thus indefinitely extended in length. Cowper-Coles (*Journ. Inst. Elec. Eng.*, 1898, 27, p. 99) very successfully produced true parabolic reflectors for projectors, by depositing copper upon carefully ground and polished glass surfaces rendered conductive by a film of deposited silver.

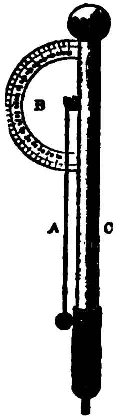

Fig. 1.—Henley's Electroscope.

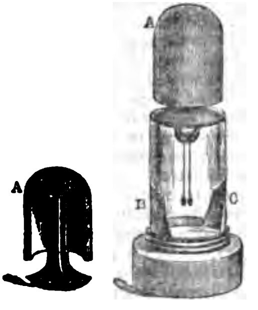

Fig. 2.—Cavallo's Electroscope.

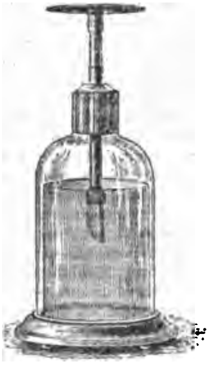

Fig. 3.—Bennet's Electroscope.

ELECTROSCOPE, an instrument for detecting differences of electric potential and hence electrification. The earliest form of scientific electroscope was the *versorium* or electrical needle of William Gilbert (1544–1603), the celebrated author of the treatise *De magnete* (see Electricity). It consisted simply of a light metallic needle balanced on a pivot like a compass needle. Gilbert employed it to prove that numerous other bodies besides amber are susceptible of being electrified by friction.[1] In this case the visible indication consisted in the attraction exerted between the electrified body and the light pivoted needle which was acted upon and electrified by induction. The next improvement was the invention of simple forms of repulsion electroscope. Two similarly electrified bodies repel each other. Benjamin Franklin employed the repulsion of two linen threads, C. F. de C. du Fay, J. Canton, W. Henley and others devised the pith ball, or double straw electroscope (fig. 1). T. Cavallo about 1770 employed two fine silver wires terminating in pith balls suspended in a glass vessel having strips of tin-foil pasted down the sides (fig. 2). The object of the thimble-shaped dome was to keep moisture from the stem from which the pith balls were supported, so that the apparatus could be used in the open air even in the rainy weather. Abraham Bennet (*Phil. Trans.*, 1787, 77, p. 26) invented the modern form of gold-leaf electroscope. Inside a glass shade he fixed to an insulated wire a pair of strips of gold-leaf (fig. 3). The wire terminated in a plate or knob outside the vessel. When an electrified body was held near or in contact with the knob, repulsion of the gold leaves ensued. Volta added the condenser (*Phil. Trans.*, 1782), which greatly increased the power of the instrument. M. Faraday, however, showed long subsequently that to bestow upon the indications of such an electroscope definite meaning it was necessary to place a cylinder of metallic gauze connected to the earth inside the vessel, or better still, to line the glass shade with tin-foil connected to the earth and observe through a hole the indications of the gold leaves (fig. 4). Leaves of aluminium foil may with advantage be substituted for gold-leaf, and a scale is sometimes added to indicate the angular divergence of the leaves.

The uses of an electroscope are, first, to ascertain if any body is in a state of electrification, and secondly, to indicate the sign of that charge. In connexion with the modern study of radio-activity, the electroscope has become an instrument of great usefulness, far outrivalling the spectroscope in sensibility. Radio-active bodies are chiefly recognized by the power they possess of rendering the air in their neighbourhood conductive; hence the electroscope detects the presence of a radio-active body by losing an electric charge given to it more quickly than it would otherwise do. A third great use of the electroscope is therefore to detect electric conductivity either in the air or in any other body.

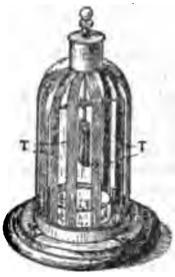

Fig. 4.—Gold-Leaf Electroscope.

To detect electrification it is best to charge the electroscope by induction. If an electrified body is held near the gold-leaf electroscope the leaves diverge with electricity of the same sign as that of the body being tested. If, without removing the electrified body, the plate or knob of the electroscope is touched, the leaves collapse. If the electroscope is insulated once more and the electrified body removed, the leaves again diverge with electricity of the opposite sign to that of the body being tested. The sign of charge is then determined by holding near the electroscope a glass rod rubbed with silk or a sealing-wax rod rubbed with flannel. If the approach of the glass rod causes the leaves in their final state to collapse, then the charge in the rod was positive, but if it causes them to expand still more the charge was negative, and vice versa for the sealing-wax rod. When employing a Volta condensing electroscope, the following is the method of procedure:—The top of the electroscope consists of a flat, smooth plate of lacquered brass on which another plate of brass rests, separated from it by three minute fragments of glass or shellac, or a film of shellac varnish. If the electrified body is touched against the upper plate whilst at the same time the lower plate is put to earth, the condenser formed of the two plates and the film of air or varnish becomes charged with positive electricity on the one plate and negative on the other. On insulating the lower plate and raising the upper plate by the glass handle, the capacity of the condenser formed by the plates is vastly decreased, but since the charge on the lower plate including the gold leaves attached to it remains the same, as the capacity of the system is reduced the potential is raised and therefore the gold leaves diverge widely. Volta made use of such an electroscope in his celebrated experiments (1790–1800) to prove that metals placed in contact with one another are brought to different potentials, in other words to prove the existence of so-called contact electricity. He was assisted to detect the small potential differences then in question by the use of a multiplying condenser or revolving doubler (see Electrical Machine). To employ the electroscope as a means of detecting radio-activity, we have first to test the leakage quality of the electroscope itself. Formerly it was usual to insulate the rod of the electroscope by passing it through a hole in a cork or mass of sulphur fixed in the top of the glass vessel within which the gold leaves were suspended. A further improvement consisted in passing the metal wire to which the gold leaves were attached through a glass tube much wider than the rod, the latter being fixed concentrically in the glass tube by means of solid shellac melted and run in. This insulation, however, is not sufficiently good for an electroscope intended for the detection of radio-activity; for this purpose it must be such that the leaves will remain for hours or days in a state of steady divergence when an electrical charge has been given to them.

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[1] See the English translation by the Gilbert Club of Gilbert's *De magnete*, p. 49 (London, 1900).

In their researches on radio-activity M. and Mme P. Curie employed an electroscope made as follows:—A metal case (fig. 5), having two holes in its sides, has a vertical brass strip B attached to the inside of the lid by a block of sulphur SS or any other good insulator. Joined to the strip is a transverse wire terminating at one end in a knob C, and at the other end in a condenser plate P′. The strip B carries also a strip of gold-leaf L, and the metal case is connected to earth. If a charge is given to the electroscope, and if any radio-active material is placed on a condenser plate P attached to the outer case, then this substance bestows conductivity on the air between the plates P and P′, and the charge of the electroscope begins to leak away. The collapse of the gold-leaf is observed through an aperture in the case by a miscroscope, and the time taken by the gold-leaf to fall over a certain distance is proportional to the ionizing current, that is, to the intensity of the radio-activity of the substance.

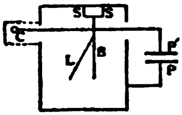

FIG. 5.—Curie's Electroscope.

A very similar form of electroscope was employed by J. P. L. J. Elster and H. F. K. Geitel (fig. 6), and also by C. T. R. Wilson (see *Proc. Roy. Soc.*, 1901, 68, p. 152). A metal box has a metal strip B suspended from a block or insulator by means of a bit of sulphur or amber S, and to it is fastened a strip of gold-leaf L. The electroscope is provided with a charging rod C. In a dry atmosphere sulphur or amber is an early perfect insulator, and hence if the air in the interior of the box is kept dry by calcium chloride, the electroscope will hold its charge for a long time. Any divergence or collapse of the gold-leaf can be viewed by a microscope through an aperture in the side of the case.

Another type of sensitive electroscope is one devised by C. T. R. Wilson (*Proc. Cam. Phil. Soc.*, 1903, 12, part 2). It consists of a metal box placed on a tilting stand (fig. 7). At one end is an insulated plate P kept at a potential of 200 volts or so above the earth by a battery. At the other end is an insulated metal wire having attached to it a thin strip of gold-leaf L. If the plate P is electrified it attracts the strip which stretches out towards it. Before use the strip is for one moment connected to the case, and the arrangement is then tilted until the strip extends at a certain angle. If then the strip of gold-leaf is raised or lowered in potential it moves to or from the plate P, and its movement can be observed by a microscope through a hole in the side of the box. There is a particular angle of tilt of the case which gives a maximum sensitiveness. Wilson found that with the plate electrified to 207 volts and with a tilt of the case of 30°, if the gold-leaf was raised one volt in potential above the case, it moved over 200 divisions of the micrometer scale in the eye-piece of the microscope, 54 divisions being equal to one millimetre. In using the instrument the insulated rod to which the gold-leaf is attached is connected to the conductor, the potential of which is being examined. In the use of all these electroscopic instruments it is essential to bear in mind (as first pointed out by Lord Kelvin) that what a gold-leaf electroscope really indicates is the difference of potential between the gold-leaf and the solid walls enclosing the air space in which they move.[1] If these enclosing walls are made of anything else than perfectly conducting material, then the indications of the instrument may be uncertain and meaningless. As already mentioned, Faraday remedied this defect by coating the inside of the glass vessel in which the gold-leaves were suspended to form an electroscope with tinfoil (see fig. 4). In spite of these admonitions all but a few instrument makers have continued to make the vicious type of instrument consisting of a pair of gold-leaves suspended within a glass shade or bottle, no means being provided for keeping the walls of the vessel continually at zero potential.

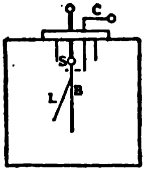

FIG. 6.—Elster and Geitel Electroscope.

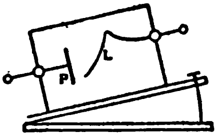

FIG. 7.—Wilson's Electroscope.

See J. Clerk Maxwell, *Treatise on Electricity and Magnetism*, vol. i. p. 300 (2nd ed., Oxford, 1881); H. M. Noad, *A Manual of Electricity*, vol. i. p. 25 (London, 1855); E. Rutherford, *Radio-activity*.

(J. A. F.)

ELECTROSTATICS, the name given to that department of electrical science in which the phenomena of electricity at rest are considered. Besides their ordinary condition all bodies are capable of being thrown into a physical state in which they are said to be electrified or charged with electricity. When in this condition they become sources of electric force, and the space round them in which this force is manifested is called an "electric field" (see ELECTRICITY). Electrified bodies exert mechanical forces on each other, creating or tending to create motion, and also induce electric charges on neighbouring surfaces.

The reader possessed of no previous knowledge of electrical phenomena will best appreciate the meaning of the terms employed by the aid of a few simple experiments. For this purpose the following apparatus should be provided:—(1) two small metal tea-trays and some clean dry tumblers, the latter preferably varnished with shellac varnish made with alcohol free from water; (2) two sheets of ebonite rather larger than the tea-trays; (3) a rod of sealing-wax or ebonite and a glass tube, also some pieces of silk and flannel; (4) a few small gilt pith balls suspended by dry silk threads; (5) a gold-leaf electroscope, and, if possible, a simple form of quadrant electrometer (see ELECTROSCOPE and ELECTROMETER); (6) some brass balls mounted on the ends of ebonite penholders, and a few tin canisters. With the aid of this apparatus, the principal facts of electrostatics can be experimentally verified, as follows:—

Experiment I.—Place one tea-tray bottom side uppermost upon three warm tumblers as legs. Rub the sheet of ebonite vigorously with warm flannel and lay it rubbed side downwards on the top of the tray. Touch the tray with the finger for an instant, and lift up the ebonite without letting the hand touch the tray a second time. The tray is then found to be electrified. If a suspended gilt pith ball is held near it, the ball will first be attracted and then repelled. If small fragments of paper are scattered on the tray and then the other tray held in the hand over them, they will fly up and down rapidly. If the knuckle is approached to the electrified tray, a small spark will be seen, and afterwards the tray will be found to be discharged or unelectrified. If the electrified tray is touched with the sealing-wax or ebonite rod, it will not be discharged, but if touched with a metal wire, the hand, or a damp thread, it is discharged at once. This shows that some bodies are *conductors* and others *non-conductors* or *insulators* of electricity, and that bodies can be electrified by friction and impart their electric charge to other bodies. A charged conductor supported on a non-conductor retains its charge. It is then said to be insulated.

Experiment II.—Arrange two tea-trays, each on dry tumblers as before. Rub the sheet of ebonite with flannel, lay it face downwards on one tray, touch that tray with the finger for a moment and lift up the ebonite sheet, rub it again, and lay it face downwards on the second tray and leave it there. Then take two suspended gilt pith balls and touch them (*a*) both against one tray; they will be found to repel each other; (*b*) touch one against one tray and the other against the other tray, and they will be found to attract each other. This proves the existence of two kinds of electricity, called *positive* and *negative*.

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[1] See Lord Kelvin, "Report on Electrometers and Electrostatic Measurements," *Brit. Assoc. Report* for 1867, or Lord Kelvin's *Reprint of Papers on Electrostatics and Magnetism*, p. 260.

The first tea-tray is positively electrified, and the second negatively. If an insulated brass ball is touched against the first tray and then against the knob or plate of the electroscope, the gold leaves will diverge. If the ball is discharged and touched against the other tray, and then afterwards against the previously charged electroscope, the leaves will collapse. This shows that the two electricities neutralize each other's effect when imparted equally to the same conductor.

Experiment III.—Let one tray be insulated as before, and the electrified sheet of ebonite held over it, but not allowed to touch the tray. If the ebonite is withdrawn without touching the tray, the latter will be found to be unelectrified. If whilst holding the ebonite sheet over the tray the latter is also touched with an insulated brass ball, then this ball when removed and tested with the electroscope will be found to be negatively electrified. The sign of the electrification imparted to the electroscope when so charged—that is, whether positive or negative—can be determined by rubbing the sealing-wax rod with flannel and the glass rod with silk, and approaching them gently to the electroscope one at a time. The sealing-wax so treated is electrified negatively or *resinously*, and the glass with positive or *vitreous* electricity. Hence if the electrified sealing-wax rod makes the leaves collapse, the electroscopic charge is positive, but if the glass rod does the same, the electroscopic charge is negative. Again, if, whilst holding the electrified ebonite over the tray, we touch the latter for a moment and then withdraw the ebonite sheet, the tray will be found to be positively electrified. The electrified ebonite is said to act by "electrostatic induction" on the tray, and creates on it two induced charges, one of positive and the other of negative electricity. The last goes to earth when the tray is touched, and the first remains when the tray is insulated and the ebonite withdrawn.

Experiment IV.—Place a tin canister on a warm tumbler and connect it by a wire with the gold-leaf electroscope. Charge positively a brass ball held on an ebonite stem, and introduce it, without touching, into the canister. The leaves of the electroscope will diverge with positive electricity. Withdraw the ball and the leaves will collapse. Replace the ball again and touch the outside of the canister; the leaves will collapse. If then the ball be withdrawn, the leaves will diverge a second time with negative electrification. If, before withdrawing the ball, after touching the outside of the canister for a moment the ball is touched against the inside of the canister, then on withdrawing it the ball and canister are found to be discharged. This experiment proves that when a charged body acts by induction on an insulated conductor it causes an electrical separation to take place; electricity of opposite sign is drawn to the side nearest the inducing body, and that of like sign is repelled to the remote side, and these quantities are equal in amount.

Seat of the Electric Charge.—So far we have spoken of electric charge as if it resided on the conductors which are electrified. The work of Benjamin Franklin, Henry Cavendish, Michael Faraday and J. Clerk Maxwell demonstrated, however, that all electric charge or electrification of conductors consists simply in the establishment of a physical state in the surrounding insulator or dielectric, which state is variously called *electric strain*, *electric displacement* or *electric polarisation*. Under the action of the same or identical electric forces the intensity of this state in various insulators is determined by a quality of them called their *dielectric constant*, *specific inductive capacity* or *inductivity*. In the next place we must notice that electrification is a measurable magnitude and in electrostatics is estimated in terms of a unit called the *electrostatic unit* of electric quantity. In the absolute C.G.S. system this unit quantity is defined as follows:—If we consider a very small electrified spherical conductor, experiment shows that it exerts a repulsive force upon another similar and similarly electrified body. Cavendish and C. A. Coulomb proved that this mechanical force varies inversely as the square of the distance between the centres of the spheres. The unit of mechanical force in the "centimetre, gramme, second" (C.G.S.) system of units is the *dyne*, which is approximately equal to 1/981 part of the weight of one gramme. A very small sphere is said then to possess a charge of one electrostatic unit of quantity, when it repels another similar and similarly electrified body with a force of one dyne, the centres being at a distance of one centimetre, provided that the spheres are *in vacuo* or immersed in some insulator, the dielectric constant of which is taken as unity. If the two small conducting spheres are placed with centres at a distance d centimetres, and immersed in an insulator of dielectric constant K, and carry charges of Q and Q′ electrostatic units respectively, measured as above described, then the mechanical force between them is equal to QQ'/Kd^2 dynes. For constant charges and distances the mechanical force is inversely as the dielectric constant.

Electric Force.—If a small conducting body is charged with Q electrostatic units of electricity, and placed in any electric field at a point where the electric force has a value E, it will be subject to a mechanical force equal to QE dynes, tending to move it in the direction of the resultant electric force. This provides us with a definition of a unit of electric force, for it is the strength of an electric field at that point where a small conductor carrying a unit charge is acted upon by unit mechanical force, assuming the dielectric constant of the surrounding medium to be unity. To avoid unnecessary complications we shall assume this latter condition in all the following discussion, which is equivalent simply to assuming that all our electrical measurements are made in air or *in vacuo*.

Owing to the confusion introduced by the employment of the term force, Maxwell and other writers sometimes use the words *electromotive intensity* instead of electric force. The reader should, however, notice that what is generally called electric force is the analogue in electricity of the so-called acceleration of gravity in mechanics, whilst electrification or quantity of electricity is analogous to mass. If a mass of M grammes be placed in the earth's field at a place where the acceleration of gravity has a value g centimetres per second, then the mechanical force acting on it and pulling it downwards is Mg dynes. In the same manner, if an electrified body carries a positive charge Q electrostatic units and is placed in an electric field at a place where the electric force or electromotive intensity has a value E units, it is urged in the direction of the electric force with a mechanical force equal to QE dynes. We must, however, assume that the charge Q is so small that it does not sensibly disturb the original electric field, and that the dielectric constant of the insulator is unity.

Faraday introduced the important and useful conception of *lines* and *tubes* of electric force. If we consider a very small conductor charged with a unit of positive electricity to be placed in an electric field, it will move or tend to move under the action of the electric force in a certain direction. The path described by it when removed from the action of gravity and all other physical forces is called a line of electric force. We may otherwise define it by saying that a line of electric force is a line so drawn in a field of electric force that its direction coincides at every point with the resultant electric force at that point. Let any line drawn in an electric field be divided up into small elements of length. We can take the sum of all the products of the length of each element by the resolved part of the electric force in its direction. This sum, or integral, is called the "line integral of electric force" or the *electromotive force* (E.M.F.) along this line. In some cases the value of this electromotive force between two points or conductors is independent of the precise path selected, and it is then called the *potential difference* (P.D.) of the two points or conductors. We may define the term potential difference otherwise by saying that it is the work done in carrying a small conductor charged with one unit of electricity from one point to the other in a direction opposite to that in which it would move under the electric forces if left to itself.

Electric Potential.—Suppose then that we have a conductor charged with electricity, we may imagine its surface to be divided up into small unequal areas, each of which carries a unit charge of electricity. If we consider lines of electric force to be drawn from the boundaries of these areas, they will cut up the space round the conductor into tubular surfaces called tubes of electric force, and each tube will spring from an area of the conductor carrying a unit electric charge. Hence the charge on the conductor can be measured by the number of unit electric tubes springing from it. In the next place we may consider the charged body to be surrounded by a number of closed surfaces, such that the potential difference between any point on one surface and the earth is the same. These surfaces are called "equipotential" or "level surfaces," and we may so locate them that the potential difference between two adjacent surfaces is one unit of potential; that is, it requires one absolute unit of work (1 erg) to move a small body charged with one unit of electricity from one surface to the next. These enclosing surfaces, therefore, cut up the space into shells of potential, and divide up the tubes of force into electric cells. The surface of a charged conductor is an equipotential surface, because when the electric charge is in equilibrium there is no tendency for electricity to move from one part to the other.

We arbitrarily call the potential of the earth zero, since all potential difference is relative and there is no absolute potential any more than absolute level. We call the difference of potential between a charged conductor and the earth the potential of the conductor. Hence when a body is charged positively its potential is raised above that of the earth, and when negatively it is lowered beneath that of the earth. Potential in a certain sense is to electricity as difference of level is to liquids or difference of temperature to heat. It must be noted, however, that potential is a mere mathematical concept, and has no objective existence like difference of level, nor is it capable *per se* of producing physical changes in bodies, such as those which are brought about by rise of temperature, apart from any question of difference of temperature. There is, however, this similarity between them. Electricity tends to flow from places of high to places of low potential, water to flow down hill, and heat to move from places of high to places of low temperature. Returning to the case of the charged body with the space around it cut up into electric cells by the tubes of force and shells of potential, it is obvious that the number of these cells is represented by the product QV, where Q is the charge and V the potential of the body in electrostatic units. An electrified conductor is a store of energy, and from the definition of potential it is clear that the work done in increasing the charge q of a conductor whose potential is v by a small amount dq, is vdq, and since this added charge increases in turn the potential, it is easy to prove that the work done in charging a conductor with Q units to a potential V units is $\frac{1}{2}$QV units of work. Accordingly the number of electric cells into which the space round is cut up is equal to twice the energy stored up, or each cell contains half a unit of energy. This harmonizes with the fact that the real seat of the energy of electrification is the dielectric or insulator surrounding the charged conductor.[1]

We have next to notice three important facts in electrostatics and some consequences flowing therefrom.

(i) *Electrical Equilibrium and Potential.*—If there be any number of charged conductors in a field, the electrification on them being in equilibrium or at rest, the surface of each conductor is an equipotential surface. For since electricity tends to move between points or conductors at different potentials, if the electricity is at rest on them the potential must be everywhere the same. It follows from this that the electric force at the surface of the conductor has no component along the surface, in other words, the electric force at the bounding surface of the conductor and insulator is everywhere at right angles to it.

By the *surface density* of electrification on a conductor is meant the charge per unit of area, or the number of tubes of electric force which spring from unit area of its surface. Coulomb proved experimentally that the electric force just outside a conductor at any point is proportional to the electric density at that point. It can be shown that the resultant electric force normal to the surface at a point just outside a conductor is equal to $4\pi\sigma$, where σ is the surface density at that point. This is usually called Coulomb's Law.[2]

(ii) *Seat of Charge.*—The charge on an electrified conductor is wholly on the surface, and there is no electric force in the interior of a closed electrified conducting surface which does not contain any other electrified bodies. Faraday proved this experimentally (see *Experimental Researches*, series xi. § 1173) by constructing a large chamber or box of paper covered with tinfoil or thin metal. This was insulated and highly electrified. In the interior no trace of electric charge could be found when tested by electroscopes or other means. Cavendish proved it by enclosing a metal sphere in two hemispheres of thin metal held on insulating supports. If the sphere is charged and then the jacketing hemispheres fitted on it and removed, the sphere is found to be perfectly discharged.[3] Numerous other demonstrations of this fact were given by Faraday. The thinnest possible spherical shell of metal, such as a sphere of insulator coated with gold-leaf, behaves as a conductor for static charge just as if it were a sphere of solid metal. The fact that there is no electric force in the interior of such a closed electrified shell is one of the most certainly ascertained facts in the science of electrostatics, and it enables us to demonstrate at once that particles of electricity attract and repel each other with a force which is inversely as the square of their distance.

We may give in the first place an elementary proof of the converse proposition by the aid of a simple lemma:—

Lemma.—If particles of matter attract one another according to the law of the inverse square the attraction of all sections of a cone for a particle at the vertex is the same. *Definition.*—The solid angle subtended by any surface at a point is measured by the quotient of its apparent surface by the square of its distance from that point. Hence the total solid angle round any point is 4π. The solid angles subtended by all normal sections of a cone at the vertex are therefore equal, and since the attractions of these sections on a particle at the vertex are proportional to their distances from the vertex, they are numerically equal to one another and to the solid angle of the cone.

Let us then suppose a spherical shell O to be electrified. Select any point P in the interior and let a line drawn through it sweep out a small double cone (see fig. 1). Each cone cuts out an area on the surface equally inclined to the cone axis. The electric density on the sphere being uniform, the quantities of electricity on these areas are proportional to the areas, and if the electric force varies inversely as the square of the distance, the forces exerted by these two surface charges at the point in question are proportional to the solid angle of the little cone. Hence the forces due to the two areas at opposite ends of the chord are equal and opposed.

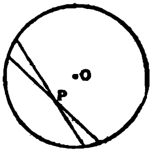

FIG. 1.

Hence we see that if the whole surface of the sphere is divided into pairs of elements by cones described through any interior point, the resultant force at that point must consist of the sum of pairs of equal and opposite forces, and is therefore zero. For the proof of the converse proposition we must refer the reader to the *Electrical Researches of the Hon. Henry Cavendish*, p. 419, or to Maxwell's *Treatise on Electricity and Magnetism*, 2nd ed., vol. i. p. 76, where Maxwell gives an elegant proof that if the force in the interior of a closed conductor is zero, the law of the force must be that of the inverse square of the distance.[4] From this fact it follows that we can shield any conductor entirely from external influence by other charged conductors by enclosing it in a metal case. It is not even necessary that this envelope should be of solid metal; a cage made of fine metal wire gauze which permits objects in its interior to be seen will yet be a perfect electrical screen for them. Electroscopes and electrometers, therefore, standing in proximity to electrified bodies can be perfectly shielded from influence by enclosing them in cylinders of metal gauze.

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[1] See Maxwell, *Elementary Treatise on Electricity* (Oxford, 1881), p. 47.

[2] See Maxwell, *Treatise on Electricity and Magnetism* (3rd ed., Oxford, 1892), vol. i. p. 80.

[3] Maxwell, *Ibid.* vol. i. § 74a; also *Electrical Researches of the Hon. Henry Cavendish*, edited by J. Clerk Maxwell (Cambridge, 1879), p. 104.

[4] Laplace (*Mec. Cel.* vol. i. ch. ii.) gave the first direct demonstration that no function of the distance except the inverse square can satisfy the condition that a uniform spherical shell exerts no force on a particle within it.

Even if a charged and insulated conductor, such as an open canister or deep cup, is not perfectly closed, it will be found that a proof-plane consisting of a small disk of gilt paper carried at the end of a rod of gum-lac will not bring away any charge if applied to the deep inside portions. In fact it is curious to note how large an opening may be made in a vessel which yet remains for all electrical purposes "a closed conductor." Maxwell (*Elementary Treatise*, &c., p. 15) ingeniously applied this fact to the insulation of conductors. If we desire to insulate a metal ball to make it hold a charge of electricity, it is usual to do so by attaching it to a handle or stem of glass or ebonite. In this case the electric charge exists at the point where the stem is attached, and there leakage by creeping takes place. If, however, we employ a hollow sphere and let the stem pass through a hole in the side larger than itself, and attach the end to the interior of the sphere, then leakage cannot take place.

Another corollary of the fact that there is no electric force in the interior of a charged conductor is that the potential in the interior is constant and equal to that at the surface. For by the definition of potential it follows that the electric force in any direction at any point is measured by the space rate of change of potential in that direction or $E = \pm dV/dx$. Hence if the force is zero the potential V must be constant.

(iii.) *Association of Positive and Negative Electricities.*—The third leading fact in electrostatics is that positive and negative electricity are always created in equal quantities, and that for every charge, say, of positive electricity on one conductor there must exist on some other bodies an equal total charge of negative electricity. Faraday expressed this fact by saying that no absolute electric charge could be given to matter. If we consider the charge of a conductor to be measured by the number of tubes of electric force which proceed from it, then, since each tube must end on some other conductor, the above statement is equivalent to saying that the charges at each end of a tube of electric force are equal.

The facts may, however, best be understood and demonstrated by considering an experiment due to Faraday, commonly called the ice pail experiment, because he employed for it a pewter ice pail (*Exp. Res.* vol. ii. p. 279, or *Phil. Mag.* 1843, 22). On the plate of a gold-leaf electroscope place a metal canister having a loose lid. Let a metal ball be suspended by a silk thread, and the canister lid so fixed to the thread that when the lid is in place the ball hangs in the centre of the canister. Let the ball and lid be removed by the silk, and let a charge, say, of positive electricity (+ Q) be given to the ball. Let the canister be touched with the finger to discharge it perfectly. Then let the ball be lowered into the canister. It will be found that as it does so the gold-leaves of the electroscope diverge, but collapse again if the ball is withdrawn. If the ball is lowered until the lid is in place, the leaves take a steady deflection. Next let the canister be touched with the finger, the leaves collapse, but diverge again when the ball is withdrawn. A test will show that in this last case the canister is left negatively electrified. If before the ball is withdrawn, after touching the outside of the canister with the finger, the ball is tilted over to make it touch the inside of the canister, then on withdrawing it the canister and ball are found to be perfectly discharged. The explanation is as follows: the charge (+ Q) of positive electricity on the ball creates by induction an equal charge (−Q) on the inside of the canister when placed in it, and repels to the exterior surface of the canister an equal charge (+ Q). On touching the canister this last charge goes to earth. Hence when the ball is touched against the inside of the canister before withdrawing it a second time, the fact that the system is found subsequently to be completely discharged proves that the charge −Q induced on the inside of the canister must be exactly equal to the charge +Q on the ball, and also that the inducing action of the charge +Q on the ball created equal quantities of electricity of opposite sign, one drawn to the inside and the other repelled to the outside of the canister.

Electrical Capacity.—We must next consider the quality of a conductor called its electrical capacity. The potential of a conductor has already been defined as the mechanical work which must be done to bring up a very small body charged with a unit of positive electricity from the earth's surface or other boundary taken as the place of zero potential to the surface of this conductor in question. The mathematical expression for this potential can in some cases be calculated or predetermined.

Potential of a sphere.

Thus, consider a sphere uniformly charged with Q units of positive electricity. It is a fundamental theorem in attractions that a thin spherical shell of matter which attracts according to the law of the inverse square acts on all external points as if it were concentrated at its centre. Hence a sphere having a charge Q repels a unit charge placed at a distance x from its centre with a force Q/x^2 dynes, and therefore the work W in ergs expended in bringing the unit up to that point from an infinite distance is given by the integral

$$W=\int_{\infty}^{x} Qx^{-2}dx=Q/x \qquad (1)$$

Capacity of a sphere.

Hence the potential at the surface of the sphere, and therefore the potential of the sphere, is Q/R, where R is the radius of the sphere in centimetres. The quantity of electricity which must be given to the sphere to raise it to unit potential is therefore R electrostatic units. The capacity of a conductor is defined to be the charge required to raise its potential to unity, all other charged conductors being at an infinite distance. This capacity is then a function of the geometrical dimensions of the conductor, and can be mathematically determined in certain cases. Since the potential of a small charge of electricity dQ at a distance r is equal to dQ/r, and since the potential of all parts of a conductor is the same in those cases in which the distribution of surface density of electrification is uniform or symmetrical with respect to some point or axis in the conductor, we can calculate the potential by simply summing up terms like $\sigma dS/r$, where dS is an element of surface, σ the surface density of electricity on it, and r the distance from the symmetrical centre. The capacity is then obtained as the quotient of the whole charge by this potential. Thus the distribution of electricity on a sphere in free space must be uniform, and all parts of the charge are at an equal distance R from the centre. Accordingly the potential at the centre is Q/R. But this must be the potential of the sphere, since all parts are at the same potential V. Since the capacity C is the ratio of charge to potential, the capacity of the sphere in free space is $Q/V=R$, or is numerically the same as its radius reckoned in centimetres.

Capacity of a thin rod.

We can thus easily calculate the capacity of a long thin wire like a telegraph wire far removed from the earth, as follows: Let $2r$ be the diameter of the wire, l its length, and σ the uniform surface electric density. Then consider a thin annulus of the wire of width dx; the charge on it is equal to $2\pi r\sigma/dx$ units, and the potential V at a point on the axis at a distance x from the annulus due to this elementary charge is

$$V=2\int_{0}^{l/2}\frac{2\pi r\sigma}{\sqrt{(r^2+x^2)}}dx=4\pi r\sigma\left\{\log_e(\tfrac{1}{2}l+\sqrt{r^2+\tfrac{1}{4}l^2})-\log_e r\right\}.$$

If, then, r is small compared with l, we have $V=4\pi r\sigma \log_e l/r$. But the charge is $Q=2\pi r\sigma$, and therefore the capacity of the thin wire is given by

$$C=1/2\log_e l/r \qquad (2).$$

Potential of an ellipsoid.

A more difficult case is presented by the ellipsoid.[1] We have first to determine the mode in which electricity distributes itself on a conducting ellipsoid in free space. It must be such a distribution that the potential in the interior will be constant, since the electric force must be zero. It is a well-known theorem in attractions that if a shell is made of gravitative matter whose inner and outer surfaces are similar ellipsoids, it exercises no attraction on a particle of matter in its interior.[2] Consider then an ellipsoidal shell the axes of whose bounding surfaces are (a, b, c) and $(a+da)$, $(b+db)$, $(c+dc)$, where $da/a=db\ b=dc/c=\mu$. The potential of such a shell at any internal point is constant, and the equi-potential surfaces for external space are ellipsoids confocal with the ellipsoidal shell. Hence if we distribute electricity over an ellipsoid, so that its density is everywhere proportional to the thickness of a shell formed by describing round the ellipsoid a similar and slightly larger one, that distribution will be in equilibrium and will produce a constant potential throughout the interior. Thus if σ is the surface density, δ the thickness of the shell at any point, and ρ the assumed volume density of the matter of the shell, we have $\sigma = A\delta\rho$. Then the quantity of electricity on any element of surface dS is A times the mass of the corresponding element of the shell; and if Q is the whole quantity of electricity on the ellipsoid, Q = A times the whole mass of the shell. This mass is equal to $4\pi abc\rho\mu$; therefore $Q = A4\pi abc\rho\mu$ and $\delta = \mu p$, where p is the length of the perpendicular let fall from the centre of the ellipsoid on the tangent plane. Hence

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[1] The solution of the problem of determining the distribution on an ellipsoid of a fluid the particles of which repel each other with a force inversely as the nth power of the distance was first given by George Green (see Ferrer's edition of Green's *Collected Papers*, p. 119, 1871).

[2] See Thomson and Tait, *Treatise on Natural Philosophy*, § 519.

$$\sigma = Qp/4\pi abc \qquad (3).$$

Capacity of an ellipsoid.

Accordingly for a given ellipsoid the surface density of free distribution of electricity on it is everywhere proportional to the length of the perpendicular let fall from the centre on the tangent plane at that point. From this we can determine the capacity of the ellipsoid as follows: Let p be the length of the perpendicular from the centre of the ellipsoid, whose equation is $x^2/a^2+y^2/b^2+z^2/c^2=1$ to the tangent plane at x, y, z. Then it can be shown that $1/p^2 = x^2/a^4+y^2/b^4+z^2/c^4$ (see Frost's *Solid Geometry*, p. 172). Hence the density σ is given by

$$\sigma = \frac{Q}{4\pi abc}\,\frac{1}{\sqrt{(x^2/a^4+y^2/b^4+z^2/c^4)}},$$

and the potential at the centre of the ellipsoid, and therefore its potential as a whole is given by the expression,

$$V = \int\frac{\sigma dS}{r} = \frac{Q}{4\pi abc}\int\frac{dS}{r\sqrt{(x^2/a^4+y^2/b^4+z^2/c^4)}} \qquad (4).$$

Accordingly the capacity C of the ellipsoid is given by the equation

$$\frac{1}{C} = \frac{1}{4\pi abc}\int\frac{dS}{\sqrt{(x^2+y^2+z^2)}\sqrt{(x^2/a^4+y^2/b^4+z^2/c^4)}} \qquad (5).$$

It has been shown by Professor Chrystal that the above integral may also be presented in the form,[1]

$$\frac{1}{C} = \tfrac{1}{2}\int_0^\infty\frac{d\lambda}{\sqrt{\{(a^2+\lambda)(b^2+\lambda)(c^2+\lambda)\}}} \qquad (6).$$

The above expressions for the capacity of an ellipsoid of three unequal axes are in general elliptic integrals, but they can be evaluated for the reduced cases when the ellipsoid is one of revolution, and hence in the limit either takes the form of a long rod or of a circular disk.

Thus if the ellipsoid is one of revolution, and ds is an element of arc which sweeps out the element of surface dS, we have

$$dS = 2\pi y ds = 2\pi y dx\Big/\left(\frac{dx}{ds}\right) = 2\pi y dx\Big/\left(\frac{py}{b}\right) = \frac{2\pi b^2}{p}dx.$$

Hence, since $\sigma = Qp/4\pi ab^2$, $\sigma dS = Qdx/2a$.

Accordingly the distribution of electricity is such that equal parallel slices of the ellipsoid of revolution taken normal to the axis of revolution carry equal charges on their curved surface.

The capacity C of the ellipsoid of revolution is therefore given by the expression

$$\frac{1}{C} = \frac{1}{2a}\int\frac{dx}{\sqrt{(x^2+y^2)}} \qquad (7).$$

If the ellipsoid is one of revolution round the major axis a (prolate) and of eccentricity e, then the above formula reduces to

$$\frac{1}{C_1} = \frac{1}{2ae}\log_\epsilon\left(\frac{1+e}{1-e}\right) \qquad (8).$$

Whereas if it is an ellipsoid of revolution round the minor axis b (oblate), we have

$$\frac{1}{C^2} = \frac{\sin^{-1}ae}{ae} \qquad (9).$$

In each case we have $C = a$ when $e = 0$, and the ellipsoid thus becomes a sphere.

In the extreme case when $e = 1$, the prolate ellipsoid becomes a long thin rod, and then the capacity is given by

$$C_1 = a/\log_\epsilon 2a/b \qquad (10),$$

which is identical with the formula (2) already obtained. In the other extreme case the oblate spheroid becomes a circular disk when $e = 1$, and then the capacity $C_2 = 2a/\pi$. This last result shows that the capacity of a thin disk is $2/\pi = 1/1{\cdot}571$ of that of a sphere of the same radius. Cavendish (*Elec. Res.* pp. 137 and 347) determined in 1773 experimentally that the capacity of a sphere was 1·541 times that of a disk of the same radius, a truly remarkable result for that date.

Three other cases of practical interest present themselves, viz. the capacity of two concentric spheres, of two coaxial cylinders and of two parallel planes.

Capacity of two concentric spheres.

Consider the case of two concentric spheres, a solid one enclosed in a hollow one. Let R_1 be the radius of the inner sphere, R_2 the inside radius of the outer sphere, and R_3 the outside radius of the outer spherical shell. Let a charge +Q be given to the inner sphere. Then this produces a charge −Q on the inside of the enclosing spherical shell, and a charge +Q on the outside of the shell. Hence the potential V at the centre of the inner sphere is given by $V = Q/R_1 - Q/R_2 + Q/R_3$. If the outer shell is connected to the earth, the charge +Q on it disappears, and we have the capacity C of the inner sphere given by

$$C = 1/R_1 - 1/R_2 = (R_2 - R_1)\ R_1R_2 \qquad (11).$$

Such a pair of concentric spheres constitute a condenser (see LEYDEN JAR), and it is obvious that by making R_2 nearly equal to R_1, we may enormously increase the capacity of the inner sphere. Hence the name *condenser*.

Capacity of two coaxial cylinders.

The other case of importance is that of two coaxial cylinders. Let a solid circular sectioned cylinder of radius R_1 be enclosed in a coaxial tube of inner radius R_2. Then when the inner cylinder is at potential V_1 and the outer one kept at potential V_2 the lines of electric force between the cylinders are radial. Hence the electric force E in the interspace varies inversely as the distance from the axis. Accordingly the potential V at any point in the interspace is given by

$$E = -dV/dR = A/R \text{ or } V = -A\int R^{-1}dR, \qquad (12),$$

where R is the distance of the point in the interspace from the axis, and A is a constant. Hence $V_2 - V_1 = -A\log R_2/R_1$. If we consider a length l of the cylinder, the charge Q on the inner cylinder is $Q = 2\pi R_1 l\sigma$, where σ is the surface density, and by Coulomb's law $\sigma = E_1/4\pi$, where $E_1 = A/R_1$ is the force at the surface of the inner cylinder.

Accordingly $Q = 2\pi R_1 lA/4\pi R_1 = Al/2$. If then the outer cylinder be at zero potential the potential V of the inner one is

$$V = A\log(R_2/R_1), \text{ and its capacity } C = l/2\log R_2/R_1.$$

This formula is important in connexion with the capacity of electric cables, which consist of a cylindrical conductor (a wire) enclosed in a conducting sheath. If the dielectric or separating insulator has a constant K, then the capacity becomes K times as great.

Capacity of two parallel planes.

The capacity of two parallel planes can be calculated at once if we neglect the distribution of the lines of force near the edges of the plates, and assume that the only field is the uniform field between the plates. Let V_1 and V_2 be the potentials of the plates, and let a charge Q be given to one of them. If S is the surface of each plate, and d their distance, then the electric force E in the space between them is $E = (V_1 - V_2)/d$. But if σ is the surface density, $E = 4\pi\sigma$, and $\sigma = Q/S$. Hence we have

$$(V_1 - V_2)\,d = 4\pi Q/S \text{ or } C = Q/(V_1 - V_2) = S/4\pi d \qquad (13).$$

"Edge effect."

In this calculation we neglect altogether the fact that electric force distributed on curved lines exists outside the interspace between the plates, and these lines in fact extend from the back of one plate to that of the other. G. R. Kirchhoff (*Gesammelte Abhandl.* p. 112) has given a full expression for the capacity C of two circular plates of thickness t and radius r placed at any distance d apart in air from which the edge effect can be calculated. Kirchhoff's expression is as follows:—

$$C = \frac{\pi r^2}{4\pi d} + \frac{r}{4\pi d}\left\{d\log_\epsilon\frac{16\pi r(d+t)}{\epsilon d^2} + t\log_\epsilon\frac{d+t}{t}\right\} \qquad (14).$$

In the above formula ϵ is the base of the Napierian logarithms. The first term on the right-hand side of the equation is the expression for the capacity, neglecting the curved edge distribution of electric force, and the other terms take into account, not only the uniform field between the plates, but also the non-uniform field round the edges and beyond the plates.

Guard plates.

In practice we can avoid the difficulty due to irregular distribution of electric force at the edges of the plate by the use of a guard plate as first suggested by Lord Kelvin.[2] If a large plate has a circular hole cut in it, and this is nearly filled up by a circular plate lying in the same plane, and if we place another large plate parallel to the first, then the electric field between this second plate and the small circular plate is nearly uniform; and if S is the area of the small plate and d its distance from the opposed plate, its capacity may be calculated by the simple formula $C = S/4\pi d$. The outer larger plate in which the hole is cut is called the "guard plate," and must be kept at the same potential as the smaller, inner or "trap-door plate." The same arrangement can be supplied to a pair of coaxial cylinders. By placing metal plates on either side of a larger sheet of dielectric or insulator we can construct a condenser of relatively large capacity. The instrument known as a Leyden jar (*q.v.*) consists of a glass bottle coated within and without, for three parts of the way up with tinfoil.

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[1] See article "Electricity," *Encyclopaedia Britannica* (9th edition), vol. viii. p. 30. The reader is also referred to an article by Lord Kelvin (*Reprint of Papers on Electrostatics and Magnetism*, p. 178), entitled "Determination of the Distribution of Electricity on a Circular Segment of a Plane, or Spherical Conducting Surface under any given Influence," where another equivalent expression is given for the capacity of an ellipsoid.

[2] See Maxwell, *Electricity and Magnetism*, vol. i. pp. 284-305 (3rd ed., 1892).

If we have a number of such condensers we can combine them in "parallel" or in "series." If all the plates on one side are connected together and also those on the other, the condensers are joined in parallel. If C_1, C_2, C_3, &c., are the separate capacities, then $\Sigma(C)=C_1+C_2+C_3+$ &c., is the total capacity in parallel. If the condensers are so joined that the inner coating of one is connected to the outer coating of the next, they are said to be in series. Since then they are all charged with the same quantity of electricity, and the total over all potential difference V is the sum of each of the individual potential differences V_1, V_2, V_3, &c., we have

Systems of condensers.

$$Q=C_1V_1=C_2V_2=C_3V_3=\text{\&c., and } V=V_1+V_2+V_3+\text{\&c.}$$

The resultant capacity is $C=Q/V$, and

$$C=1/(1/C_1+1/C_2+1/C_3+\text{\&c})=1/\Sigma(1/C) \qquad (15).$$

These rules provide means for calculating the resultant capacity when any number of condensers are joined up in any way.

If one condenser is charged, and then joined in parallel with another uncharged condenser, the charge is divided between them in the ratio of their capacities. For if C_1 and C_2 are the capacities and Q_1 and Q_2 are the charges after contact, then Q_1/C_1 and Q_2/C_2 are the potential differences of the coatings and must be equal. Hence $Q_1/C_1=Q_2/C_2$ or $Q_1/Q_2=C_1/C_2$. It is worth noting that if we have a charged sphere we can perfectly discharge it by introducing it into the interior of another hollow insulated conductor and making contact. The small sphere then becomes part of the interior of the other and loses all charge.

Measurement of Capacity.—Numerous methods have been devised for the measurement of the electrical capacity of conductors in those cases in which it cannot be determined by calculation. Such a measurement may be an *absolute* determination or a *relative* one. The dimensions of a capacity in electrostatic measure is a length (see UNITS, PHYSICAL). Thus the capacity of a sphere in electrostatic units (E.S.U.) is the same as the number denoting its radius in centimetres. The unit of electrostatic capacity is therefore that of a sphere of 1 cm. radius.[1] This unit is too small for practical purposes, and hence a unit of capacity 900,000 greater, called a microfarad, is generally employed. Thus for instance the capacity in free space of a sphere 2 metres in diameter would be 100/900,000 = 1/9000 of a microfarad. The electrical capacity of the whole earth considered as a sphere is about 800 microfarads. An absolute measurement of capacity means, therefore, a determination in E.S. units made directly without reference to any other condenser. On the other hand there are numerous methods by which the capacities of condensers may be compared and a relative measurement made in terms of some standard.

One well-known comparison method is that of C. V. de Sauty. The two condensers to be compared are connected in the branches of a Wheatstone's Bridge (*q.v.*) and the other two arms completed with variable resistance boxes. These arms are then altered until on raising or depressing the battery key there is no sudden deflection either way of the galvanometer. If R_1 and R_2 are the arms' resistances and C_1 and C_2 the condenser capacities, then when the bridge is balanced we have $R_1:R_2=C_1:C_2$.

Relative determination.

Another comparison method much used in submarine cable work is the method of mixtures, originally due to Lord Kelvin and usually called Thomson and Gott's method. It depends on the principle that if two condensers of capacity C_1 and C_2 are respectively charged to potentials V_1 and V_2, and then joined in parallel with terminals of opposite charge together, the resulting potential difference of the two condensers will be V, such that

$$V=\frac{(C_1V_1-C_2V_2)}{(C_1+C_2)} \qquad (16);$$

and hence if V is zero we have $C_1:C_2=V_2:V_1$.

The method is carried out by charging the two condensers to be compared at the two sections of a high resistance joining the ends of a battery which is divided into two parts by a movable contact.[2] This contact is shifted until such a point is found by trial that the two condensers charged at the different sections and then joined as above described and tested on a galvanometer show no charge. Various special keys have been invented for performing the electrical operations expeditiously.

A simple method for condenser comparison is to charge the two condensers to the same voltage by a battery and then discharge them successively through a ballistic galvanometer (*q.v.*) and observe the respective "throws" or deflections of the coil or needle. These are proportional to the capacities. For the various precautions necessary in conducting the above tests special treatises on electrical testing must be consulted.

In the absolute determination of capacity we have to measure the ratio of the charge of a condenser to its plate potential difference. One of the best methods for doing this is to charge the condenser by the known voltage of a battery, and then discharge it through a galvanometer and repeat this process rapidly and successively. If a condenser of capacity C is charged to potential V, and discharged *n* times per second through a galvanometer, this series of intermittent discharges is equivalent to a current *n*CV. Hence if the galvanometer is calibrated by a potentiometer (*q.v.*) we can determine the value of this current in amperes, and knowing the value of *n* and V thus determine C. Various forms of commutator have been devised for effecting this charge and discharge rapidly by J. J. Thomson, R. T. Glazebrook, J. A. Fleming and W. C. Clinton and others.[3] One form consists of a tuning-fork electrically maintained in vibration of known period, which closes an electric contact at every vibration and sets another electromagnet in operation, which reverses a switch and moves over one terminal of the condenser from a battery to a galvanometer contact. In another form, a revolving contact is used driven by an electric motor, which consists of an insulating disk having on its surface slips of metal and three wire brushes *a*, *b*, *c* (see fig. 2) pressing against them. The metal slips are so placed that, as the disk revolves, the middle brush, connected to one terminal of the condenser C, is alternately put in conductive connexion with first one and then the other outside brush, which are joined respectively to the battery B and galvanometer G terminals. From the speed of this motor the number of commutations per second can be determined. The above method is especially useful for the determinations of very small capacities of the order of 100 electrostatic units or so and upwards.

Absolute determinations.

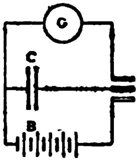

FIG. 2.

Dielectric constant.—Since all electric charge consists in a state of strain or polarization of the dielectric, it is evident that the physical state and chemical composition of the insulator must be of great importance in determining electrical phenomena. Cavendish and subsequently Faraday discovered this fact, and the latter gave the name "specific inductive capacity," or "dielectric constant," to that quality of an insulator which determines the charge taken by a conductor embedded in it when charged to a given potential. The simplest method of determining it numerically is, therefore, that adopted by Faraday.[4]

TABLE I.—*Dielectric Constants* (K) *of Solids* (K *for Air* = 1).

Substance.	K.	Authority.
Glass, double extra dense flint, density 4·5	9·896	J. Hopkinson
Glass, light flint, density 3·2	6·72	„
Glass, hard crown, density 2·485	6·61	„
Sulphur	2·24	M. Faraday
	2·88	Coullner
	3·84	L. Boltzmann
	4·0	P. J. Curie
	2·94	P. R. Blondlot
Ebonite	2·05	Rosetti
	3·15	Boltzmann
	2·21	Schiller
	2·86	Elsas
India-rubber, pure brown	2·12	Schiller
India-rubber, vulcanized, grey	2·69	„
Gutta-percha	2·462	J. E. H. Gordon
Paraffin	1·977	Gibson and Barclay
	2·32	Boltzmann
	2·29	J. Hopkinson
	1·99	Gordon
Shellac	2·95	Wällner
	2·74	Gordon
	3·04	A. A. Winkelmann
Mica	6·64	I. Klemenčič
	8·00	P. J. Curie
	7·98	E. M. L. Bouty
	5·97	Elsas
Quartz—		
along optic axis	4·55	P. J. Curie
perp. to optic axis	4·49	P. J. Curie
Ice at −23°	78·0	Bouty

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[1] It is an interesting fact that Cavendish measured capacity in "globular inches," using as his unit the capacity of a metal ball, 1 in. in diameter. Hence multiplication of his values for capacities by 2·54 reduces them to E.S. units in the C.G.S. system. See *Elec. Res.* p. 347.

[2] For fuller details of these methods of comparison of capacities see J. A. Fleming, *A Handbook for the Electrical Laboratory and Testing Room*, vol. ii. ch. ii. (London, 1903).

[3] See Fleming, *Handbook for the Electrical Laboratory*, vol. ii. p. 130.

[4] Faraday, *Experimental Researches on Electricity*, vol. i. § 1252. For a very complete set of tables of dielectric constants of solids, liquids and gases see A. Winkelmann, *Handbuch der Physik*, vol. iv. pp. 98-148 (Breslau, 1905); also see Landolt and Börnstein's *Tables of Physical Constants* (Berlin, 1894).

He constructed two equal condensers, each consisting of a metal ball enclosed in a hollow metal sphere, and he provided also certain hemispherical shells of shellac, sulphur, glass, resin, &c., which he could so place in one condenser between the ball and enclosing sphere that it formed a condenser with solid dielectric. He then determined the ratio of the capacities of the two condensers, one with air and the other with the solid dielectric. This gave the dielectric constant K of the material. Taking the dielectric constant of air as unity he obtained the following values, for shellac K = 2·0, glass K = 1·76, and sulphur K = 2·24.

Since Faraday's time, by improved methods, but depending essentially upon the same principles, an enormous number of determinations of the dielectric constants of various insulators, solid, liquid and gaseous, have been made (see tables I., II., III. and IV.). There are very considerable differences between the values assigned by different observers, sometimes no doubt due to differences in method, but in most cases unquestionably depending on variations in the quality of the specimens examined. The value of the dielectric constant is greatly affected by the temperature and the frequency of the applied electric force.

TABLE II.—*Dielectric Constant* (K) *of Liquids.*

Liquid.	K.	Authority.
Water at 17° C.	80·88	F. Heerwagen
„ „ 25° C.	75·7	E. B. Rosa
„ „ 25·3° C.	78·87	Franke
Olive oil	3·16	Hopkinson
Castor oil	4·78	„
Turpentine	2·15	P. A. Silow
„	2·23	Hopkinson
Petroleum	2·072	Silow
„	2·07	Hopkinson
Ethyl alcohol at 25° C.	25·7	Rosa
Ethyl ether	4·57	Doule
„ „	4·8	Bouty
Acetic acid	9·7	Franke

TABLE III.—*Dielectric Constant of some Bodies at a very low Temperature* (−185° C.) (*Fleming and Dewar*).

Substance.	K at 15° C.	K at −185° C.
Water	80	2·4 to 2·9
Formic acid	62	2·41
Glycerine	56	3·2
Methyl alcohol	34	3·13
Nitrobenzene	32	2·6
Ethyl alcohol	25	3·1
Acetone	21·85	2·62
Ethyl nitrate	17·7	2·73
Amyl alcohol	16	2·14
Aniline	7·5	2·92
Castor oil	4·76	2·19
Ethyl ether	4·25	2·31

The above determinations at low temperature were made with either a steady or a slowly alternating electric force applied a hundred times a second. They show that the dielectric constant of a liquid generally undergoes great reduction in value when the liquid is frozen and reduced to a low temperature.[1]

The dielectric constants of gases have been determined by L. Boltzmann and I. Klemenčič as follows:—

TABLE IV.—*Dielectric Constants* (K) *of Gases at* 15° *C. and* 760 *mm. Vacuum* = 1

Gas.	Dielectric Constant K.	√K.	Optical Refractive Index. μ.
Air	1·000590	1·000295	1·000293
Hydrogen	1·000264	1·000132	1·000139
Carbon dioxide	1·000946	1·000475	1·000454
Carbon monoxide	1·000690	1·000345	1·000335
Nitrous oxide	1·000994	1·000497	1·000516
Ethylene	1·001312	1·000656	1·000720
Marsh gas (methane)	1·000944	1·000478	1·000442
Carbon bisulphide	1·002900	1·001450	1·001478
Sulphur dioxide	1·00954	1·004770	1·000703
Ether	1·00744	1·003720	1·00154
Ethyl chloride	1·01552	1·007760	1·001174
Ethyl bromide	1·01546	1·007730	1·00122

In general the dielectric constant is reduced with decrease of temperature towards a certain limiting value it would attain at the absolute zero. This variation, however, is not always linear. In some cases there is a very sudden drop at or below a certain temperature to a much lower value, and above and below the point the temperature variation is small. There is also a large difference in most cases between the value for a steadily applied electric force and a rapidly reversed or intermittent force—in the last case a decrease with increase of frequency. Maxwell (*Elec. and Magn.* vol. ii. § 788) showed that the square root of the dielectric constant should be the same number as the refractive index for waves of the same frequency (see ELECTRIC WAVES). There are very few substances, however, for which the optical refractive index has the same value as K for steady or slowly varying electric force, on account of the great variation of the value of K with frequency.

There is a close analogy between the variation of dielectric constant of an insulator with electric force frequency and that of the rigidity or stiffness of an elastic body with the frequency of applied mechanical stress. Thus pitch is a soft and yielding body under steady stress, but a bar of pitch if struck gives a musical note, which shows that it vibrates and is therefore stiff or elastic for high frequency stress.

Residual Charges in Dielectrics.—In close connexion with this lies the phenomenon of residual charge in dielectrics.[2] If a glass Leyden jar is charged and then discharged and allowed to stand awhile, a second discharge can be obtained from it, and in like manner a third, and so on. The reappearance of the residual charge is promoted by tapping the glass. It has been shown that this behaviour of dielectrics can be imitated by a mechanical model consisting of a series of perforated pistons placed in a tube of oil with spiral springs between each piston.[3] If the pistons are depressed and then released, and then the upper piston fixed awhile, a second discharge can be obtained from it, and the mechanical stress-strain diagram of the model is closely similar to the discharge curve of a dielectric. R. H. A. Kohlrausch called attention to the close analogy between residual charge and the elastic recovery of strained bodies such as twisted wire or glass threads. If a charged condenser is suddenly discharged and then insulated, the reappearance of a potential difference between its coatings is analogous to the reappearance of a torque in the case of a glass fibre which has been twisted, released suddenly, and then gripped again at the ends.

For further information on the qualities of dielectrics the reader is referred to the following sources:—J. Hopkinson, "On the Residual Charge of the Leyden Jar," *Phil. Trans.*, 1876, 166 [ii.], p. 489, where it is shown that tapping the glass of a Leyden jar permits the reappearance of the residual charge; "On the Residual Charge of the Leyden Jar," *ib.* 167 [ii.], p. 599, containing many valuable observations on the residual charge of Leyden jars; W. E. Ayrton and J. Perry, "A Preliminary Account of the Reduction of Observations on Strained Material, Leyden Jars and Voltameters," *Proc. Roy. Soc.*, 1880, 30, p. 411, showing experiments on residual charge of condensers and a comparison between the behaviour of dielectrics and glass fibres under torsion. In connexion with this paper the reader may also be referred to one by L. Boltzmann, "Zur Theorie der elastischen Nachwirkung," *Wien. Acad. Sitz.-Ber.*, 1874, 70.

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[1] See the following papers by J. A. Fleming and James Dewar on dielectric constants at low temperatures: "On the Dielectric Constant of Liquid Oxygen and Liquid Air," *Proc. Roy. Soc.*, 1897, 60, p. 360; "Note on the Dielectric Constant of Ice and Alcohol at very low Temperatures," *ib.*, 1897, 61, p. 2; "On the Dielectric Constants of Pure Ice, Glycerine, Nitrobenzol and Ethylene Dibromide at and above the Temperature of Liquid Air," *id. ib.* p. 316; "On the Dielectric Constant of Certain Frozen Electrolytes at and above the Temperature of Liquid Air," *id. ib.* p. 299—this paper describes the cone condenser and methods used; "Further Observations on the Dielectric Constants of Frozen Electrolytes at and above the Temperature of Liquid Air," *id. ib.* p. 381; "The Dielectric Constants of Certain Organic Bodies at and below the Temperature of Liquid Air," *id. ib.* p. 358; "On the Dielectric Constants of Metallic Oxides dissolved or suspended in Ice cooled to the Temperature of Liquid Air," *id. ib.* p. 368.

[2] See Faraday, *Experimental Researches*, vol. i. § 1245; R. H. A. Kohlrausch, *Pogg. Ann.*, 1854, 91; see also Maxwell, *Electricity and Magnetism*, vol. i. § 327, who shows that a composite or stratified dielectric composed of layers of materials of different dielectric constants and resistivities would exhibit the property of residual charge.

[3] Fleming and Ashton, "On a Model which imitates the behaviour of Dielectrics," *Phil. Mag.*, 1901 [6], 2, p. 228.

Distribution of Electricity on Conductors.—We now proceed to consider in more detail the laws which govern the distribution of electricity at rest upon conductors. It has been shown above that the potential due to a charge of q units placed on a very small sphere, commonly called a point-charge, at any distance x is q/x. The mathematical importance of this function called the potential is that it is a scalar quantity, and the potential at any point due to any number of point charges q_1, q_2, q_3, &c., distributed in any manner, is the sum of them separately, or

$$q_1/x_1+q_2/x_2+q_3/x_3+\&c.=\Sigma(q/x)=V \qquad (17),$$

where x_1, x_2, x_3, &c., are the distances of the respective point charges from the point in question at which the total potential is required. The resultant electric force E at that point is then obtained by differentiating V, since $E=-dV/dx$, and E is in the direction in which V diminishes fastest. In any case, therefore, in which we can sum up the elementary potentials at any point we can calculate the resultant electric force at the same point.

We may describe, through all the points in an electric field which have the same potential, surfaces called equipotential surfaces, and these will be everywhere perpendicular or orthogonal to the lines of electric force. Let us assume the field divided up into tubes of electric force as already explained, and these cut normally by equipotential surfaces. We can then establish some important properties of these tubes and surfaces. At each point in the field the electric force can have but one resultant value. Hence the equipotential surfaces cannot cut each other. Let us suppose any other surface described in the electric field so as to cut the closely compacted tubes. At each point on this surface the resultant force has a certain value, and a certain direction inclined at an angle θ to the normal to the selected surface at that point. Let dS be an element of the surface. Then the quantity $E\cos\theta dS$ is the product of the normal component of the force and an element of the surface, and if this is summed up all over the surface we have the total electric flux or induction through the surface, or the surface integral of the normal force mathematically expressed by $\int E\cos\theta dS$, provided that the dielectric constant of the medium is unity.

We have then a very important theorem as follows:—If any closed surface be described in an electric field which wholly encloses or wholly excludes electrified bodies, then the total flux through this surface is equal to 4π- times the total quantity of electricity within it.[1] This is commonly called Stokes's theorem. The proof is as follows:—Consider any point-charge E of electricity included in any surface S, S, S (see fig. 3), and describe through it as centre a cone of small solid angle $d\omega$ cutting out of the enclosing surface in two small areas dS and dS' at distances x and x'. Then the electric force due to the point charge q at distance x is q/x, and the resolved part normal to the element of surface dS is $q\cos\theta/x^2$. The normal section of the cone at that point is equal to $dS\cos\theta$, and the solid angle $d\omega$ is equal to $dS\cos\theta/x^2$. Hence the flux through dS is $qd\omega$. Accordingly, since the total solid angle round a point is 4π, it follows that the total flux through the closed surface due to the single point charge q is $4\pi q$, and what is true for one point charge is true for any collection forming a total charge Q of any form. Hence the total electric flux due to a charge Q through an enclosing surface is $4\pi Q$, and therefore is zero through one enclosing no electricity.

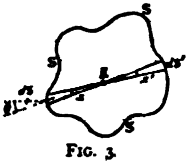

FIG. 3.

Stokes's theorem becomes an obvious truism if applied to an incompressible fluid. Let a *source* of fluid be a point from which an incompressible fluid is emitted in all directions. Close to the source the stream lines will be radial lines. Let a very small sphere be described round the source, and let the strength of the source be defined as the total flow per second through the surface of this small sphere. Then if we have any number of sources enclosed by any surface, the total flow per second through this surface is equal to the total strengths of all the sources. If, however, we defined the strength of the source by the statement that the strength divided by the square of the distance gives the velocity of the liquid at that point, then the total flux through any enclosing surface would be 4π times the strengths of all the sources enclosed. To every proposition in electrostatics there is thus a corresponding one in the hydrokinetic theory of incompressible liquids.

Let us apply the above theorem to the case of a small parallelepipedon or rectangular prism having sides dx, dy, dz respectively, its centre having co-ordinates (x, y, z). Its angular points have then co-ordinates $(x\pm\frac{1}{2}dx, y\pm\frac{1}{2}dy, z\pm\frac{1}{2}dz)$. Let this rectangular prism be supposed to be wholly filled up with electricity of density ρ; then the total quantity in it is $\rho\, dx\, dy\, dz$. Consider the two faces perpendicular to the x-axis. Let V be the potential at the centre of the prism, then the normal forces on the two faces of area $dy.dz$ are respectively

$$-\left(\frac{dV}{dx}+\frac{1}{2}\frac{d^2V}{dx^2}dx\right) \text{ and } \left(\frac{dV}{dx}-\frac{1}{2}\frac{d^2V}{dx^2}dx\right),$$

and similar expressions for the normal forces to the other pairs of faces $dx.dy$, $dz.dx$. Hence, multiplying these normal forces by the areas of the corresponding faces, we have the total flux parallel to the x-axis given by $-(d^2V/dx^2)dx\,dy\,dz$, and similar expressions for the other sides. Hence the total flux is

$$-\left(\frac{d^2V}{dx^2}+\frac{d^2V}{dy^2}+\frac{d^2V}{dz^2}\right)dx\,dy\,dz,$$

and by the previous theorem this must be equal to $4\pi\rho\, dx\, dy\, dz$.

Hence $$\frac{d^2V}{dx^2}+\frac{d^2V}{dy^2}+\frac{d^2V}{dz^2}+4\pi\rho=0 \qquad (18).$$

This celebrated equation was first given by S. D. Poisson, although previously demonstrated by Laplace for the case when $\rho=0$. It defines the condition which must be fulfilled by the potential at any and every point in an electric field, through which ρ is finite and the electric force continuous. It may be looked upon as an equation to determine ρ when V is given or vice versa. An exactly similar expression holds good in hydrokinetics, provided that for the electric potential we substitute velocity potential, and for the electric force the velocity of the liquid.

The Poisson equation cannot, however, be applied in the above form to a region which is partly within and partly without an electrified conductor, because then the electric force undergoes a sudden change in value from zero to a finite value, in passing outwards through the bounding surface of the conductor. We can, however, obtain another equation called the "surface characteristic equation" as follows:—Suppose a very small area dS described on a conductor having a surface density of electrification σ. Then let a small, very short cylinder be described of which dS is a section, and the generating lines are normal to the surface. Let V_1 and V_2 be the potentials at points just outside and inside the surface dS, and let n_1 and n_2 be the normals to the surface dS drawn outwards and inwards; then $-dV_1/dn_1$ and $-dV_2 dn_2$ are the normal components of the force over the ends of the imaginary small cylinder. But the force perpendicular to the curved surface of this cylinder is everywhere zero. Hence the total flux through the surface considered is $-[(dV_1/dn_1)+(dV_2/dn_2)]dS$, and this by a previous theorem must be equal to $4\pi\sigma dS$, or the total included electric quantity. Hence we have the surface characteristic equation,[2]

$$(dV_1/dn_1)+(dV_2/dn_2)+4\pi\sigma=0 \qquad (19).$$

Let us apply these theorems to a portion of a tube of electric force. Let the part selected not include any charged surface. Then since the generating lines of the tube are lines of force, the component of the electric force perpendicular to the curved surface of the tube is everywhere zero. But the electric force is normal to the ends of the tube. Hence if dS and dS' are the areas of the ends, and $+E$ and $-E'$ the oppositely directed electric forces at the ends of the tube, the surface integral of normal force on the flux over the tube is

$$EdS-E'dS' \qquad (20),$$

and this by the theorem already given is equal to zero, since the tube includes no electricity. Hence the characteristic quality of a tube of electric force is that its section is everywhere inversely as the electric force at that point. A tube so chosen that EdS for one section has a value unity, is called a unit tube, since the product of force and section is then everywhere unity for the same tube.

In the next place apply the surface characteristic equation to any point on a charged conductor at which the surface density is σ. The electric force outward from that point is $-dV/dn$, where dn is a distance measured along the outwardly drawn normal, and the force within the surface is zero. Hence we have

$$-dV/dn=4\pi\sigma \text{ or } \sigma=-(1/4\pi)dV/dn=E/4\pi.$$

The above is a statement of Coulomb's law, that *the electric force at the surface of a conductor is proportional to the surface density of the charge at that point and equal to 4π times the density.*[3]

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[1] The beginner is often puzzled by the constant appearance of the factor 4π in electrical theorems. It arises from the manner in which the unit quantity of electricity is defined. The electric force due to a point-charge q at a distance r is defined to be q/r^2, and the total flux or induction through the sphere of radius r is therefore $4\pi q$. If, however, the unit point charge were defined to be that which produces a unit of electric flux through a circumscribing spherical surface or the electric force at distance r defined to be $1/4\pi r^2$, many theorems would be enunciated in simpler forms.

[2] See Maxwell, *Electricity and Magnetism*, vol. i. § 78b (2nd ed.).

[3] *Id. ib.* vol. i. § 80. Coulomb proved the proportionality of electric surface force to density, but the above numerical relation $E=4\pi\sigma$ was first established by Poisson.

If we define the positive direction along a tube of electric force as the direction in which a small body charged with positive electricity would tend to move, we can summarize the above facts in a simple form by saying that, *if we have any closed surface described in any manner in an electric field, the excess of the number of unit tubes which leave the surface over those which enter it is equal to 4π-times the algebraic sum of all the electricity included within the surface.*

Every tube of electric force must therefore begin and end on electrified surfaces of opposite sign, and the quantities of positive and negative electricity on its two ends are equal, since the force E just outside an electrified surface is normal to it and equal to $\sigma/4\pi$, where σ is the surface density; and since we have just proved that for the ends of a tube of force $EdS=E'dS'$, it follows that $\sigma dS=\sigma' dS'$, or $Q=Q'$, where Q and Q′ are the quantities of electricity on the ends of the tube of force. Accordingly, since every tube sent out from a charged conductor must end somewhere on another charge of opposite sign, it follows that the two electricities always exist in equal quantity, and that it is impossible to create any quantity of one kind without creating an equal quantity of the opposite sign.

We have next to consider the energy storage which takes place when electric charge is created, *i.e.* when the dielectric is strained or polarized. Since the potential of a conductor is defined to be the work required to move a unit of positive electricity from the surface of the earth or from an infinite distance from all electricity to the surface of the conductor, it follows that the work done in putting a small charge dq into a conductor at a potential v is $v\,dq$. Let us then suppose that a conductor originally at zero potential has its potential raised by administering to it small successive doses of electricity dq. The first raises its potential to v, the second to v' and so on, and the nth to V. Take any horizontal line and divide it into small elements of length each representing dq, and draw vertical lines representing the potentials v, v', &c., and after each dose. Since the potential rises proportionately to the quantity in the conductor, the ends of these ordinates will lie on a straight line and define a triangle whose base line is a length equal to the total quantity Q and height a length equal to the final potential V. The element of work done in introducing the quantity of electricity dq at a potential v is represented by the element of area of this triangle (see fig. 4), and hence the work done in charging the conductor with quantity Q to final potential V is $\frac{1}{2}QV$, or since $Q=CV$, where C is its capacity, the work done is represented by $\frac{1}{2}CV^2$ or by $\frac{1}{2}Q^2/C$.

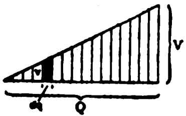

FIG. 4.

If σ is the surface density and dS an element of surface, then $\int\sigma dS$ is the whole charge, and hence $\frac{1}{2}\int V\sigma dS$ is the expression for the energy of charge of a conductor.

We can deduce a remarkable expression for the energy stored up in an electric field containing electrified bodies as follows:[1] Let V denote the potential at any point in the field. Consider the integral

$$W=\frac{1}{8\pi}\iiint\left\{\left(\frac{dV}{dx}\right)^2+\left(\frac{dV}{dy}\right)^2+\left(\frac{dV}{dz}\right)^2\right\}dx\,dy\,dz \quad . \quad (21)$$

where the integration extends throughout the whole space unoccupied by conductors. We have by partial integration

$$\iiint\left(\frac{dV}{dx}\right)^2dx\,dy\,dz=\iint V\frac{dV}{dx}dy\,dz-\iiint V\frac{d^2V}{dx^2}dx\,dy\,dz,$$

and two similar equations in y and z. Hence

$$\frac{1}{8\pi}\iiint\left\{\left(\frac{dV}{dx}\right)^2+\left(\frac{dV}{dy}\right)^2+\left(\frac{dV}{dz}\right)^2\right\}dx\,dy\,dz=$$

$$\frac{1}{8\pi}\iint V\frac{dV}{dn}dS-\frac{1}{8\pi}\iiint V\nabla V dx\,dy\,dz \quad . \quad . \quad (22)$$

where dV/dn means differentiation along the normal, and ∇ stands for the operator $\frac{d^2}{dx^2}+\frac{d^2}{dy^2}+\frac{d^2}{dz^2}$. Let E be the resultant electric force at any point in the field. Then bearing in mind that $\sigma=(1/4\pi)dV/dn$, and $\rho=-(1/4\pi)\nabla V$, we have finally

$$\frac{1}{8\pi}\iiint E^2dv=\frac{1}{2}\iint V\sigma\,dS+\frac{1}{2}\iiint V\rho\,dv.$$

The first term on the right hand side expresses the energy of the surface electrification of the conductors in the field, and the second the energy of volume density (if any). Accordingly the term on the left hand side gives us the whole energy in the field.

Suppose that the dielectric has a constant K, then we must multiply both sides by K and the expression for the energy per unit of volume of the field is equivalent to $\frac{1}{2}DE$ where D is the displacement or polarization in the dielectric.

Furthermore it can be shown by the application of the calculus of variations that the condition for a minimum value of the function W, is that $\nabla V=0$. Hence that distribution of potential which is necessary to satisfy Laplace's equation is also one which makes the potential energy a minimum and therefore the energy stable. Thus the actual distribution of electricity on the conductor in the field is not merely *a* stable distribution, it is *the only* possible stable distribution.

Method of Electrical Images.—A very powerful method of attacking problems in electrical distribution was first made known by Lord Kelvin in 1845 and is described as the method of electrical images.[2] By older mathematical methods it had only been possible to predict in a few simple cases the distribution of electricity at rest on conductors of various forms. The notion of an electrical image may be easily grasped by the following illustration: Let there be at A (see fig. 5) a point-charge of positive electricity $+q$ and an infinite conducting plate PO, shown in section, connected to earth and therefore at zero potential. Then the charge at A together with the induced surface charge on the plate makes a certain field of electric force on the left of the plate PO, which is a zero equipotential surface. If we remove the plate, and yet by any means can keep the identical surface occupied by it a plane of zero potential, the boundary conditions will remain the same, and therefore the field of force to the left of PO will remain unaltered. This can be done by placing at B an equal negative point-charge $-q$ in the place which would be occupied by the optical image of A if PO were a mirror, that is, let $-q$ be placed at B, so that the distance BO is equal to the distance AO, whilst AOB is at right angles to PO. Then the potential at any point P in this ideal plane PO is equal to $q/AP-q/BP=0$, whilst the resultant force at P due to the two point charges is $2qAO/AP^3$, and is parallel to AB or normal to PO. Hence if we remove the charge $-q$ at B and distribute electricity over the surface PO with a surface density σ, according to the Coulomb-Poisson law, $\sigma=qAO/2\pi AP^3$, the field of force to the left of PD will fulfil the required boundary conditions, and hence will be the law of distribution of the induced electricity in the case of the actual plate. The point-charge $-q$ at B is called the "electrical image" of the point-charge $+q$ at A.

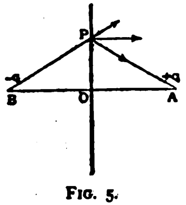

FIG. 5.

We find a precisely analogous effect in optics which justifies the term "electrical image." Suppose a room lit by a single candle. There is everywhere a certain illumination due to it. Place across the room a plane mirror. All the space behind the mirror will become dark, and all the space in front of the mirror will acquire an exalted illumination. Whatever this increased illumination may be, it can be precisely imitated by removing the mirror and placing a second lighted candle at the place occupied by the optical image of the first candle in the mirror, that is, as far behind the plane as the first candle was in front. So the potential distribution in the space due to the electric point-charge $+q$ as A together with $-q$ at B is the same as that due to $+q$ at A and the negative induced charge erected on the infinite plane (earthed) metal sheet placed half-way between A and B.

The same reasoning can be applied to determine the electrical image of a point-charge of positive electricity in a spherical surface, and therefore the distribution of induced electricity over a metal sphere connected to earth produced by a point-charge near it. Let $+q$ be any positive point-charge placed at a point A outside a sphere (fig. 6) of radius r, and centre at C, and let P be any point on it. Let $CA=d$. Take a point B in CA such that $CB\cdot CA=r^2$, or $CB=r^2/d$. It is easy then to show that $PA:PB=d:r$. If then we put a negative point-charge $-qr/d$ at B, it follows that the spherical surface will be a zero potential surface, for

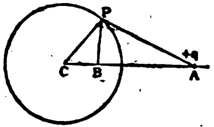

FIG. 6.

$$\frac{q}{PA}-\frac{rq}{d}\cdot\frac{1}{PB}=0 \quad . \quad . \quad . \quad . \quad (24).$$

Another equipotential surface is evidently a very small sphere described round A. The resultant force due to these two point-charges must then be in the direction CP, and its value E is the vector sum of the two forces along AP and BP due to the two point-charges. It is not difficult to show that

$$E=-(d^2-r^2)q/rAP^3 \quad . \quad . \quad . \quad (25),$$

in other words, the force at P is inversely as the cube of the distance from A. Suppose then we remove the negative point-charge, and let the sphere be supposed to become conductive and be connected to earth. If we make a distribution of negative electricity over it, which has a density σ varying according to the law

$$\sigma=-(d^2-r^2)q/4\pi rAP^3 \quad . \quad . \quad . \quad (26),$$

that distribution, together with the point-charge $+q$ at A, will make a distribution of electric force at all points outside the sphere exactly similar to that which would exist if the sphere were removed and a negative point charge $-qr/d$ were placed at B. Hence this charge is the electrical image of the charge $+q$ at A in the spherical surface.

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[1] See Maxwell, *Electricity and Magnetism*, vol. i. § 99a (3rd ed., 1892), where the expression in question is deduced as a corollary of Green's theorem.

[2] See Lord Kelvin's *Papers on Electrostatics and Magnetism*, p. 144.

We may generalise these statements in the following theorem, which is an important deduction from a wider theorem due to G. Green. Suppose that we have any distribution of electricity at rest over conductors, and that we know the potential at all points and consequently the level or equipotential surfaces. Take any equipotential surface enclosing the whole of the electricity, and suppose this to become an actual sheet of metal connected to the earth. It is then a zero potential surface, and every point outside is at zero potential as far as concerns the electric charge on the conductors inside. Then if U is the potential outside the surface due to this electric charge inside alone, and V that due to the opposite charge it induces on the inside of the metal surface, we must have $U+V=0$ or $U=-V$ at all points outside the earthed metal surface. Therefore, whatever may be the distribution of electric force produced by the charges inside taken alone, it can be exactly imitated for all space outside the metal surface if we suppose the inside charge removed and a distribution of electricity of the same sign made over the metal surface such that its density follows the law

$$\sigma = -(1/4\pi)dU/dn \quad . \quad . \quad . \quad (27),$$

where dU/dn is the electric force at that point on the closed equipotential surface considered, due to the original charge alone.

BIBLIOGRAPHY.—For further developments of the subject we must refer the reader to the numerous excellent treatises on electrostatics now available. The student will find it to be a great advantage to read through Faraday's three volumes entitled *Experimental Researches on Electricity*, as soon as he has mastered some modern elementary book giving in compact form a general account of electrical phenomena. For this purpose he may select from the following books: J. Clerk Maxwell, *Elementary Treatise on Electricity* (Oxford, 1881); J. J. Thomson, *Elements of the Mathematical Theory of Electricity and Magnetism* (Cambridge, 1895); J. D. Everett, *Electricity*, founded on part iii. of Deschanel's *Natural Philosophy* (London, 1901); G. C. Foster and A. W. Porter, *Elementary Treatise on Electricity and Magnetism* (London, 1903); S. P. Thompson, *Elementary Lessons on Electricity and Magnetism* (London, 1903).

When these elementary books have been digested, the advanced student may proceed to study the following: J. Clerk Maxwell, *A Treatise on Electricity and Magnetism* (1st ed., Oxford, 1873; 2nd ed. by W. D. Niven, 1881; 3rd ed. by J. J. Thomson, 1892); Joubert and Mascart, *Electricity and Magnetism*, English translation by E. Atkinson (London, 1883); Watson and Burbury, *The Mathematical Theory of Electricity and Magnetism* (Oxford, 1885); A. Gray, *A Treatise on Magnetism and Electricity* (London, 1898). In the collected *Scientific Papers* of Lord Kelvin (3 vols., Cambridge, 1882), of James Clerk Maxwell (2 vols., Cambridge, 1890), and of Lord Rayleigh (4 vols., Cambridge, 1903), the advanced student will find the means for studying the historical development of electrical knowledge as it has been evolved from the minds of some of the master workers of the 19th century. (J. A. F.)

ELECTROTHERAPEUTICS, a general term for the use of electricity in therapeutics, *i.e.* in the alleviation and cure of disease. Before the different forms of medical treatment are dealt with, a few points in connexion with the machines and currents, of special interest to the medical reader, must first be given.

Faradism.—For the battery required either for faradism or galvanism, cells of the Leclanché type are the most satisfactory. Being dry they can be carried in any position, are lighter, and there is no trouble from the erosion of wires and binding screws, such as so often results from wet cells. The best method of producing a smooth current in the secondary coil is for the interruptor hammer to vibrate directly against the iron core of the primary coil. For this it is best that the interruptor be made of a piece of steel spring, as a high rate of interruption can then be maintained, with a fairly smooth current in the secondary coil. This form of interruptor necessitates that the iron core be fixed, and variation in the primary induced current is arranged for by slipping a brass tube more or less over the iron core, thus cutting off the magnetic field from the primary coil. The secondary current (that obtained from the secondary coil) can be varied by keeping the secondary coil permanently fixed over the primary and varying the strength of the primary current. Where, as suggested above, the iron core is fixed, the primary and secondary induced currents will be at their strongest when the brass tube is completely withdrawn. As there is no simple means of measuring the strength of the faradic current, it is best to start with a very weak current, testing it on the muscles of one's own hand until these begin to contract and a definite sensory effect is produced; the current can then be applied to the part, being strengthened only very gradually.

Galvanism.—For treatment by galvanism a large battery is needed, the simplest form being known as a "patient's battery," consisting of a variable number of dry cells arranged in series. The cells used are those of Leclanché, with E.M.F. (or voltage) of 1·5 and an internal resistance of ·3 ohm. Thus the exact strength of the current is known; the number of cells usually employed is 24, and when new give an E.M.F. of about 36 volts. By using the formula $C = \frac{E}{R}$, where E is the voltage of the battery, R the total resistance of battery, electrodes and the patient's skin and tissues, and C the current in amperes, the number of cells required for any particular current can be worked out. The resistance of the patient's skin must be made as low as possible by thoroughly wetting both skin and electrodes with sodium bicarbonate solution, and keeping the electrodes in very close apposition to the skin. A galvanometer is always fitted to the battery, usually of the d'Arsonval type, with a shunt by means of which, on turning a screw, nine-tenths of the inducing current can be short-circuited away, and the solenoid only influenced by one-tenth of the current which is being used on the patient. In districts where electric power is available the continuous current can be used by means of a switchboard. A current of much value for electrotherapeutic purposes is the sinusoidal current, by which is meant an alternating current whose curve of electromotive force, in both positive and negative phase, varies constantly and smoothly in what is known as the sine curve. In those districts supplied by an alternating current, the sinusoidal current can be obtained from the mains by passing it through various transformers, but where the main supply is the direct or constant current, a motor transformer is needed.

Static Electricity.—For treatment by static electricity the Wimshurst type of machine is the one most generally used. A number of electrodes are required; thus for the application of sparks a brass ball and brass roller electrode, for the "breeze" a single point and a multiple point electrode, and another multiple point electrode in the form of a metal cap that can be placed over the patient's head. The polarity of the machine must always be tested, as either knob may become positive or negative, though the polarity rarely changes when once the machine is in action. The oldest method of subjecting a patient to electric influence is that in which static electricity is employed. The patient is insulated on a suitable platform and treated by means of charges and discharges from an electrical machine. The effect is to increase the regularity and frequency of the pulse, raise the blood pressure and increase the action of the skin. The nervous system is quieted, sleep being promoted, the patient often becoming drowsy during the application. If while the patient is being treated a point electrode is brought towards him he feels the sensation of a wind blowing from that point; this is an electric breeze or brush discharge. The breeze is negative if the patient is positively charged and vice versa. The "breeze discharge" treatment is especially valuable in subduing pain of the superficial cutaneous nerves, and also in the treatment of chronic indolent ulcers. Quite recently this form of treatment has been applied with much success to various skin lesions—psoriasis, eczema and pruritus. Static electricity is also utilized for medical purposes by means of "sparks," which are administered with a ball electrode, the result being a sudden muscular contraction at the point of application. The electrode must be rapidly withdrawn before a second spark has time to leap across, as this is a severe form of treatment and must be administered slowly. It is mainly employed for muscular stimulation, and the contractions resulting from spark stimulation can be produced in cases of nerve injury and degeneration, even when the muscles have lost their reaction to faradism. The sensory stimulation of this form of treatment is also strong, and is useful in hysterical anaesthesia and functional paralysis. Where a milder sensory stimulation is required friction can be used, the electrode being in the form of a metal roller which is moved rapidly outside the patient's clothing over the spine or other part to be treated. The clothing must be dry and of wool, and each additional woollen layer intensifies the effect.

Another method of employing electricity at high potential is by the employment of high frequency currents. There are two methods of application: that in which brush discharges are made use of, with undoubtedly good effects in many of the diseases affecting the surface of the body, and that in which the currents of the solenoid are made to traverse the patient directly. The physiological value of the latter method is not certain, though one point of interest in connexion with it is that whereas statical applications raise the blood pressure, high frequency applications lower it. It has been used in the case of old people with arteriosclerosis, and the reduction of blood pressure produced is said to have shown considerable permanence.

The Faradic Current.—G. B. Duchenne was the first physician to make use of the induced current for treatment, and the term "faradization" is supposed to be due to him. But in his day the differences between the two currents available, the primary and the secondary, were not worked out, and they were used somewhat indiscriminately. Nowadays it is generally accepted that the primary current should be used for the stimulation of deep-lying organs, as stomach and intestines, &c., while the secondary current is employed for stimulation of the limb muscles and the cutaneous sensory nerves. The faradic current is also used as a means of diagnosis for neuro-muscular conditions. When the interrupted current is used to stimulate the skin over a motor nerve, all the muscles supplied by that nerve are thrown into rapid tetanic contraction, the contraction both beginning and ceasing sharply and suddenly with the current. This is the normal reaction of the nerve to faradism. If the muscle be wasted from disuse or some local cause unconnected with its nerve-supply, the contraction is smaller, and both arises and relaxes more slowly. But if the lesion lies in the nerve itself, as in Bell's palsy, the muscles no longer show any response when the nerve is stimulated, and this is known as the reaction of degeneration in the nerve. It is usually preceded by a condition of hyperexcitability. These results are applied to distinguish between functional paralysis and that due to some organic lesion, as in the former case the reaction of faradism will be as brisk as usual. Also at the beginning of most cases of infantile paralysis many more groups of muscles appear to be affected than ultimately prove to be, and faradism enables the physician to distinguish between those groups of muscles that are permanently paralysed owing to the destruction of their trophic centre, and those muscles which are only temporarily inhibited from shock, and which with proper treatment will later regain their full power. In the testing of muscles electrically that point on the skin which on stimulation gives the maximum contraction for that muscle is known as the "motor point" for that muscle. It usually corresponds to the entry of the motor nerve. Faradic treatment may be employed in the weakness and emaciation depending on any long illness, rickets, anaemia, &c. For these cases it is best to use the electric bath, the patient being placed in warm water, and the two electrodes, one at the patient's back and the other at his feet, being connected with the secondary coil. The patient's general metabolism is stimulated, he eats and sleeps better and soon begins to put on weight. This is especially beneficial in severe cases of rickets. In the weakness and emaciation due to neurasthenia, especially in those cases being treated by the Weir Mitchell method (isolation, absolute confinement to bed, massage and overfeeding), a similar faradic bath is a very helpful adjunct. In tabes dorsalis faradic treatment will often diminish the anaesthesia and numbness in the legs, with resulting benefit to the ataxy. Perhaps the most beneficial use of the faradic current is in the treatment of chronic constipation—especially that so frequently met with in young women and due to deficient muscular power of the intestinal walls. In long-standing cases the large intestine becomes permanently dilated, and its muscular fibres so attenuated as to have no power over the intestinal contents. But faradism causes contraction at the point of stimulation, and the peristaltic wave thus started slowly progresses along the bowel. All that is needed is a special electrode for introduction into the bowel and an ordinary roller electrode. The rectal electrode consists of a 6-inch wire bearing at one end a small metal knob and fitted at the other into a metal cup which screws into the handle of the electrode. The only part exposed is the metallic knob; the rest is coated with some insulating material. The patient reclines on a couch on his back, the rectal electrode is connected, and having been vaselined is passed some three inches into the rectum. A current is started with the secondary coil in such a position as to give only an extremely weak current. The roller electrode is then wetted with hot water and applied to the front of the abdomen. At first the patient should feel nothing, but the current should slowly be increased until a faint response is perceptible from the abdominal muscles. This gives the required strength, and the roller electrode, pressed well into the abdominal wall, should very slowly be moved along the course of the large intestine beginning at the right iliac fossa. Thus a combination of massage and faradic current is obtained, and the results are particularly satisfactory. Treatment should be given on alternate days immediately after breakfast, and should be persevered with for six or eight weeks. The patient can be taught to administer it to himself.

The Galvanic, Continuous or Direct Current.—In using the galvanic or direct current the electrode must be covered with padded webbing or some other absorbent material, the metal of the electrode never being allowed to come in contact with the skin. The padding by retaining moisture helps to make good contact, and also helps to guard against burning the skin. But when a continuous current of 3 am. or more is passed for more than 5 min. the electrodes must be raised periodically and the skin inspected. If the current be too strong or applied for too long a time, small blisters are raised which break and are very troublesome to heal. Nor does the patient always feel much pain when this occurs. Also the electrodes must be remoistened every five or six minutes, as they soon become dry, and the skin will then be burnt. It is best to use a solution of sodium bicarbonate. Again, the danger of burning the skin depends on the density of the current per sq. in. of electrode, so that a strong current through a small electrode will burn the skin, whereas the same current through a larger electrode will produce a beneficial effect. If the patient be immersed up to his neck in an electric bath, much stronger currents can be passed without causing either pain or injury, as in this case the whole area of the skin in contact with the water acts as an electrode. In passing the current it must be remembered that the negative electrode or kathode is the more painful of the two, and its action more stimulating than the positive electrode or anode, which is sedative. If a muscle be stimulated over its motor point, it will contract with a sharp twitch and then become quiescent. With normal muscle the KCC (kathodal closure contraction) is stronger than that produced by the closure of the current at the anode ACC (anodal closure contraction). And if the muscle be normal the opening contraction KOC and AOC are not seen. When a galvanic current is passed along a nerve its excitability is increased at the kathode and diminished at the anode. The increased excitability at the kathode is katelectrotonus, and the lowered excitability at the anode anelectrotonus. But since in a patient the electrode cannot be applied directly to the nerve, the lines of force from the electrode pass into the nerve both in an upward and downward direction, and hence there are two poles produced by each electrode. If the current be suddenly reversed, so that what was the anode becomes the kathode, a stonger contraction is obtained than by simply making and breaking the current. To avoid the four poles on the nerve to be tested, it is found most satisfactory to have one electrode placed at some distance, on the back or chest, not on the same limb.

As explained above, when the nerve supplying a muscle is diseased it no longer responds to the faradic current. On further testing this with the galvanic or continuous current it responds, but the contraction is not brisk but begins slowly and relaxes slowly, though the contraction as a whole may be larger than that of a normal muscle. This excessive contraction is known as hyperexcitability to galvanism. This form of contraction is that obtained when the muscle fibre itself is stimulated. Again, whereas in normal muscle $KCC>ACC$, when the nerve is degenerated $KCC=ACC$ or $ACC>KCC$. Also in the more severe forms of nerve injury tetanic contractions may be set up in the paralysed muscles, by closure of the current either at the anode or kathode. These charges are known as the reaction of degeneration or R D, and are of great value in diagnosis. They occur only after sudden or acute damage to the nerve cells of the anterior horn of the spinal cord, or to the motor nerve fibres proceeding from these cells. Thus RD is present in infantile paralysis, acute neuritis, &c., but absent in progessive muscular atrophy where the wasting of nerve and muscle takes place extremely slowly. The reaction of degeneration in the nerve is shown by disappearance of reaction to either kind of current, preceded for some days by hyperexcitability to either current. Where the muscle wasting is due to a lesion in the muscle alone, as in ischaemic myositis (usually due to injury from tight bandaging or badly applied splints), no reaction of degeneration is found; the only change is a loss of power in the contraction. If the damage to the anterior horn cells be only very slight, there may only be partial RD, and the prognosis is given according to the extent of RD. From this account it is clear that the greatest value of the continuous current lies in its use in diagnosis. But it is also applied extremely successfully, in combination with massage, to cases of infantile paralysis. Wrist drop from lead poisoning and lead neuritis of all kinds, reflex muscular atrophy and the muscular wasting of hemiplegia, are all benefited by the continuous current; the severe pain of sciatica, and the inflammation of the nerve sheath in these cases, can be arrested more quickly by galvanic treatment than in any other way. Nearly all forms of neuritis, both of the cranial and other nerves, are best treated by the continuous current. The action in all cases is to stimulate the natural tendency to repair, very largely by improving the circulation through the injured parts.

Another effect of an electric current is electrolysis, and the phenomena of electrolytic conduction involve not merely the ionization of the compounds, but also the setting in motion of the ions towards their respective poles. Solutions which conduct electric currents are called electrolytes, and in the case of the human body the electrolyte is the whole mass of the saline constituents in solution throughout the body. When a current is passed through an electrolyte, dissociation into ions takes place, the ions which are freed round the anode being called anions and those which are freed round the kathode being called kations. The anions carry negative charges and are consequently attracted by the positive electricity of the anode. The kations carry positive charges, hence they are repelled by the anode and attracted by the kathode. But a certain number of molecules do not dissociate, and hence in an electrolytic solution there are neutral molecules, anions and kations. The chemical actions, and thus the antiseptic, remedial or toxic effects of electrolytes, are due to the actions of their ions. The phosphides and phosphates may be taken as examples. Some are extremely toxic, while others are quite harmless. But it is to the phosphorus ion that the toxic or therapeutic effect is due. In the phosphates the phosphorus is part of a complex ion possessing quite different properties to those of the phosphorus ion of the phosphides. The strikingly different effects of the sulphates and sulphides are due to similar conditions, as also of many other compounds. There are certain solvents, as alcohol, chloroform, glycerin and vaseline which do not dissociate electrolytes, and consequently the latter become inert when mixed with these solvents. These solutions do not conduct electricity, and hence ionic effects are extremely slow. A vaseline ointment containing 5% of phenol makes a good dressing for an ulcer of the leg, and produces no irritant effect, but a 5% aqueous solution may be both caustic and toxic. Since the toxic or therapeutic action of a solution is due to its ions, the action must be proportional to the number of ions in a given volume, that is, the action of an electrolyte depends on the degree of dissociation. Thus a strong acid is one that is much dissociated, a weak acid one that has undergone but little dissociation and so on. In 1896–1897 it was shown that the bactericidal action of salts varies with their degree of dissociation and therefore depends on the concentration of the active ions. In the medical application of these facts it must be remembered that when an ion is introduced into the body by electrolysis, it is propably forced into the actual cellular constituents of the body, whereas the drug administered by one of the usual methods though circulating in the blood may perhaps never gain access to the cell itself. Hence the different effects that have been recorded between a drug administered by the mouth or subcutaneously and the same administered by electrolysis. Thus a solution of cocaine injected subcutaneously produces quite different effects to that introduced by electrolysis. By the latter method it produces anaesthesia but does not diffuse, and the anaesthesia remains strictly limited to the surface covered by the electrode. It would appear that the ion is never introduced into the general circulation but into the cell plasma.

In the technical working of medical electrolysis the most minute precautions are required. The solution of the drug must be made with as pure water as possible, recently distilled. The spongy substance forming the electrode must be free from any trace of electrolytic substances. Hence all materials used must be washed in distilled water. Absorbent cotton answers all requirements and is easily procured. The area of introduction can be exactly circumscribed by cutting a hole in a sheet of adhesive plaster which is applied to the skin and on which the electrolytic electrodes are pressed. The great advantage of electrolytic methods is that it enables general treatment to be replaced by a strictly local treatment, and the cells can be saturated exactly to the degree and depth required. Strong antiseptics and materials that coagulate albumen cannot be introduced locally by ordinary methods, as the skin is impermeable to them, but by electrolysis they can be introduced to the exact depth required. The local effects of the ions depend on the dosage; thus a feeble dose of the ions of zinc stimulates the growth of hair, but a stronger dose produces the death of the tissue. Naturally the different ions produce different effects. Thus the ions of the alkalis and magnesium are caustic, those of the alkaline earthy metals produce actual mortification of the tissue and so on. According to the ion chosen the effect may be caustic in various degrees, antiseptic, coagulating, producing vascular or nervous changes, &c., &c. And again electrolysis can also be used for extracting from the body such ions as are injurious, as uric and oxalic acid from a patient suffering from gout.

One of the latest advances is the treatment of ankylosed joints by the electrolytic method, the electrolyte used being chloride of sodium, and the marvellous results being attributed to the introduction of the chlorine ions. This sclerolytic property of the current is applicable to all parts of the body accessible to the current. Old cases of rheumatic scleritis, entirely unaffected by the routine treatment of salicylates and iodide, have often cleared up entirely under electrolytic treatment. Cases of chronic iritis with adhesions and old pleural adhesions are also suited for this method of procedure. Certain menstrual troubles of women and also endometritis yield rapidly to electrolysis with a zinc anode. Before this method of introduction, the zinc salts, though excellent disinfectants, acted only on the surface in consequence of their coagulating action on the albuminoids, but by the electric current, under the influence of a difference of potential, the zinc iron will penetrate to any desired depth. Cases of rodent ulcer unaffected by all other methods of treatment have been cured by electric kataphoresis with zinc ions, and the method is now being applied to the treatment of inoperable malignant tumours. As very strong currents are required for this latter, the patient has first to be anaesthetized by a general anaesthetic. Another direction in which electric ions are being used is that of the induction of local anaesthesia before minor surgical operations. Cocaine is the drug used, the resulting anaesthesia is absolute, and the operation can be made almost bloodless by the admixture of suprarenal extract.

ELECTROTYPING, an application of the art of electroplating (*q.v.*) to typography (*q.v.*). In copying engraved plates for printing purposes, copper may be deposited upon the original plate, the surface of which is first rendered slightly dirty, by means of a weak solution of wax in turpentine or otherwise, to prevent adhesion. The reversed plate thus produced is then stripped from the first and used as cathode in its turn, with the result that even the finest lines of the original are faithfully reproduced. The electrolyte commonly contains about 1½ lb of copper sulphate and ½ lb of strong sulphuric acid per gallon, and is worked with a current density of about 10 amperes per sq. ft., which should give a thickness of 0·000563 in. of copper per hour. As time is an object, the conditions alluded to in the article on COPPER as being favourable to the use of high current densities should be studied, bearing in mind that a tough copper deposit of high quality is essential. Moulds for reproducing plates or art-work are often taken in plaster, beeswax mixed with Venice turpentine, fusible metal, or gutta-percha, and the surface being rendered conductive by powdered black-lead, copper is deposited upon it evenly throughout. For statuary, and "undercut" work generally, an elastic mould—of glue and treacle (80 : 20 parts)—may be used; the mould, when set, is waterproofed by immersion in a solution of potassium bichromate followed by exposure to sunlight, or in some other way. The best results, however, are obtained by taking a wax cast from the elastic mould, and then from this a plaster mould, which may be waterproofed with wax, black-leaded, and used as cathode. In art-work of this nature the principal points to be looked to in depositing are the electrical connexions to the cathode, the shape of the anode (to secure uniformity of deposition), the circulation of the electrolyte, and, in some cases, the means for escape of anode oxygen. Silver electrotyping is occasionally resorted to for special purposes.

ELECTRUM, ELECTRON (Gr. ἤλεκτρον, amber), an alloy of gold and silver in use among the ancients, described by Pliny as containing one part of silver to four of gold. The term is also applied in mineralogy to native argentiferous gold containing from 20 to 50% of silver. In both cases the name is derived from the pale yellow colour of electrum, resembling that of amber.

ELEGIT (Lat. for "he has chosen"), in English law, a judicial writ of execution, given by the Statute of Westminster II. (1285), and so called from the words of the writ, that the plaintiff has chosen (*elegit*) this mode of satisfaction. Previously to the Statute of Westminster II., a judgment creditor could only have the profits of lands of a debtor in satisfaction of his judgment, but not the possession of the lands themselves. But this statute provided that henceforth it should be *in the election* of the party having recovered judgment to have a writ of *fieri facias* (*q.v.*) unto the sheriff on lands and goods or else all the chattels of the debtor and the one half of his lands until the judgment be satisfied. Since the Bankruptcy Act 1883 the writ of *elegit* has extended to lands and hereditaments only. (See further EXECUTION.)

ELEGY, a short poem of lamentation or regret, called forth by the decease of a beloved or revered person, or by a general sense of the pathos of mortality. The Greek word ἐλεγεία is of doubtful signification; it is usually interpreted as meaning a mournful or funeral song. But there seems to be no proof that this idea of regret for death entered into the original meaning of ἐλεγεία. The earliest Greek elegies which have come down to us are not funereal, although it is possible that the primitive ἐλεγεία may have been a set of words liturgically used, with music, at a burial. When the elegy appears in surviving Greek literature, we find it dedicated, not to death, but to war and love. Callinus of Ephesus, who flourished in the 7th century, is the earliest elegist of whom we possess fragments. A little later Tyrtaeus was composing his famous elegies in Sparta. Both of these writers were, so far as we know, exclusively warlike and patriotic. On the other hand, the passion of love inspires Mimnermus, whose elegies are the prototypes not only of the later Greek pieces, and of the Latin poems of the school of Tibullus and Propertius, but of a great deal of the formal erotic poetry of modern Europe. In the 6th century B.C., the elegies of Solon were admired; they are mainly lost. But we possess more of the work of Theognis of Megara than of any other archaic elegist, and in it we can observe the characteristics of Greek elegy best. Here the Dorian spirit of chivalry reaches its highest expression, and war is combined with manly love

The elegy, in its calm movement, seems to have begun to lose currency when the ecstasy of emotion was more successfully interpreted by the various rhythmic and dithyrambic inventions of the Aeolic lyrists. The elegy, however, rose again to the highest level of merit in Alexandrian times. It was reintroduced by Philetas in the 3rd cent. B.C., and was carried to extreme perfection by Callimachus. Other later Greek elegists of high reputation were Asclepiades and Euphorion. But it is curious to notice that all the elegies of these poets were of an amatory nature, and that antiquity styled the funeral dirges of Theocritus, Bion and Moschus—which are to us the types of elegy—not elegies at all, but idylls. When the poets of Rome began their imitative study of Alexandrian models, it was natural that the elegies of writers such as Callimachus should tempt them to immediate imitation. Gallus, whose works are unhappily lost, is known to have produced a great sensation in Rome by publishing his translation of the poems of Euphorion; and he passed on to the composition of erotic elegies of his own, which were the earliest in the Latin language. If we possessed his once-famous *Cytheris*, we should be able to decide the question of how much Propertius, who is now the leading figure among Roman elegists, owed to the example of Gallus. His brilliantly emotional *Cynthia*, with its rich and unexampled employment of that alternation of hexameter and pentameter which had now come to be known as the elegiac measure, seems, however, to have settled the type of Latin elegy. Tibullus is always named in conjunction with Propertius, who was his contemporary, although in their style they were violently contrasted. The sweetness of Tibullus was the object of admiration and constant imitation by the Latin poets of the Renaissance, although Propertius has more austerely pleased a later taste. Finally, Ovid wrote elegies of great variety in subject, but all in the same form, and his dexterous easy metre closed the tradition of elegiac poetry among the ancients. What remains in the decline of Latin literature is all founded on a study of those masters of the Golden Age.

When the Renaissance found its way to England, the word "elegy" was introduced by readers of Ovid and Propertius. But from the beginning of the 16th century, it was used in English, as it has been ever since, to describe a funeral song or lament. One of the earliest poems in English which bears the title of elegy is *The Complaint of Philomene*, which George Gascoigne began in 1562, and printed in 1576. The *Daphnaida* of Spenser (1591) is an elegy in the strict modern sense, namely a poem of regret pronounced at the obsequies of a particular person. In 1579 Puttenham had defined an elegy as being a song "of long lamentation." With the opening of the 17th century the composition of elegies became universal on every occasion of public or private grief. Dr Johnson's definition, "*Elegy*, a short poem without points or turns," is singularly inept and careless. By that time (1755) English literature had produced many great elegies, of which the *Lycidas* of Milton is by far the most illustrious. But even Cowley's on Crashaw, Tickell's on Addison, Pope's on an Unfortunate Lady, those of Quarles, and Dryden, and Donne, should have warned Johnson of his mistake. Since the 18th century the most illustrious examples of elegy in English literature have been the *Adonais* of Shelley (on Keats), the *Thyrsis* of Matthew Arnold (on Clough), and the *Ave atque Vale* of Mr Swinburne (on Baudelaire). It remains for us to mention what is the most celebrated elegy in English, that written by Gray in a Country Churchyard. This, however, belongs to a class apart, as it is not addressed to the memory of any particular person. A writer of small merit, James Hammond (1716-1742), enjoyed a certain success with his *Love Elegies* in which he endeavoured to introduce the erotic elegy as it was written by Ovid and Tibullus. This experiment took no hold of English literature; but was welcomed in France in the amatory works of Parny (1753–1814), in those of Chênedollé (1769–1833), and of Millevoye (1782–1816). The melancholy and sentimental elegies of the last named are the typical examples of this class of poetry in French literature. Lamartine must be included among the elegists, and his famous "Le Lac" is as eminent an elegy in French as Gray's "Country Churchyard" is in English. The elegy has flourished in Portugal, partly because it was cultivated with great success by Camoens, the most illustrious of the Portuguese poets. In Italian, Chiabrera and Filicaia are named among the leading national elegists. In German literature, the notion of elegy as a poem of lamentation does not exist. The famous Roman Elegies of Goethe imitate in form and theme those of Ovid; they are not even plaintive in character.

Elegiac Verse has commonly been adopted by German poets for their elegies, but by English poets never. Schiller defines this kind of verse, which consists of a distich of which the first line is a hexameter and the second a pentameter, in the following pretty illustration:—

> "In the hexameter rises the fountain's silvery column,
> In the pentameter aye falling in melody back."

The word "elegy," in English, is one which is frequently used very incorrectly; it should be remembered that it must be mournful, meditative and short without being ejaculatory. Thus Tennyson's *In Memoriam* is excluded by its length; it may at best be treated as a collection of elegies. Wordsworth's *Lucy*, on the other hand, is a dirge; this is too brief a burst of emotion to be styled an elegy. *Lycidas* and *Adonais* remain the two unapproachable types of what a personal elegy ought to be in English. (E. G.)

ELEMENT (Lat. *elementum*), an ultimate component of anything, hence a fundamental principle. *Elementum* was used in Latin to translate the Greek *στοιχεῖον* (that which stands in a *στοῖχος*, or row), and is a word of obscure origin and etymology. The root of Lat. *alere*, to nourish, has been suggested, thus making it a doublet of *alimentum*, that which supports life; another explanation is that the word represents LMN., the first three letters of the second part of the alphabet, a parallel use to that of ABC. Apart from its application in chemistry, which is treated below, the word is used of the rudiments or *principia* of any science or subject, as in Euclid's *Elements of Geometry*, or in the "beggarly elements" (*τὰ πτωχὰ στοιχεῖα*, of St Paul in Gal. iv. 9); in mathematics, of a fundamental concept involved in an investigation, as the "elements" of a determinant; and in electricity, of a galvanic (or voltaic) "element" in an electric cell (see Battery: *Electric*). In astronomy, "element" is used of any one of the numerical or geometrical data by which the course of a varying phenomenon is computed; it is applied especially to orbital motion and eclipses. The "elements of an orbit" are the six data by which the position of a moving body in its orbit at any time may be determined. The "elements of an eclipse" express and determine the motion of the centre of the shadow-axis, and are the data necessary to compute the phenomena of an eclipse during its whole course, as seen at any place. In architecture the term "element" is applied to the outline of the design of a Decorated window, on which the centres for the tracery are found. These centres will all be found to fall on points which, in some way or other, will be equimultiples of parts of the openings.

Chemical Elements.

Ancient ideas.

Like all other scientific concepts, that of an element has changed its meaning many times in many ways during the development of science. Owing to their very small amount of real chemical knowledge, the generalizations of the ancients were necessarily rather superficial, and could not stand in the face of the increasing development of practical chemistry. Nevertheless we find the concept of an element as "a substance from which all bodies are made or derived" held at the very beginning of occidental philosophy. Thales regarded "water" as the element of all things; his followers accepted his idea of a primordial substance as the basis of all bodies, but they endeavoured to determine some other general element or elements, like "fire" or "spirit," or "love" and "hatred," or "fire," "water," "air" and "earth." We find in this development an exact parallelism to the manner in which scientific ideas generally arise, develop and change. They are created to point out the common part in a variety of observed phenomena, in order to get some leading light in the chaos of events. At first almost any idea will do, if only it promises some comprehensive arrangement of the facts; afterwards, the inconsistencies of the first trial make themselves felt; the first idea is then changed to meet better the new requirements. For a shorter or longer time the facts and ideas may remain in accord, but the uninterrupted increase of empirical knowledge involves sooner or later new fundamental alterations of the general idea, and in this way there is a never-ceasing process of adaptation of the ideas to the facts. As facts are unchangeable by themselves, the adaptation can be only one-sided; the ideas are compelled to change according to the facts. We must therefore educate ourselves to regard the ideas or theories as the changing part of science, and keep ourselves ready to accept even the most fundamental revision of current theories.

The first step in the development of the idea of elements was to recognize that a *single* principle would not prove sufficient to cover the manifoldness of facts. Empedocles therefore conceived a double or binary elementary principle; and Aristotle developed this idea a stage further, stating two sets of binary antagonistic principles, namely "dry-wet" and "hot-cold." The Aristotelian or peripatetic elements, which played such a great rôle in the whole medieval philosophy, are the representatives of the several binary combinations of these fundamental properties, "fire" being hot and dry, "air" hot and wet, "water" cold and wet, "earth" cold and dry. According to the amount of these properties found in any body, these elements were regarded as having taken part in forming this body. Concerning the reason why only these properties were regarded as fundamental, we know nothing. They seem to be taken at random rather than carefully selected; they relate only to the sense of touch, and not to vision or any other sense, possibly because deceptions in the sense of touch were regarded as non-existent, while the other senses were apparently not so trustworthy. At any rate, the Aristotelian elements soon proved to be rather inadequate to meet the requirements of the increasing chemical knowledge; other properties had therefore to be selected to represent the general behaviour of chemical substances, and in this case we find them already much more "chemical" in the modern sense.

Elements of the alchemists.

Among the various substances recognized by the chemists, certain classes or groups readily distinguished themselves. First the metals, by their lustre, their heaviness, and a number of other common properties. According to the general principle of selecting a single substance as a representative of the group, the metallic properties were represented by "mercury." The theoreticians of the middle ages were rather careful to point out that common mercury (the liquid metal of to-day) was not at all to be identified with "philosophical" mercury, the last being simply the *principle* of metallic behaviour. In the same way combustibility was represented by "sulphur," solubility by "salt," and occasionally the chemically indifferent or refractory character by "earth." According to the subsistence and preponderance of these properties in different bodies, these were regarded as containing the corresponding elements; conversely, just as experience teaches the chemist every day that by proper treatment the properties of given bodies may be changed in the most various ways, the observed changes of properties were ascribed to the gain or loss of the corresponding elements. According to this theory, which accounted rather well for a large number of facts, there was no fundamental objection against trying to endow base metals with the properties of the precious ones; to make artificial gold was a task quite similar to the modern problem of, *e.g.* making artificial quinine. The realization that there is a certain natural law preventing such changes is of much later date. It is therefore quite unjust to consider the work of the alchemists, who tried to make artificial gold, as consummate nonsense. *A priori* there was no reason why a change from lead to gold should be less possible than a change from iron to rust; indeed there is no *a priori* reason against it now. But experience has taught us that lead and gold are chemical elements in the modern sense, and that there is a general experimental law that elements are not transformable one into another. So experience taught the alchemists irresistibly that in spite of the manifoldness of chemical changes it is not always possible to change any given substance into another; the possibilities are much more limited, and there is only a certain range of substances to be obtained from a given one. The impossibility of transforming lead or copper into noble metals proved to be only one case out of many, and it was recognized generally that there are certain chemical families whose members are related to one another by their mutual transformability, while it is impossible to bridge the boundaries separating these families.

Work of Robert Boyle.

The man who brought all these experiences and considerations into scientific form was Robert Boyle. He stated as a general principle, that only tangible and ponderable substances should be recognized as elements, an element being a substance from which other substances may be made, but which cannot be separated into different substances. He showed that neither the peripatetic nor the alchemistic elements satisfied this definition. But he was more of a critical than of a synthetical turn of mind; although he established the correct principles, he hesitated to point out what substances, among those known at his time, were to be considered as elements. He only paved the way to the goal by laying the foundations of analytical chemistry, *i.e.* by teaching how to characterize and to distinguish different chemical individuals. Further, by adopting and developing the corpuscular hypothesis of the constitution of the ponderable substances, he foreshadowed, in a way, the law of the conservation of the elements, viz. that no element can be changed into another element; and he considered the compound substances to be made up from small particles or corpuscles of their elements, the latter retaining their essence in all combinations. This hypothesis accounts for the fact that only a limited number of other substances can be made from a given one—namely, only those which contain the elements present in the given substance. But it is characteristic of Boyle's critical mind that he did not shut his eyes against a serious objection to his hypothesis. If the compound substance is made up of parts of the elements, one would expect that the properties of the compound substance would prove to be the sum of the properties of the elements. But this is not the case, and chemical compounds show properties which generally differ very considerably from those of the compounds. On the one hand, the corpuscular hypothesis of Boyle was developed into the atomic hypothesis of Dalton, which was considered at the beginning of the 19th century as the very best representation of chemical facts, while, on the other hand, the difficulty as to the properties of the compounds remained the same as Boyle found it, and has not yet been removed by an appropriate development of the atomic hypothesis. Thus Boyle considered, *e.g.* the metals as elements. However, it is interesting to note that he considered the mutual transformation of the metals as not altogether impossible, and he even tells of a case when gold was transformed into base metal. It is a common psychological fact that a reformer does not generally succeed in being wholly consistent in his reforming ideas; there remains invariably some point where he commits exactly the same fault which he set out to abolish. We shall find the same inconsistency also among other chemical reformers. Even earlier than Boyle, Joachim Jung (1587–1657) of Hamburg developed similar ideas. But as he did not distinguish himself, as Boyle did, by experimental work in science, his views exerted only a limited influence amongst his pupils.

Phlogiston theory.

In the times following Boyle's work we find no remarkable outside development of the theory of elements, but a very important inside one. Analytical chemistry, or the art of distinguishing different chemical substances, was rapidly developing, and the necessary foundation for such a theory was thus laid. We find the discussions about the true elements disappearing from the text-books, or removed to an insignificant corner, while the description of observed chemical changes of different ways of preparing the same substance, as identified by the same properties, and of the methods for recognizing and distinguishing the various substances, take their place. The similarity of certain groups of chemical changes, as, for example, combustion, and the inverse process, reduction, was observed, and thus led to an attempt to shape these most general facts into a common theory. In this way the theory of "phlogiston" was developed by G.E. Stahl, phlogiston being (according to the usual way of regarding general properties as being due to a principle or element) the "principle of combustibility," similar to the "sulphur" of the alchemists. This again must be regarded as quite a legitimate step justified by the knowledge of the time. For experience taught that combustibility could be *transferred* by chemical action, *e.g.* from charcoal to litharge, the latter being changed thereby into combustible metallic lead; and according to Boyle's principle, that only *bodies* should be recognized as chemical elements, phlogiston was considered as a body. From the fact that all leading chemists in the second half of the 18th century used the phlogiston theory and were not hindered by it in making their great discoveries, it is evident that a sufficient amount of truth and usefulness was embodied in this theory. It states indeed quite correctly the mutual relations between oxidation and reduction, as we now call these very general processes, and was erroneous only in regard to one question, which at that time had not aroused much interest, the question of the change of weight during chemical processes.

Lavoisier's reform.

It was only after Isaac Newton's discovery of universal gravitation that weight was considered as a property of paramount interest and importance, and that the question of the changes of weight in chemical reactions became one worth asking. When in due time this question was raised, the fact became evident at once, that combustion means not loss but gain of weight. To be sure of this, it was necessary to know first the chemical and physical properties of gases, and it was just at the same time that this knowledge was developed by Priestley, Scheele and others. Lavoisier was the originator and expounder of the necessary reform. Oxygen was just discovered at that time, and Lavoisier gathered evidence from all sides that the theory of phlogiston had to be turned inside out to fit the new facts.

He realized that the sum total of the weights of all substances concerned within a chemical change is not altered by the change. This principle of the "conservation of weight" led at once to a simple and unmistakable definition of a chemical element. As the weight of a compound substance is the sum of the weights of its elements, the compound necessarily weighs more than any of its elements. An element is therefore a substance which, by being changed into another substance, invariably increases its weight, and never gives rise to substances of less weight. By the help of this criterion Lavoisier composed the first table of chemical elements similar to our modern ones. According to the knowledge of his time he regarded the alkalis as elements, although he remarked that they are rather similar to certain oxides, and therefore may possibly contain oxygen; the truth of this was proved at a later date by Humphry Davy. But the inconsistency of the reformer, already referred to, may be observed with Lavoisier. He included "heat and light" in his list of elements, although he knew that neither of them had weight, and that neither fitted his definition of an element; this atavistic survival was subsequently removed from the table of the elements by Berzelius in the beginning of the 19th century. In this way the question of what substances are to be regarded as chemical elements had been settled satisfactorily in a qualitative way, but it is interesting to realize that the last step in this development, the theory of Lavoisier, was based on quantitative considerations. Such considerations became of paramount interest at once, and led to the concept of the *combining weights of the elements*.

J. B. Richter's work.

The first discoveries in this field were made in the last quarter of the 18th century by J. B. Richter. The point at issue was a rather commonplace one: it was the fact that when two neutral salt solutions were mixed to undergo mutual chemical decomposition and recombination, the resulting liquid was neutral again, *i.e.* it did not contain any excess of acid or base. In other words, if two salts, $A'B'$ and $A''B''$, composed of the acids A' and A'' and the bases B' and B'', undergo mutual decomposition, the amount of the base B' left by the first salt, when its acid A' united with the base B'' to form a new salt $A'B''$, was just enough to make a neutral salt $A''B'$ with the acid A'' left by the second salt. At first sight this looks quite simple and self-evident,—that neutral salts should form neutral ones again and not acid or basic ones,—but if this fact is once stated very serious quantitative inferences may be drawn from it, as Richter showed. For if the symbols A', A'', B', B'' denote at the same time such quantities of the acids and bases as form neutral salts, then if three of these quantities are determined, the fourth may be calculated from the others. This follows from the fact that by decomposing $A'B'$ with just the proper amount of the other salt to form $A'B''$, the remaining quantities B' and A'' exist in exactly the ratio to form a neutral salt $A''B'$. It is possible, therefore, to ascribe to each acid and base a certain relative weight or "combining weight" by which they will combine one with the other to form neutral salts. The same reasoning may be extended to any number of acids and bases.

It is true that Richter did not find out by himself this simplest statement of the law of neutrality which he discovered, but he expressed the same consequence in a rather clumsy way by a table of the combining weights of different bases related to the unit amount of a certain acid, and doing the same thing for the unit weight of every other acid. Then he observed that the numbers in these different tables are proportionate one to another. The same holds good if the corresponding series of the combining weights of acids for unit weights of different bases were tabulated. It was only a little later that a Berlin physicist, G. E. Fischer, united the whole system of Richter's numbers simply into a double table of acids and bases, taking as unit an arbitrarily chosen substance, namely sulphuric acid. The following table by Fischer is therefore the first table of combining weights.

Bases.		*Acids.*	
Alumina	525	Fluoric	427
Magnesia	615	Carbonic	577
Ammoniac	672	Sebacic	706
Lime	793	Muriatic (hydrochloric)	712
Soda	859	Oxalic	755
Strontiane	1329	Phosphoric	979
Potash	1605	Formic	988
Baryte	2222	Sulphuric	1000
		Succinic	1209
		Nitric	1405
		Acetic	1480
		Citric	1683
		Tartaric	1694

It is interesting again to notice how difficult it is for the discoverer of a new truth to find out the most simple and complete statement of his discovery. It looks as if the amount of work needed to get to the top of a new idea is so great that not enough energy remains to clear the very last few steps. It is noteworthy also to observe how difficult it was for the chemists of that time to understand the bearing of Richter's work. Although a summary of his results was published in Berthollet's *Essai de statique chimique*, one of the most renowned chemical books of that time, nobody dared for a long time to take up the scientific treasure laid open for all the world.

John Dalton's atomic theory.

At the beginning of the 19th century the same question was taken up from quite another standpoint. John Dalton, in his investigations of the behaviour of gases, and in order to understand more easily what happened when gases were absorbed by liquids, used the corpuscular hypothesis already mentioned in connexion with Boyle. While he depicted to himself how the corpuscles, or, as he preferred to call them, the "atoms" of the gases, entered the interstices of the atoms of the liquids in which they dissolved, he asked himself: Are the several atoms of the same substance exactly alike, or are there differences as between the grains of sand? Now experience teaches us that it is impossible to separate, for example, a quantity of pure water into two samples of somewhat different properties. When a pure substance is fractionated by partial distillation or partial crystallization or partial change into another substance by chemical means, we find constantly that the residue is not changed in its properties, as it would be if the atoms were slightly different, since in that case *e.g.* the lighter atoms would distil first and leave behind the heavier ones, &c. Therefore we must conclude that all atoms of the same kind are exactly alike in shape and weight. But, if this be so, then all combinations between different atoms must proceed in certain invariable ratios of the weights of the elements, namely by the ratio of the weights of the atoms. Now it is impossible to weigh the atoms directly; but if we determine the ratio of the weights in which oxygen and hydrogen combine to form water, we determine in this way also the relative weight of their atoms. By a proper number of analyses of simple chemical compounds we may determine the ratios between the weights of all elementary atoms, and, selecting one of them as a standard or unit, we may express the weight of all other atoms in terms of this unit. The following table is Dalton's (*Mem. of the Lit. and Phil. Soc. of Manchester* (II.), vol. i. p. 287, 1805).

Table of the Relative Weights of the Ultimate Particles of Gaseous and other Bodies.

Hydrogen	1	Nitrous oxide	13·7
Azot	4·2	Sulphur	14·4
Carbone	4·3	Nitric acid	15·2
Ammonia	5·2	Sulphuretted hydrogen	15·4
Oxygen	5·5	Carbonic acid	15·3
Water	6·5	Alcohol	15·1
Phosphorus	7·2	Sulphureous acid	19·9
Phosphuretted hydrogen	8·2	Sulphuric acid	25·4
Nitrous gas	9·3	Carburetted hydrogen from stagnant water	6·3
Ether	9·6	Olefiant gas	5·3
Gaseous oxide of carbone	9·8		

Dalton at once drew a peculiar inference from this view. If two elements combine in different ratios, one must conclude that different numbers of atoms unite. There must be, therefore, a simple ratio between the quantities of the one element united to the same quantity of the other. Dalton showed at once that the analysis of carbon monoxide and of carbonic acid satisfied this consequence, the quantity of oxygen in the second compound being double the quantity in the first one. A similar relation holds good between marsh gas and olefiant gas (ethylene). This is the "law of multiple proportions" (see ATOM). By these considerations Dalton extended the law of combining weights, which Richter had demonstrated only for neutral salts, to all possible chemical compounds. While the scope of the law was enormously extended, its experimental foundation was even smaller than with Richter. Dalton did not concern himself very much with the experimental verification of his ideas, and the first communication of his theory in a paper on the absorption of gases by liquids (1803) attracted as little notice as Richter's discoveries. Even when T. Thomson published Dalton's views in an appendix to his widely read text-book of chemistry, matters did not change very much. It was only by the work of J. J. Berzelius that the enormous importance of Dalton's views was brought to light.

Work of J. J. Berzelius.

Berzelius was at that time busy in developing a trustworthy system of chemical analysis, and for this purpose he investigated the composition of the most important salts. He then went over the work of Richter, and realized that by his law he could check the results of his analyses. He tried it and found the law to hold good in most cases; when it did not, according to his analyses, he found that the error was on his own side and that better analyses fitted Richter's law. Thus he was prepared to understand the importance of Dalton's views and he proceeded at once to test its exactness. The result was the best possible. The law of the combining weights of the atoms, or of the atomic weights, proved to hold good in every case in which it was tested. All chemical combinations between the several elements are therefore regulated by weight according to certain numbers, one for each element, and combinations between the elements occur only in ratios given by these weights or by simple multiples thereof. Consequently Berzelius regarded Dalton's atomic hypothesis as proved by experiment, and became a strong believer in it.

At the same time W. H. Wollaston had discovered independently the law of multiple proportions in the case of neutral and acid salts. He gave up further work when he learned of Dalton's ideas, but afterwards he pointed out that it was necessary to distinguish the *hypothetical* part in Dalton's views from their *empirical* part. The latter is the law of combining weights, or the law that chemical combination occurs only according to certain numbers characteristic for each element. Besides this purely experimental law there is the hypothetical explanation by the assumption of the existence of atoms. As it is not proved that this explanation is the only one possible, the existence of the law is not a proof of the existence of the atoms. He therefore preferred to call the characteristic combining numbers of the elements not "atomic weights" but "chemical equivalents."

Although there were at all times chemists who shared Wollaston's cautious views, the atomic hypothesis found general acceptance because of its ready adaptability to the most diverse chemical facts. In our time it is even rather difficult to separate, as Wollaston did, the empirical part from the hypothetical one, and the concept of the atom penetrates the whole system of chemistry, especially organic chemistry.

If we compare the work of Dalton with that of Richter we find a fundamental difference. Richter's inference as to the existence of combining weights in salts is based solely on an experimental observation, namely, the persistence of neutrality after double decomposition; Dalton's theory, on the contrary, is based on the hypothetical concept of the atom. Now, however favourably one may think of the probability of the existence of atoms, this existence is really not an observed fact, and it is necessary therefore to ask: Does there exist some general fact which may lead directly to the inference of the existence of combining weights of the elements, just as the persistence of neutrality leads to the same consequence as to acids and bases? The answer is in the affirmative, although it took a whole century before this question was put and answered. In a series of rather difficult papers (*Zeits. f. Phys. Chem.* since 1895, and *Annalen der Naturphilosophie* since 1902), Franz Wald (of Kladno, Bohemia) developed his investigations as to the genesis of this general law. Later, W. Ostwald (Faraday lecture, *Trans. Chem. Soc.*, 1904) simplified Wald's reasoning and made it more evident.

The general fact upon which the necessary existence of combining weights of the elements may be based is the shifting character of the boundary between elements and compounds. It has already been pointed out that Lavoisier considered the alkalis and the alkaline earths as elements, because in his time they had not been decomposed. As long as the decomposition had not been effected, these compounds could be considered and treated like elements without mistake, their combining weight being the sum of the combining weights of their (subsequently discovered) elements. This means that compounds enter in reaction with other substances as a whole, just as elements do. In particular, if a compound AB combines with another substance (elementary or compound) C to form a ternary compound ABC, it enters this latter as a whole, leaving behind no residue of A or B. Inversely, if a ternary compound ABC be changed into a binary one AB by taking away the element C, there will not be found any excess of A or B, but both elements will exhibit just the same ratio in the binary as in the ternary compound.

Experimentally this important fact was proved first by Berzelius, who showed that by oxidizing lead sulphide, PbS, to lead sulphate, $PbSO_4$, no excess either of sulphur or lead could be found after oxidation; the same held good with barium sulphite, $BaSO_3$, when converted into barium sulphate, $BaSO_4$. On a much larger scale and with very great accuracy the inverse was proved half a century later by J. S. Stas, who reduced silver chlorate, $AgClO_3$, silver bromate, $AgBrO_3$, and silver iodate, $AgIO_3$, to the corresponding binary compounds, $AgCl$, $AgBr$ and AgI, and searched in the residue of the reaction for any excess of silver or halogen. As the tests for these substances are among the most sensitive in analytical chemistry, the general law underwent a very severe test indeed. But the result was the same as was found by Berzelius—no excess of one of the elements could be discovered. We may infer, therefore, generally that compounds enter ulterior combinations without change of the ratio of their elements, or that the ratio between different elements in their compounds is the same in binary and ternary (or still more complicated) combinations.

This law involves the existence of general combining weights just in the same way as the law of neutrality with double decomposition of salts involves the law of the combining weights of acids and bases. For if the ratio between A and B is determined, this same ratio must obtain in all ternary and more complicated compounds, containing the same elements. The same is true for any other elements, C, D, E, F, &c., as related to A. But by applying the general law to the ternary compound ABC the same conclusion may be drawn as to the ratio A : C in all compounds containing A and C, or B : C in the corresponding compounds. By reasoning further in the same way, we come to the conclusion that only such compounds are possible which contain elements according to certain ratio-numbers, *i.e.* their combining weight. Any other ratio would violate the law of the integral reaction of compounds.

As to the law of multiple proportions, it may be deduced by a similar reasoning by considering the possible combinations between a compound, *e.g.* AB, and one of its elements, say B. AB and B can combine only according to their combining weights, and therefore the quantity of B combining with AB is equal to the quantity of AB which has combined with A to form AB. The new combination is therefore to be expressed by AB_2. By extending this reasoning in the same way, we get the general conclusion that any compounds must be composed according to the formula $A_mB_nC_p \ldots$, where m, n, p, &c., are integers.

The bearing of these considerations on the atomic hypothesis is not to disprove it, but rather to show that the existence of the law of combining weights, which has been considered for so long as a proof of the truth of this hypothesis, does not necessarily involve such a consequence. Whether atoms may prove to exist or not, the law of combining weights is independent thereof.

Atomic weight determinations.

Two problems arose from the discoveries of Dalton and Berzelius. The first was to determine as exactly as possible the correct numbers of the combining weights. The other results from the fact that the same elements may combine in different ratios. Which of these ratios gives the true ratio of the atomic weights? And which is the multiple one? Both questions have had most ample experimental investigation, and are now answered rather satisfactorily. The first question was a purely technical one; its answer depended upon analytical skill, and Berzelius in his time easily took the lead, his numbers being readily accepted on the continent of Europe. In England there was a certain hesitation at first, owing to Prout's assumption (see below), but when Turner, at the instigation of the British Association for the Advancement of Science, tested Berzelius's numbers and found them entirely in accordance with his own measurements, these numbers were universally accepted. But then a rather large error in one of Berzelius's numbers (for carbon) was discovered in 1841 by Dumas and Stas, and a kind of panic ensued. New determinations of the atomic weights were undertaken from all sides. The result was most satisfactory for Berzelius, for no other important error was discovered, and even Dumas remarked that repeating a determination by Berzelius only meant getting the same result, if one worked properly. In later times more exact measurements, corresponding to the increasing art in analysis, were carried out by various workers, amongst whom J. S. Stas distinguished himself. But even the classical work of Stas proved not to be entirely without error; for every period has its limit in accuracy, which extends slowly as science extends. In recent times American chemists have been especially prominent in work of this kind, and the determinations of E. W. Morley, T. W. Richards and G. P. Baxter rank among the first in this line of investigation.

During this work the question arose naturally: How far does the *exactness* of the law extend? It is well known that most natural laws are only approximations, owing to disturbing causes. Are there disturbing causes also with atomic weights? The answer is that as far as we know there are none. The law is still an exact one. But we must keep in mind that an absolute answer is never possible. Our exactness is in every case limited, and as long as the possible variations lie behind this limit, we cannot tell anything about them. In recent times H. Landolt has doubted and experimentally investigated the law of the conservation of weight.

Landolt's experiments were carried out in vessels of the shape of an inverted U, each branch holding one of the substances to react one on the other. Two vessels were prepared as equal as possible and hung on both sides of a most sensitive balance. Then the difference of weight was determined in the usual way by exchanging both the vessels on the balance. After this set of weighings one of the vessels was inverted and the chemical reaction between the contained substances was performed; then the double weighing was repeated. Finally also the second vessel was inverted and a third set of weighings taken. From blank experiments where the vessels were filled with substances which did not react one on the other, the maximum error was determined to 0·03 milligramme. The reactions experimented with were: silver salts with ferrous sulphate; iron on copper sulphate; gold chloride and ferrous chloride; iodic acid and hydriodic acid; iodine and sodium sulphite; uranyl nitrate and potassium hydrate; chloral hydrate and potassium hydrate; electrolysis of cadmium iodide by an alternating current; solution of ammonium chloride, potassium bromide and uranyl nitrate in water, and precipitation of an aqueous solution of copper sulphate by alcohol. In most of these experiments a slight diminution of weight was observed which exceeded the limit of error distinctly in two cases, viz. silver nitrate with ferrous sulphate and iodic acid with hydriodic acid, the loss of weight amounting from 0·068 to 0·199 mg. with the first and 0·047 to 0·177 mg. with the second reaction on about 50 g. of substance. As each of these reactions had been tried in nine independent experiments, Landolt felt certain that there was no error of observation involved. But when the vessels were covered inside with paraffin wax, no appreciable diminution of weight was observed.

These experiments apparently suggested a small decrease of weight as a consequence of chemical processes. On repeating them, however, and making allowance for the different amounts of water absorbed on the surface of the vessel at the beginning and end of the experiment, Landolt found in 1908 (*Zeit. physik. Chem.* 64, p. 581) that the variations in weight are equally positive and negative, and he concluded that there was no change in weight, at least to the extent of 1 part in 10,000,000.

The periodic arrangement.

There is still another question regarding the numerical values of the atomic weights, namely: Are there relations between the numbers belonging to the several elements? Richter had arranged his combining weights according to their magnitude, and endeavoured to prove that they form a certain mathematical series. He also explained the incompleteness of his series by assuming that certain acids or bases requisite to the filling up of the gaps in the series, were not yet known. He even had the satisfaction that in his time a new base was discovered, which fitted rather well into one of his gaps; but when it turned out afterwards that this new base was only calcium phosphate, this way of reasoning fell into discredit and was resumed only at a much later date.

To obtain a correct table of atomic weights the second question already mentioned, viz. how to select the correct value in the case of multiple proportions, had to be answered. Berzelius was constantly on the look-out for means to distinguish the true atomic weights from their multiples or sub-multiples, but he could not find an unmistakable test. The whole question fell into a terrible disorder, until in the middle of the 19th century S. Cannizzaro showed that by taking together all partial evidences one could get a system of atomic weights consistent in itself and fitting the exigencies of chemical systematics. Then a startling discovery was made by the same method which Richter had tried in vain, by arranging all atomic weights in one series according to their numerical values.

The Periodic Law.—The history of this discovery is rather long. As early as 1817 J. W. Döbereiner of Jena drew attention to the fact that the combining weight of strontium lies midway between those of calcium and barium, and some years later he showed that such "triads" occurred in other cases too. L. Gmelin tried to apply this idea to all elements, but he realized that in many cases more than three elements had to be grouped together. While Ernst Lenssen applied the idea of triads to the whole table of chemical elements, but without any important result, the other idea of grouping more than three elements into series according to their combining weights proved more successful. It was the concept of homologous series just developed in organic chemistry which influenced such considerations. First Max von Pettenkofer in 1850 and then J. B. A. Dumas in 1851 undertook to show that such a series of similar elements could be formed, having nearly constant differences between their combining weights. It is true that this idea in all its simplicity did not hold good extensively enough; so J. P. Cooke and Dumas tried more complicated types of numerical series, but only with a temporary success.

The idea of arranging all elements in a single series in the order of the magnitude of their combining weights, the germ of which is to be found already in J. B. Richter's work, appears first in 1860 in some tables published by Lothar Meyer for his lectures. Independently, A. E. B. de Chancourtois in 1862, J. A. R. Newlands in 1863, and D. I. Mendeléeff in 1869, developed the same idea with the same result, namely, that it is possible to divide this series of all the elements into a certain number of very similar parts. In their papers, which appeared in the same year, 1869, Lothar Meyer and Mendeléeff gave to all these trials the shape now generally adopted. They succeeded in proving beyond all doubt that this series was of a *periodic character*, and could be cut into shorter pieces of similar construction. Here again gaps were present to be filled up by elements to be discovered, and Mendeléeff, who did this, predicted from the general regularity of his table the properties of such unknown elements. In this case fate was more kind than with Richter, and science had the satisfaction of seeing these predictions turn out to be true.

The following table contains this periodic arrangement of the elements according to their atomic weight. By cutting the whole series into pieces of eight elements (or more in several

He 4·0	Li 7·03	Be 9·1	B 11·0	C 12·00	N 14·01	O 16·00	F 19·0	..	..	..
Ne 20	Na 23·00	Mg 24·32	Al 27·1	Si 28·4	P 31·0	S 32·06	Cl 35·45	..	..	..
Ar 39·9	K 39·15	Ca 40·1	Sc 44·1	Ti 48·1	V 51·2	Cr 52·0	Mn 55·0	Fe 55·9,	Ni 58·7,	Co 59·0
..	Cu 63·6	In 65·4	Ga 70	Ge 72·5	As 75·0	Se 79·2	Br 79·96	..	..	..
Kr 83·0	Rb 85·5	Sr 87·6	Y 89·0	Zr 90·6	Cb(Nb) 94	Mo 96·0	..	Ru 101·7,	Rh 103·0,	Pd 106·5
..	Ag 107·93	Cd 112·4	In 115	Sn 119·0	Sb 120·2	Te 127·6	I 126·97	..	..	..
Xe 130·7	Cs 132·9	Ba 137·4	La 138·9	Ce &c. 140	Ta 181	W 184	..	Os 191,	Ir 193·0,	Pt 194·8
..	Au 197·2	Hg 200·0	Tl 204·1	Pb 206·9	Bi 208·0	..	..	..	..	..
..	..	Ra 225	..	Th 232·5	..	U 238·5	..	..	..	..

cases) and arranging these one below another in the alternating way shown in the table, one finds similar elements placed in vertical series whose properties change gradually and with some regularity according to their place in the table. Not only the properties of the uncombined elements obey this rule, but also almost all properties of similar compounds of the elements.

But upon closer investigation it must be confessed that these regularities can be called only rules, and not laws. In the first line one would expect that the steps in the values of the atomic weights should be regular, but it is not so. There are even cases when it is necessary to invert the order of the atomic weights to satisfy the chemical necessities. Thus argon has a larger number than potassium, but must precede it to fit into its proper place. The same is true of tellurium and iodine. It looks as if the real elements were scattered somewhat haphazard on a regular table, or as if some independent factor were active to disturb an existing regularity. It may be that the new facts mentioned above will lead also to an explanation of these irregularities; at present we must recognize them and not try to explain them away. Such considerations have to be kept in mind especially in regard to the very numerous attempts to express the series of combining weights in a mathematical form. In several cases rather surprising agreements were found, but never without exception. It looks as if some very important factor regulating the whole matter is still unknown, and before this has been elucidated no satisfactory treatment of the matter is possible. It seems therefore premature to enter into the details of these speculations.

Transmutation of elements.

In recent times not only our belief in the absolute exactness of the law of the conservation of weight has been shaken, but also our belief in the law of the conservation of the elements. The wonderful substance radium, whose existence has made us to revise quite a number of old and established views, seems to be a fulfilment of the old problem of the alchemists. It is true that by its help lead is not changed into gold, but radium not only changes itself into another element, helium (Ramsay), but seems also to cause other elements to change. Work in this line is of present day origin only and we do not know what new laws will be found to regulate these most unexpected reactions (see RADIOACTIVITY). But we realize once more that no law can be regarded as free from criticism and limitation; in the whole realm of exact sciences there is no such thing as the Absolute.

Prout's assumption.

Another question regarding the values of atomic weights was raised very soon after their first establishment. From the somewhat inexact first determinations William Prout concluded that all atomic weights are multiples of the atomic weight of hydrogen, thus suggesting all other elements to be probably made up from condensed hydrogen. Berzelius found his determinations not at all in accordance with this assumption, and strongly opposed the arbitrary rounding off of the numbers practised by the partisans of Prout's hypothesis. His hypothesis remained alive, although almost every chemist who did *exact* atomic weight determinations, especially Stas, contradicted it severely. Even in our time it seems to have followers, who hope that in some way the existing experimental differences may disappear. But one of the most important and best-known relations, that between *hydrogen* and *oxygen*, is certainly different from the simple ratio 1:16, for it has been determined by a large number of different investigators and by different methods to be undoubtedly lower, namely, 1:15·87. Therefore, if Prout's hypothesis contain an element of truth, by the act of condensation of some simpler substance into the present chemical elements a change of weight also must have occurred, such that the weight of the element did not remain exactly the weight of the simpler substance which changed into it. We have already remarked that such phenomena are not yet known with certainty, but they cannot be regarded as utterly impossible.

It may here be mentioned that the internationality of science has shown itself active also in the question of atomic weights. These numbers undergo incessantly small variations because of new work done for their determination. To avoid the uncertainty arising from this inevitable state of affairs, an international committee was formed by the co-operation of the leading chemical societies all over the world, and an international table of the most probable values is issued every year. The following table is that for 1910:—

International table of atomic weights.

International Atomic Weights, 1910.

Name.	Symbol.	Atomic Weights. 0=16.
Aluminium	Al	27·1
Antimony	Sb	120·2
Argon	Ar	39·9
Arsenic	As	74·96
Barium	Ba	137·37
Beryllium (Glucinum)	Be Gl	9·1
Bismuth	Bi	208·0
Boron	B	11·0
Bromine	Br	79·92
Cadmium	Cd	112·40
Caesium	Cs	132·81
Calcium	Ca	40·09
Carbon	C	12·00
Cerium	Ce	140·25
Chlorine	Cl	35·46
Chromium	Cr	52·0
Cobalt	Co	58·97
Columbium (Niobium)	Cb (Nb)	93·5
Copper	Cu	63·57
Dysprosium	Dy	162·5
Erbium	Er	167·4
Europium	Eu	152·0
Fluorine	F	19·0
Gadolinium	Gd	157·3
Gallium	Ga	69·9
Germanium	Ge	72·5
Gold	Au	197·2
Helium	He	4·0
Hydrogen	H	1·008
Indium	In	114·8
Iodine	I	126·92
Iridium	Ir	193·1
Iron	Fe	55·85
Krypton	Kr	83·0
Lanthanum	La	139·0
Lead	Pb	207·10
Lithium	Li	7·00
Lutecium	Lu	174·0
Magnesium	Mg	24·32
Manganese	Mn	54·93
Mercury	Hg	200·0
Molybdenum	Mo	96·0
Neodymium	Nd	144·3
Neon	Ne	20·0
Nickel	Ni	58·68
Nitrogen	N	14·01
Osmium	Os	190·9
Oxygen	O	16·00
Palladium	Pd	106·7
Phosphorus	P	31·0
Platinum	Pt	195·0
Potassium	K	39·10
Praseodymium	Pr	140·6
Radium	Ra	226·4
Rhodium	Rh	102·9
Rubidium	Rb	85·45
Ruthenium	Ru	101·7
Samarium	Sm	150·4
Scandium	Sc	44·1
Selenium	Se	79·2
Silicon	Si	28·3
Silver	Ag	107·88
Sodium	Na	23·00
Strontium	Sr	87·62
Sulphur	S	32·07
Tantalum	Ta	181·0
Tellurium	Te	127·5
Terbium	Tb	159·2
Thallium	Tl	204·0
Thorium	Th	232·42
Thulium	Tm	168·5
Tin	Sn	119·0
Titanium	Ti	48·1
Tungsten	W	184·0
Uranium	U	238·5
Vanadium	V	51·2
Xenon	Xe	130·7
Ytterbium (Neo-ytterbium)	Yb	172·0
Yttrium	Y	89·0
Zinc	Zn	65·37
Zirconium	Zr	90·6

Concluding remarks.

In the long and manifold development of the concept of the element one idea has remained prominent from the very beginning down to our times: it is the idea of a primordial matter. Since the naive statement of Thales that all things came from water, chemists could never reconcile themselves to the fact of the conservation of the elements. By an experimental investigation which extended over five centuries and more, the impossibility of transmuting one element into another—for example, lead into gold—was demonstrated in the most extended way, and nevertheless this law has so little entered the consciousness of the chemists that it is seldom explicitly stated even in carefully written text-books. On the other side the attempts to reduce the manifoldness of the actual chemical elements to one single primordial matter have never ceased, and the latest development of science seems to endorse such a view. It is therefore necessary to consider this question from a most general standpoint.

In physical science, the chemical elements may be compared with such concepts as *mass*, *momentum*, *quantity of electricity*, *entropy* and such like. While mass and entropy are determined univocally by a unit and a number, quantity of electricity has a unit, a number and a sign, for it can be positive as well as negative. Momentum has a unit, a number and a direction in space. Elements do not have a common unit as the former magnitudes, but every element has its own unit, and there is no transition from one to another. All these magnitudes underlie a law of conservation, but to a very different degree. While mass was considered as absolutely invariable in the classical mechanics, the newer theories of the electrical constitution of matter make mass dependent on the velocity of the moving electron. Momentum also is not entirely conservative because it can be changed by light-pressure. Entropy is known as constantly increasing, remaining constant only in an ideal limiting case. With chemical elements we observe the same thing as with momentum; though till recently considered as conservative, there is now experimental evidence that they do not always show this character.

Generally the laws of the conservation of mass, weight and elements are expressed as the "law of the conservation of matter." But this expression lacks scientific exactness because the term "matter" is generally not defined exactly, and because only the above-named properties of ponderable objects do not change, while all other properties do to a greater or less extent. Considered in the most general way, we may define matter as a complex of gravitational, kinetic and chemical energies, which are found to cling together in the same space. Of these energies the capacity factors, namely, weight, mass and elements, are conservative as described, while the intensity factors, potential, velocity and affinity, may change in wide limits. To explain why we find these energies constantly combined one with another, we only have to think of a mass without gravity or a ponderable body without mass. The first could not remain on earth because every movement would carry it into infinite space, and the second would acquire infinite velocity by the slightest push and would also disappear at once. Therefore only such objects which have both mass and weight can be handled and can be objects of our knowledge. In the same way all other energies come to our knowledge only by being (at least temporarily) associated with this combination of mass and weight. This is the true meaning of the term "matter."

In this line of ideas matter appears not at all as a primary concept, but as a complex one; there is therefore no reason to consider matter as the last term of scientific analysis of chemical facts, and the idea of a primordial matter appears as a survival from the very first beginning of European natural philosophy. The most general concept science has developed to express the variety of experience is *energy*, and in terms of energy (combined with number, magnitudes, time and space) all observed and observable experiences are to be described. (W. O.)

ELEMI, an oleo-resin (Manilla elemi) obtained in the Philippine Islands, probably from *Canarium commune* (nat. ord. Burseraceae), which when fresh and of good quality is a pale yellow granular substance, of honey-like consistency, but which gradually hardens with age. It is soluble in alcohol and ether, and has a spicy taste with a smell like fennel. In the 17th and 18th centuries the term elemi usually denoted an oleo-resin (American or Brazilian elemi) obtained from trees of the genus *Icica* in Brazil, and still earlier it meant oriental or African elemi, derived from *Boswellia Frereana*, which flourishes in the neighbourhood of Cape Gardafui. The word, like the older term *animi*, appears to have been derived from *enhaemon* (Gr. ἔναιμον), the name of a styptic medicine said by Pliny to contain tears exuded by the olive tree of Arabia.

ELEPHANT, the designation of the two existing representatives of the *Proboscidea*, a sub-order of ungulate mammals, and also extended to include their more immediate extinct relatives. As the distinctive characteristics of the sub-order, and also of the single existing genus *Elephas*, are given in the article PROBOSCIDEA, it will suffice to point out how the two existing species are distinguished from one another.

The more specialized of the two species is the Indian or Asiatic elephant, *Elephas maximus*, specially characterized by the extreme complexity of the structure of its molar teeth, which are composed of a great number of tall and thin plates of enamel and dentine, with the intervals filled by cement (see PROBOSCIDEA, fig. 1). The average number of plates of the six successive molar teeth may be expressed by the "ridge-formula" 4, 8, 12, 12, 16, 24. The plates are compressed from before backwards, the anterior and posterior surfaces (as seen in the worn grinding face of the tooth) being nearly parallel. Ears of moderate size. Upper margin of the end of the proboscis developed into a distinct finger-like process, much longer than the lower margins, and the whole trunk uniformly tapering and smooth. Five nails on the fore-feet, and four (occasionally five) on the hind-feet.

The Asiatic elephant inhabits the forest-lands of India, Burma, the Malay Peninsula, Cochin China, Ceylon and Sumatra. Elephants from the last-named islands present some variations from those of the mainland, and have been separated under the names of *E. zeylonicus* and *E. sumatranus*, but they are not more than local races, and the Ceylon animal, which is generally tuskless, may be the typical *E. maximus*, in which case the Indian race will be *E. maximus indicus*. The appearance of the Asiatic elephant is familiar to all. In the wild state it is gregarious, associating in herds of ten, twenty or more individuals, and, though it may under certain circumstances become dangerous, it is generally inoffensive and even timid, fond of shade and solitude and the neighbourhood of water. The height of the male at the shoulder when full grown is usually from 8 to 10 ft., occasionally as much as 11, and possibly even more. The female is somewhat smaller.

The following epitome of the habits of the Asiatic elephants is extracted from *Great and Small Game of India and Tibet*, by R. Lydekker:—

"The structure of the teeth is sufficient to indicate that the food consists chiefly of grass, leaves, succulent shoots and fruits; and this has been found by observation to be actually the case. In this respect the Asiatic species differs very widely from its African relative, whose nutriment is largely composed of boughs and roots. Another difference between the two animals is to be found in the great intolerance of the direct rays of the sun displayed by the Asiatic species, which never voluntarily exposes itself to their influence. Consequently, during the hot season in Upper India, and at all times except during the rains in the more southern districts, elephants keep much to the denser parts of the forests. In Southern India they delight in hill-forest, where the undergrowth is largely formed of bamboo, the tender shoots of which form a favourite delicacy; but during the rains they venture out to feed on the open grass tracts. Water is everywhere essential to their well-being; and no animals delight more thoroughly in a bath. Nor are they afraid to venture out of their depth, being excellent swimmers, and able, by means of their trunks, to breathe without difficulty when the entire body is submerged. The herds, which are led by females, appear in general to be family parties; and although commonly restricted to from thirty to fifty, may occasionally include as many as one hundred head. The old bulls are very generally solitary for a considerable portion of the year, but return to the herds during the pairing season. Some 'rogue' elephants—*gunda* of the natives—remain, however, permanently separated from the rest of their kind. All such solitary bulls, as their colloquial name indicates, are of a spiteful disposition; and it appears that with the majority the inducement to live apart is due to their partiality for cultivated crops, into which the more timid females are afraid to venture. 'Must' elephants are males in a condition of—probably sexual—excitement, when an abundant discharge of dark oily matter exudes from two pores in the forehead. In addition to various sounds produced at other times, an elephant when about to charge gives vent to a shrill loud 'trumpet'; and on such occasions rushes on its

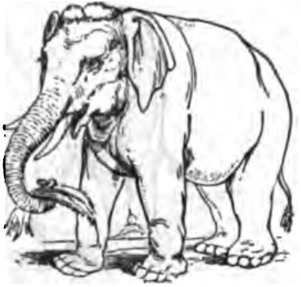


FIG. 1.

Asiatic Elephant (*Elephas maximus*).

adversary with its trunk safely rolled up out of danger, endeavouring either to pin him to the ground with its tusks (if a male tusker) or to trample him to death beneath its ponderous knees or feet."

Exact information in regard to the period of gestation of the female is still lacking, the length of the period being given from eighteen to twenty-two months by different authorities. The native idea, which may be true, is that the shorter period occurs in the case of female and the longer in that of male calves. In India elephants seldom breed in captivity, though they do so more frequently in Burma and Siam; the domesticated stock is therefore replenished by fresh captures. Occasionally two calves are produced at a birth, although the normal number is one. Calves suckle with their mouths and not with their trunks. Unlike the African species, the Indian elephant charges with its trunk curled up, and consequently in silence.

As regards their present distribution in India, elephants are found along the foot of the Himalaya as far west as the valley of Dehra-Dun, where the winter temperature falls to a comparatively low point. A favourite haunt used to be the swamp of Azufghur, lying among the sal-forests to the northward of Meerut. In the great tract of forest between the Ganges and Kistna rivers they occur locally as far west as Bilaspur and Mandla; they are met with in the Western Ghats as far north as between latitude 17° and 18°, and are likewise found in the hill-forests of Mysore, as well as still farther south. In this part of the peninsula they ascend the hills to a considerable height, as they do in the Newara Eliya district of Ceylon, where they have been encountered at an elevation of over 7000 ft. There is evidence that about three centuries ago elephants wandered in the forests of Malwa and Nimar, while they survived to a later date in the Chanda district of the Central Provinces. At the comparatively remote epoch when the Deccan was a forest tract, they were probably also met with there, but the swamps of the Bengal Sundarbans appear unsuited to their habits.

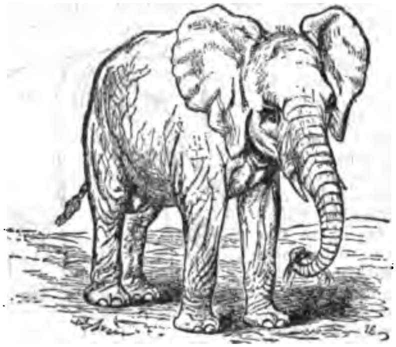


FIG. 2.—Immature African Elephant (*Elephas africanus*).

Of tusks, the three longest specimens on record respectively measure 8 ft. 9 in., 8 ft. 2 in. and 8 ft.; their respective weights being 81, 80 and 90 lb. These are, however, by no means the heaviest—one, whose length is 7 ft. 3⅜ in., weighing 102 lb; while a second, of which the length is 7 ft. 3¼ in., scaled 97½ lb. Of the largest pair in the possession of the British Museum, which belonged to an elephant killed in 1866 by Colonel G. M. Payne in Madras, one tusk measures 6 ft. 8 in. in length, and weighs 77⅜ lb, the other being somewhat smaller. It should be added that some of these large tusks came from Ceylon; such tuskers being believed to be descended from mainland animals imported into the island. "White" elephants are partial or complete albinos, and are far from uncommon in Burma and Siam. Young Indian elephants are hairy, thus showing affinity with the mammoth.

The African elephant is a very different animal from its Asiatic cousin, both as regards structure and habits; and were it not for the existence of intermediate extinct species, might well be regarded as the representative of a distinct genus. Among its characteristics the following points are noticeable. The molar teeth are of coarse construction, with fewer and larger plates and thicker enamel; the ridge-formula being 3, 6, 7, 7, 8, 10; while the plates are not flattened, but thicker in the middle than at the edges, so that their worn grinding-surfaces are lozenge-shaped. Ears very large. The upper and lower margins of the end of the trunk form two nearly equal prehensile lips. Only three toes on the hind-foot. A very important distinction is to be found in the conformation of the trunk, which, as shown in fig. 2, looks as though composed of a number of segments, gradually decreasing in size from base to tip like the joints of a telescope, instead of tapering gradually and evenly from one extremity to the other. The females have relatively large tusks, which are essential in obtaining their food. Except where exterminated by human agency (and this has been accomplished to a deplorable extent), the African elephant is a native of the wooded districts of the whole of Africa south of the Sahara. It is hunted chiefly for the sake of the ivory of its immense tusks, of which it yields the principal source of supply to the European market, and the desire to obtain which is rapidly leading to the extermination of the species. In size the male African elephant often surpasses the Asiatic species, reaching nearly 12 ft. in some cases. The circumference of the fore-foot is half the height at the shoulder, a circumstance which enables sportsmen to estimate approximately the size of their quarry. A tusk in the British Museum measures 10 ft. 2 in. in length, with a basal girth of 24 in. and a weight of 226½ lb; but a still longer, although lighter, tusk was brought to London in 1905.

Several local races of African elephant have been described, mainly distinguished from one another by the form and size of the ears, shape of the head, &c. The most interesting of these is the pigmy Congo race, *E. africanus pumilio*, named on the evidence of an immature specimen in the possession of C. Hagenbeck, the well-known animal-dealer of Hamburg, in 1905. According to Hagenbeck's estimate, this elephant, which came from the French Congo, was about six years old at the time it came under scientific notice. Moreover, in the opinion of the same observer, it is in no wise an abnormally dwarfed or ill-grown representative of the normal type of African elephant, but a well-developed adolescent animal. In height it stood about the same as a young individual of the ordinary African elephant when about a year and a half old, the vertical measurement at the shoulder being only 4 ft., or merely a foot higher than a new-born Indian elephant. Hagenbeck's estimate of its age was based on the presence of well-developed tusks, and the relative proportion of the fore and hind limbs, which are stated to show considerable differences in the case of the African elephant according to age. Nothing was stated as to the probability of an increase in the stature of the French Congo animal as it grows older; but even if we allow another foot, its height would be considerably less than half that of a large Central African bull of the ordinary elephant.

By Dr Paul Matschie several races of the African elephant have been described, mainly, as already mentioned, on certain differences in the shape of the ear. From the two West African races (*E. a. cyclotis* and *E. a. oxyotis*) the dwarf Congo elephant is stated to be distinguished by the shape of its ear; comparison in at least one instance having been made with an immature animal. The relatively small size of the ear is one of the most distinctive characteristics of the dwarf race. Further, the skin is stated to be much less rough, with fewer cracks, while a more important difference occurs in the trunk, which lacks the transverse ridges so distinctive of the ordinary African elephant, and thereby approximates to the Asiatic species.

If the differences in stature and form are constant, there can be no question as to the right of the dwarf Congo elephant to rank as a well-marked local race; the only point for consideration being whether it should not be called a species. The great interest in connexion with a dwarf West African race of elephant is in relation to the fossil pigmy elephants of the limestone fissures and caves of Malta and Cyprus. Although some of these elephants are believed not to have been larger than donkeys, the height of others may be estimated at from 4 to 5 ft, or practically the same as that of the dwarf Congo race By their describers, the dwarf European elephants were regarded as distinct species, under the names of *Elephas melitensis*, *E. mnaidriensis* and *E. cypriotes*, but since their molar teeth are essentially miniatures of those of the African elephant, it has been suggested by later observers that these animals are nothing more than dwarf races of the latter. This view may receive some support from the occurrence of a dwarf form of the African elephant in the Congo; and if we regard the latter as a subspecies of *Elephas africanus*, it seems highly probable that a similar position will have to be assigned to the pigmy European fossil elephants. If, on the other hand, the dwarf Congo elephant be regarded as a species, then the Maltese and Cyprian elephants may have to be classed as races of *Elephas pumilio*, or, rather, *E. pumilio* will have to rank as a race of the Maltese species In this connexion it is of interest to note that, both in the Mediterranean islands and in West Africa, dwarf elephants of the African type are accompanied by pigmy species of hippopotamus, although we have not yet evidence to show that in Africa the two animals occupy actually the same area Still, the close relationship of the existing Liberian pigmy hippopotamus to the fossil Mediterranean species is significant, in relation to the foregoing observations on the elephant

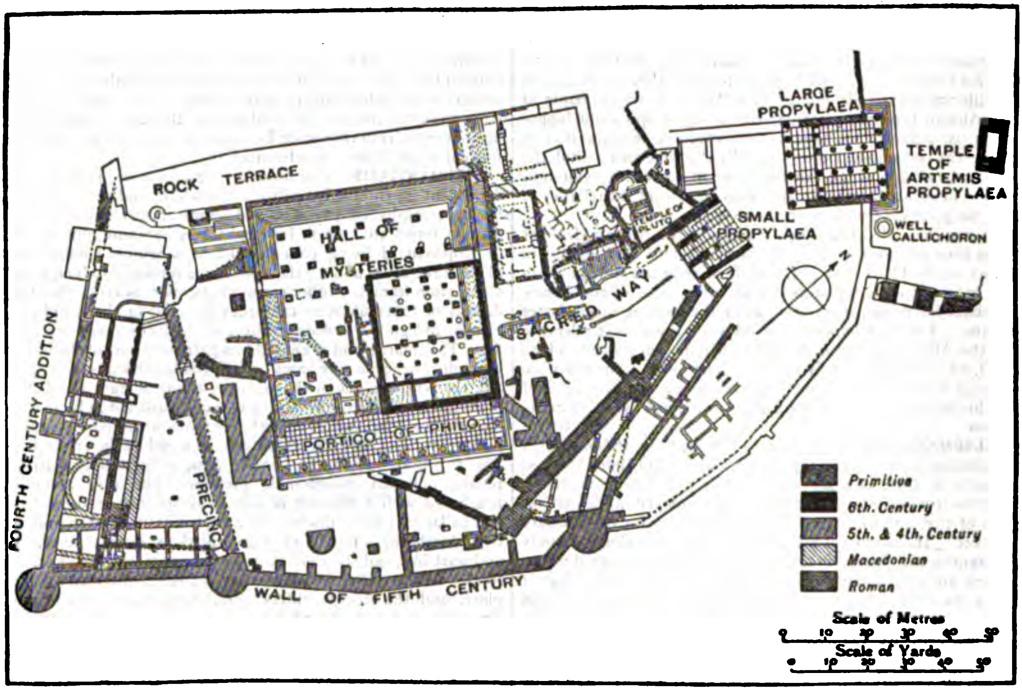
It may be added that fossil remains of the African elephant have been obtained from Spain, Sicily, Algeria and Egypt, in strata of the Pleistocene age. Some of the main differences in the habits of the African as distinct from those of the Asiatic elephant have been mentioned under the heading of the latter species. The most important of these are the greater tolerance by the African animal of sunlight, and the hard nature of its food, which consists chiefly of boughs and roots. The latter are dug up with the tusks, the left one being generally employed in this service, and thus becoming much more worn than its fellow. (R L*)

ELEPHANTA ISLE (called by the natives *Gharapuri*), a small island between Bombay and the mainland of India, situated about 6 m from Bombay It is nearly 5 m in circumference, and the few inhabitants it contains are employed in the cultivation of rice, and in rearing sheep and poultry for the Bombay market. The island, till within recent times, was almost entirely overgrown with wood, it contains several springs of good water. There are also important quarries of building stone But it owes its chief celebrity to the mythological excavations and sculptures of Hindu superstition which it contains. Opposite to the landing-place was a colossal statue of an elephant, cracked and mutilated, from which the island received from the Portuguese the name it still bears The statue was removed in 1864, and may now be seen in the Victoria Gardens, Bombay At a short distance from this spot is a cave, the entrance to which is nearly 60 ft wide and 18 high, supported by pillars cut out of the rock, the sides are sculptured into numerous compartments, containing representations of the Hindu deities, but many of the figures have been defaced by the zeal of the Mahommedans and Portuguese In the centre of the excavations is a remarkable *Trimurti* or bust, formerly thought to represent the Hindu Triad, namely, Brahma the Creator, Vishnu the Preserver, and Siva or Mahadeva the Destroyer, but now held to be a triform representation of Siva alone. The heads are from 4 to 5 ft. in length, and are well cut, and the faces, with the exception of the under lip, are handsome. The head-dresses are curiously ornamented, and one of the figures holds in its hand a cobra, while on the cap are, amongst other symbols, a human skull and an infant. On each side of the Trimurti is a pilaster, the front of which is filled up by a human figure leaning on a dwarf, both much defaced. There is a large compartment to the right, hollowed a little, and covered with a great variety of figures, the largest of which is 16 ft high, representing the double figure of Siva and Parvati, named Viraj, half male and half female. On the right is Brahma, four-faced, on a lotus—one of the very few representations of this god which now exist in India, and on the left is Vishnu. On the other side of the Trimurti is another compartment with various figures of Siva and Parvati, the most remarkable of which is Siva in his vindictive character, eight-handed, with a collet of skulls round his neck. On the right of the entrance to the cave is a square apartment, supported by eight colossal figures, containing a gigantic symbol of Mahadeva or Siva cut out of the rock. In a ravine connected with the great cave are two other caves, also containing sculptures, which, however, have been much defaced owing to the action of damp and the falling of the rocks, and in another hill is a fourth cave This interesting retreat of Hindu religious art is said to have been dedicated to Siva, but it contains numerous representations of other Hindu deities. It has, however, for long been a place not so much of worship as of archaeological and artistic interest alike to the European and Hindu traveller. It forms a wonderful monument of antiquity, and must have been a work of incredible labour Archaeological authorities are of opinion that the cave must have been excavated about the 10th century of the Christian era, if not earlier The island is much frequented by the British residents of Bombay; and during his tour in India in 1875 King Edward VII., then prince of Wales, was entertained there at a banquet

ELEPHANTIASIS (*Barbadoes leg*, *Boucnemia*), is a disease dependent on chronic lymphatic obstruction, and characterized by hypertrophy of the skin and subcutaneous tissue. Two distinct forms are known, (1) elephantiasis arabum, due to the development of living parasites, filaria sanguinis hominis (or filaria Bancrofti), and (2) the non-filarial form due to lymphatic obstruction from any other cause whatsoever, as erysipelas, the deposit of tuberculous or cancerous material in the lymphatic glands, phlegmasia dolens (white leg), long-continued eczema, &c The enlargement is limited to a particular part of the body, generally one, or in rare cases both of the lower limbs, occasionally the scrotum, one of the labiae or the mammary gland; far more rarely the face An attack is usually ushered in by febrile disturbance (elephantoid fever), the part attacked becoming rapidly swollen, and the skin tense and red as in erysipelas. The subcutaneous tissues become firm, infiltrated and hard, pitting only on considerable pressure. The skin becomes roughened with a network of dilated lymphatics, and vesicles and bullae may form, discharging a chyle-like fluid when broken (lymphorrhoea) In a later stage still the skin may be coarse and wart-like, and there is a great tendency for varicose ulcers to form. At the end of a variable time enlargement ceases to take place, and the disease enters a quiescent state but recrudescences occur at irregular intervals, always ushered in by elephantoid fever. At the end of some years the attacks of fever cease, and the affected part remains permanently swollen. The only difference in the history of the two forms of the disease lies in the fact that the non-filarial form progresses steadily, until either the underlying condition is cured, or in the case of cancer, &c., brings about a fatal issue. The elephantiasis due to filaria is spread by the agency of mosquitoes, in whose bodies the intermediate stage is passed. The dead mosquito falls upon the water, which thus becomes infected, and hence the ova reach the human stomach The young worm develops, bores through the gastric mucous membrane and finally becomes lodged in the lymphatics, usually of one or other of the extremities. A large number of embryonic filariae are produced Some remain in the lymphatic spaces and cause lymphatic obstruction, while others enter the blood stream by night (filaria nocturna), or by day (filaria diurna). It is supposed that a mosquito, biting an infected person, itself becomes infected with the blood it abstracts, and that so a new generation is developed.

Treatment for this condition is unsatisfactory. Occasionally the dilated lymph trunks can be found, and an operation performed to implant them in some vein (lymphangeioplasty). And in some few other cases artificial lymphatics have been made by introducing sterilized silk thread in the subcutaneous tissues of the affected part, and prolonging it into the normal tissues This operation has been most successful when performed on elephantoid arms dependent on a late stage of cancerous breast Elevation of the limb and elastic pressure should always be tried, but often amputation has to be resorted to in the end. The disease is totally different from the so-called elephantiasis graecorum or true leprosy, for which see LEPROSY

ELEPHANT'S-FOOT, the popular name for the plant *Testudinaria elephantipes*, a native of the Cape of Good Hope It takes its name from the large tuberous stem, which grows very slowly but often reaches a considerable size, *e.g* more than 3 yds in circumference with a height of nearly 3 ft. above ground It is rich in starch, whence the name Hottentot bread, and is covered on the outside with thick, hard, corky plates. It develops slender, leafy, climbing shoots which die down each season. It is a member of the monocotyledonous order Dioscoreaceae, climbing plants with slender herbaceous or shrubby shoots, to which belong the yam and the British black bryony, *Tamus communis*.



ELETS, a town of Russia, in the government of Orel, 122 m. by rail E.S.E. of Orel, on the railway which connects Riga with Tsaritsyn on the lower Volga. Pop. (1883) 36,680; (1900) 38,239. Owing to its advantageous position Elets has grown rapidly. Its merchants buy large quantities of grain, and numerous flour-mills, many of them driven by steam, prepare flour, which is forwarded to Moscow and Riga. The trade in cattle is very important. Elets has the first grain elevator erected in Russia (1887), a railway school, and important tanneries, foundries for cast iron and copper, tallow-melting works, limekilns and brickworks. The cathedral and two monasteries contain venerated historic relics.

Elets is first mentioned in 1147, when it was a fort of Ryazan; The Turkish Polovtsi or Kumans attacked it in the 12th century, and the Mongols destroyed it during their first invasion (1239) and again in 1305. The Tatars plundered it in 1415 and 1450; and it seems to have been completely abandoned in the latter half of the 15th century. Its development dates from the second half of the 17th century, when it became a centre for the trade with south Russia

ELEUSIS, an ancient Greek city in Attica about 14 m. N.W. of Athens, occupying the eastern part of a rocky ridge close to the shore opposite the island of Salamis. Its fame is due chiefly to its Mysteries, for which see MYSTERY Tradition carries back the origin of Eleusis to the highest antiquity. In the earlier period of its history it seems to have been an independent rival of Athens, and it was afterwards reckoned one of the twelve Old Attic cities. A considerable portion of its small territory was occupied by the plains of Thria, noticeable for their fertility, though the hopes of the husbandmen were not unfrequently disappointed by the blight of the south wind. To the west was the Πεδίον 'Ράριον or Rharian Plain, where Demeter is said to have sown the first seeds of corn; and on its confines was the field called Orgas, planted with trees consecrated to Demeter and Persephone. The sacred buildings were destroyed by Alaric in A.D. 396, and it is not certain whether they were restored before the extinction of all pagan rites by Theodosius. The present village on the site is of Albanian origin; it is called Lefsina or Lepsina, officially 'Ελευσίς.

The Site.—Systematic excavations, begun in 1882 by D. Philios for the Greek Archaeological Society, have laid bare the whole of the sacred precinct. It is now possible to trace its boundaries as extended at various periods, and also many successive stages in the history of the Telesterion, or Hall of Initiation. These complete excavations have shown the earlier and partial excavations to have been in some respects deceptive.

In front of the main entrance of the precinct is a large paved area, with the foundations of a temple in it, usually identified as that of Artemis Propylaea; in their present form both area and temple date from Roman times; and on each side of the Great Propylaea are the foundations of a Roman triumphal arch. Just below the steps of the Propylaea, on the left as one enters, there has been discovered, at a lower level than the

Roman pavement, the curb surrounding an early well. This is almost certainly the *καλλίχορον φρέαρ* mentioned by Pausanias. The Great Propylaea is a structure of Roman imperial date, in close imitation of the Propylaea on the Athenian Acropolis. It is, however, set in a wall of 6th-century work, though repaired in later times. This wall encloses a sort of outer court, of irregular triangular shape. The Small Propylaea is not set exactly opposite to the Great Propylaea, but at an angle to it; an inscription on the architrave records that it was built by Appius Claudius Pulcher, the contemporary of Cicero. It is also set in a later wall that occupies approximately the same position as two earlier ones, which date from the 6th and 5th centuries respectively, and must have indicated the boundary of the inner precinct. From the Small Propylaea a paved road of Roman date leads to one of the doors of the Telesterion. Above the Small Propylaea, partly set beneath the overhanging rock, is the precinct of Pluto; it has a curious natural cleft approached by rock-cut steps. Several inscriptions and other antiquities were found here, including the famous head, now in Athens, usually called Eubouleus, though the evidence for its identification is far from satisfactory. A little farther on is a rock-cut platform, with a well, approached by a broad flight of steps, which probably served for spectators of the sacred procession. Beyond this, close to the side of the Telesterion, are the foundations of a temple on higher ground; it has been conjectured that this was the temple of Demeter, but there is no evidence that such a building existed in historic times, apart from the Telesterion.

The Telesterion, or Hall of Initiation, was a large covered building, about 170 ft. square. It was surrounded on all sides by steps, which must have served as seats for the mystae, while the sacred dramas and processions took place on the floor of the hall: these seats were partly built up, partly cut in the solid rock; in later times they appear to have been cased with marble. There were two doors on each side of the hall, except the north-west, where it is cut out of the solid rock, and a rock terrace at a higher level adjoins it; this terrace may have been the station of those who were not yet admitted to the full initiation. The roof of the hall was carried by rows of columns, which were more than once renewed.

The architectural history of the hall has been traced by Professor W. Dörpfeld with the help of the various foundations that have been brought to light. The earliest building on the site is a small rectangular structure, with walls of polygonal masonry, built of the rock quarried on the spot. This was succeeded by a square hall, almost of the same plan as the later Telesterion, but about a quarter of the size; its eastern corner coincides with that of the later building, and it appears to have had a portico in front like that which, in the later hall, was a later addition. Its roof was carried by columns, of which the bases can still be seen. This building has with great probability been assigned to the time of Peisistratus; it was destroyed by the Persians. Between this event and the erection of the present hall, which must be substantially the one designed by Ictinus in the time of Pericles, there must have been a restoration, of which we may see the remains in a set of round sinkings to carry columns, which occur only in the north-east part of the hall; a set of bases arranged on a different system occur in the south-west part, and it is difficult to see how these two systems could be reconciled unless there were some sort of partition between the two parts of the hall. Both sets were removed to make way for the later columns, of which the bases and some of the drums still remain. These later columns are shown, by inscriptions and other fragments built into their bases, to belong to later Roman times. At the eastern and southern corners of the hall of Ictinus are projecting masses of masonry, which may be the foundation for a portico that was to be added, but perhaps they were only buttresses, intended to resist the thrust of the roof of this huge structure, which rested at its northern and western corners against the solid rock of the hill. On the south-east side the hall is faced with a portico, extending its whole width; the marble pavement of this portico is a most conspicuous feature of Eleusis at the present day. The portico was added to the hall by the architect Philo, under Demetrius of Phalerum, about the end of the 4th century B.C. It was never completed, for the fluting of its columns still remains unfinished.

The Telesterion took up the greater part of the sacred precinct, which seems merely to have served to keep the profane away from the temple. The massive walls and towers of the time of Pericles, which resemble those of a fortress, are quite close in on the south and east; later, probably in the 4th century B.C., the precinct was extended farther to the south, and at its end was erected a building of considerable extent, including a curious apsidal chamber, for which a similar but larger curved structure was substituted in Roman times. This was probably the Bouleuterion. The precinct was full of altars, dedications and inscriptions; and many fragments of sculptures, pottery and other antiquities, from the earliest to the latest days of Greece, have been discovered. It is to be noted that the subterranean passages which some earlier explorers imagined to be connected with the celebration of the mysteries, have proved to be nothing but cisterns or watercourses.

The excavations of Eleusis, and the antiquities found in them, have been published from time to time in the 'Εφημερὶς 'Αρχαιολογική and in the Πρακτικά of the Greek Archaeological Society, especially for 1887 and 1895. See also D. Philios, *Éleusis, ses mystères, ses ruines, et son musée.* Inscriptions have also been published in the *Bulletin de correspondance hellénique.* (E. Gr.)

ELEUTHERIUS, pope from about 175 to 189. Allusions to him are found in the letters of the martyrs of Lyons, cited by Eusebius, and in other documents of the time. The *Liber Pontificalis*, at the beginning of the 6th century, says that he had relations with a British king, Lucius, who was desirous of being converted to Christianity. This tradition—Roman, not British—is an enigma to critics, and, apparently, has no historical foundation. (L. D.*)

ELEUTHEROPOLIS (Gr. 'Ελευθέρα πόλις, "free city"), an ancient city of Palestine, 25 m. from Jerusalem on the road to Gaza, identified by E. Robinson with the modern Beit Jibrin. This identification is confirmed by Roman milestones in the neighbourhood. It represents the Biblical Mareshah, the ruins of which exist at Tell Sandahannah close by. As Betogabra it is mentioned by Ptolemy; the name Eleutheropolis dates from the Syrian visit of Septimius Severus (A.D. 202). Eusebius in his *Onomasticon* uses it as a central point from which the distances of other towns are measured. It was destroyed in 796, rebuilt by the crusaders in 1134 (their fortress and chapel remain, much ruined). It was finally captured by Bibars, 1244. Beit Jibrin is in the centre of a district of great archaeological interest. Besides the crusader and other remains in the village itself, the surrounding country possesses many *tells* (mounds) covering the sites of ancient cities. The famous caves of Beit Jibrin honeycomb the hills all round. These are immense artificial excavations of unknown date. Roman milestones and aqueducts also are found, and close by the now famous tomb of Apollophanes, with wall-paintings of animals and other ornamentation, was discovered in 1902; a description of it will be found in Thiersch and Peters, *The Marissa Tombs*, published by the Palestine Exploration Fund. (R. A. S. M.)

ELEVATORS, LIFTS or HOISTS, machines for raising or lowering loads, whether of people or material, from one level to another. They are operated by steam, hydraulic or electric power, or, when small and light, by hand. Their construction varies with the magnitude of the work to be performed and the character of the motive power. In private houses, where only small weights, as coal, food, &c., have to be transferred from one floor to another, they usually consist simply of a small counter-balanced platform suspended from the roof or an upper floor by a tackle, the running part of which hangs from top to bottom and can be reached and operated at any level. In buildings where great weights and numbers of people have to be lifted, or a high speed of elevation is demanded, some form of motor is necessary. This is usually, directly or indirectly, a steam-engine or occasionally a gas-engine; sometimes a water-pressure engine is adopted, and it is becoming more and more common to employ an electric motor deriving its energy from the general distribution of the city. Large establishments, hotels or business houses, commonly have their own source of energy, an electric or other power "plant," on the premises.

Construction of elevators.

The hydraulic elevator is the simplest in construction of elevators proper, sometimes consisting merely of a long pipe set deeply in the ground under the cage and containing a correspondingly long plunger, which rises and falls as required and carries the elevator-cage on its upper end (fig. 1). The "stroke" is thus necessarily equal to the height traversed by the cage, with some surplus to keep the plunger steady within its guiding-pipe. The pipe or pump chamber has a length exceeding the maximum rise and fall of the plunger, and must be strong enough to sustain safely the heavy hydraulic pressures needed to raise plunger and cage with load. The power is usually supplied by a steam pump (occasionally by a hydraulic motor), which forces water into the chamber of the great pipe as the elevator rises, a waste-cock drawing off the liquid in the process of lowering the cage. A single handle within the cage generally serves to apply the pressure when raising, and to reduce it when lowering the load. The most common form of hydraulic elevator, for important work and under usual conditions of operation, as in cities, consists of a suspended cage, carried by a tackle, the running part of which

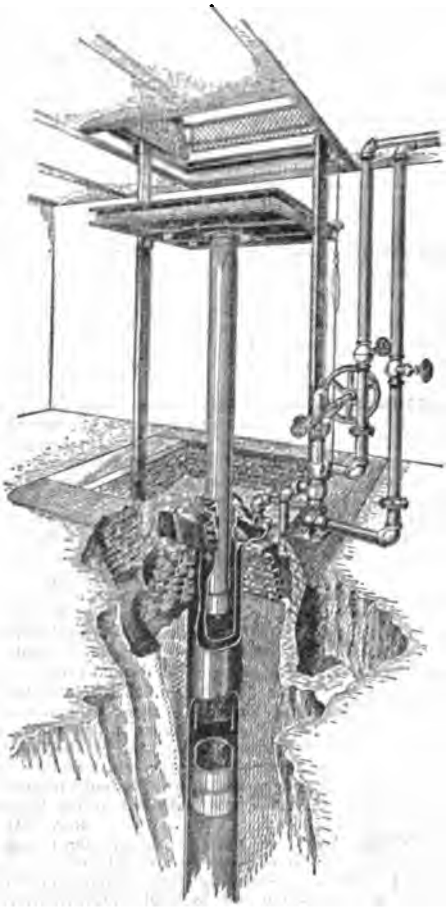


FIG. 1.—The Plunger, or Direct Lift Hydraulic Engine.

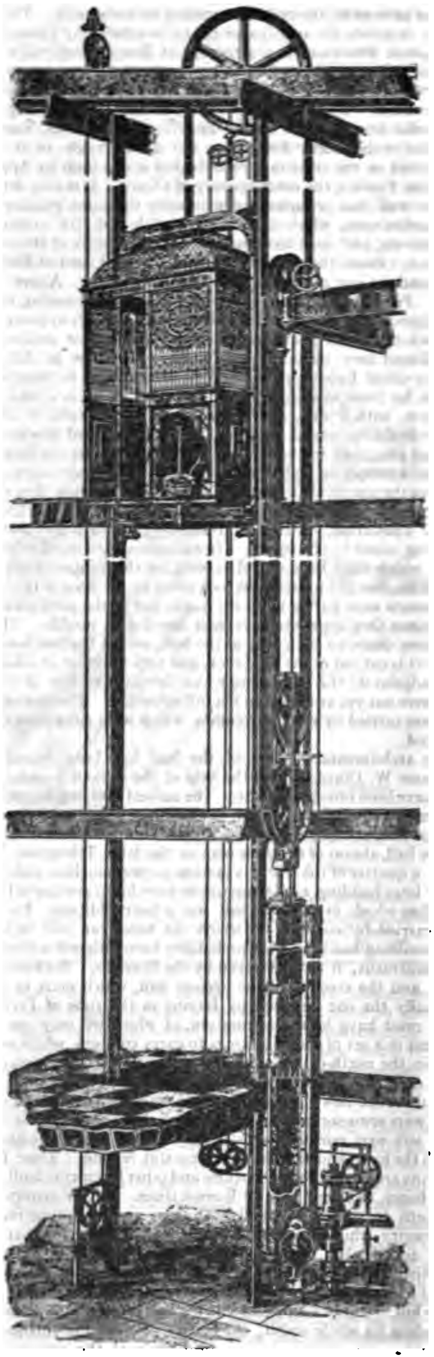


FIG. 2.—The Otis Standard Hydraulic Passenger Lift, with Pilot Valve and Lever-operating Device.

is connected with a set of pulleys at each end of a frame (fig. 2). The rope is made fast at one end, and its intermediate part is carried round first one pulley at the farther end of the frame and then round another at the nearer end, and so on as often as is found advisable in the particular case. The two pulley shafts carrying these two sets of pulleys are made to traverse the frame in such a way as, by their separation, to haul in on the running part, or, by their approximation, to permit the weight of the cage to haul out the rope. By this alternate hauling and "rendering" of the rope the cage is raised and lowered. The use of a number of parallel and independent sets of pulleys and tackles assures safety in case of the breakage of any one, each being strong enough alone to hold the load. The movement of the pair of pulley shafts is effected by a water-pressure engine, actuating the plunger of a pump which is similar to that used in the preceding apparatus, but being relatively of short stroke and large diameter, is more satisfactory in design and construction as well as in operation. Electricity may be applied to elevators of this type by attaching the travelling sheaves to a nut in which works a screwed shaft driven by an electric motor. In other electric lifts the cables which support the cage are wound on a drum which is turned by a motor, the drum being connected to the motor-shaft either by a series of pinions or by a worm-gear. The drum may also be worked by a steam or gas engine. Where the traffic is not very heavy, a form of elevator that requires no attendant is convenient. In this any one wishing to use the lift has merely to press a button placed by the side of the lift-gate on the floor on which he happens to be standing, when the car will come to him; and having entered it he can cause it to travel to any floor he desires by pressing another button inside the car. The motive power in such cases may be either electric or hydraulic, but the control of the switches or valves that govern the action of the apparatus is electric.

Essentials of design, &c.

The history of the elevator is chronologically extensive, but only since 1850 has rapid or important progress been effected. In that year George H. Fox & Co. built an elevator operated by the motion of a vertical screw, the nut on which carried the cage. This device was used in a number of instances, especially in hotels in the large cities, during the succeeding twenty years, and was then generally supplanted by the hydraulic lift of the kind already described as the plunger-lift. With the increased demand for power, speed, safety, convenience of manipulation, and comfort in operation, the inventive ability of the engineer developed the various systems more and more perfectly, and experience gradually showed to what service each type was best adapted and the best construction of each for its peculiar work. Whatever the class, the following are the essentials of design, construction and operation: the elevator must be safe, comfortable, speedy and convenient, must not be too expensive in either first cost or maintenance, and must be absolutely trustworthy. It must not be liable to fracture of any element of the hoisting gear that will permit either the fall of the cage or its projection by an over-weighted balance upwards against the top of its shaft. It must be possible to stop it, whether in regular working or in emergency, or when accident occurs, with sufficient promptness, yet without endangering life or property, or even very seriously inconveniencing the passengers. Acceleration and retardation in starting and stopping must be smooth and easy, the stop must be capable of being made precisely where and when intended, and no danger must be incurred by the passengers from contact with running parts of the mechanism or with the walls and doors of the elevator shaft.

These requirements have been fully met in the later forms of elevator commonly employed for passenger service. Usual sizes range from loads of 1000 to 5000 lb with speeds of from 80 to 250 ft. a minute unloaded, and 75 to 200 ft. loaded, and a height of travel of from 50 to 200 ft. In some very tall buildings, as the Singer and Metropolitan buildings in New York, elevators have been installed having a maximum speed of 600 ft. a minute, with a rise of over 500 ft. Where electric motors are employed, their speed ranges from 600 and 700 revolutions per minute in the larger to 1000 and 1200 in the smaller sizes, corresponding to from 20 down to 4 or 5 h.p. Two or more counter-weights are employed, and from four to six suspension cables ensure as nearly as possible absolute safety. The electric elevators of the Central London railway are guaranteed to raise 17,000 lb 65 ft. in some of its shafts, in 30 secs. from start to stop. Over 100,000 ft. of ⅝-in. and 17,000 ft. of ¾-in. steel rope are required for its 24 shafts, and each rope can carry from 16 to 22 tons without breaking. The steel used in the cables, of which there are four to six for each car and counter-weight, has a tenacity of 85 to 90 tons per sq. in. of section of wire. The maximum pull on each set of rope is assumed to be not over 9500 lb, the remainder of the load being taken by the counter-balance. Oil "dash-pots" or buffers, into which enter plungers attached to the bottom of the cage, prevent too sudden a stop in case of accident, and safety-clutches with friction adjustments of ample power and fully tested before use give ample insurance against a fall even if all the cables should yield at once—an almost inconceivable contingency. The efficiency, *i.e.* the ratio of work performed to power expended in the same time, was in these elevators found by test to be between 70 and 75 %.

Safety devices.

Safety devices constitute perhaps the most important of the later improvements in elevator construction where passengers are carried. The simplest and, where practicable, most certain of them is the "air-cushion," a chamber into which the cage drops if detached or from any cause allowed to fall too rapidly to the bottom, compression of the air bringing it to rest without shock (fig. 3). This chamber must be perfectly air-tight, except in so far as a purposely arranged clearance around the sides, diminishing downwards and in well-established proportion, is adjusted to permit a "dash-pot" action and to prevent rebound. The air-cushion should be about one-tenth the depth of the elevator shaft; in high buildings it may be a well 20 or 30 ft. deep. The Empire building, in New York, is twenty storeys in height, the total travel of the cage is 287 ft., and the air-cushion is 50 ft. deep, extending from the floor of the third storey to the bottom of the shaft. Sliding doors of great strength, and automatic in action, at the first and second floors, are the only openings. The shaft is tapered for some distance below the third floor, and then carried straight to the bottom. An inlet valve admits air freely as the cage rises, and an adjusted safety-valve provides against excess pressure. A "car," falling freely from the twentieth storey, was checked by this arrangement without injury to a basket of eggs placed on its floor. Other safety devices consist of catches under the floor of the cage, so arranged that they are held out of engagement by the pull on the cables. But if the strain is suddenly relieved, as by breakage of a cable or accident to the engine or motor, they instantly fly into place and, engaging strong side-struts in the shaft, hold the car until it can be once more lifted by its cables. These operate well when the cables part at or near the car, but they are apt to fail if the break occurs on the opposite side of the carrying sheaves at the top of the shaft, since the friction and inertia of the mass of the cables may in that case be sufficient to hold the pawls out of gear either entirely or until the headway is so great as to cause the smashing of all resistances when they do engage.

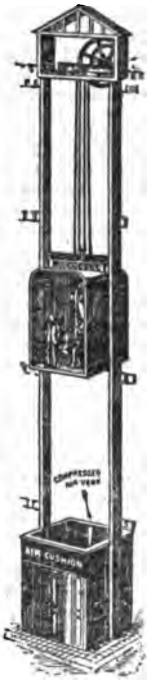


FIG. 3.
Safety Air-Cushion.

Another principle employed in safety arrangements is the action of inertia of parts properly formed and attached. Any dangerous acceleration of the cage causes the inertia of these parts to produce a retardation relative to the car which throws into action a brake or a catch, and thus controls the motion within safe limits or breaks the fall. The hydraulic brake has been used in this apparatus, as have mechanical and pneumatic apparatus. This control of the speed of fall is most commonly secured by the employment of a centrifugal or other governor or regulator. The governor may be on the top of the cage and driven by a stationary rope fixed between the top and bottom of the shafts, or it may be placed at the top of the shaft and driven by a rope travelling with the car. Its action is usually to trip into service a set of spring grips or friction clutches, which, as a rule, grasp the guides of the cage and by their immense pressure and great resultant friction bring the cage to rest within a safe limit of speed, time and distance. A coefficient of friction of about 15% is assumed in their design, and this estimate is confirmed by their operation. Pressures of 10 tons or more are sometimes provided in these grips to ensure the friction required. There are many different forms of safety device of these various classes, each maker having his own. The importance of absolute safety against a fall is so great that the best builders are not satisfied with any one form or principle, but combine provisions against every known danger, and often duplicate such precautions against the most common accidents.

The "travelling staircase," which may be classed among the passenger elevators, usually consists of a staircase so constructed that while the passenger is ascending it the whole structure is also ascending at a predetermined rate, so that the progress made is the sum of the two rates of motion. The system of "treads and risers" is carried on a long endless band of chain sustained by guides holding it in its desired line, and rendering at either end over cylinders or sprockets. The junctions between the stairway and the upper or lower floors are ingeniously arranged so as to avoid danger of injury to the passengers.

Freight elevators have the same general forms as the passenger elevators, but are often vastly larger and more powerful, and are not as a rule fitted up for such heights of lift, or constructed with such elaborate provision for safety or with any special finish. Elevators raising grain, coal, earth and similar materials, such as can be taken up by scooping into a bucket, or can be run into and out of the bucket by gravity, constitute a class by themselves, and are described in the article CONVEYORS.

The term "grain elevator" is often used to include buildings as well as machinery, and it is not unusual in Europe to hear a flour-mill, with its system of motor machinery, mills, elevator and storage departments, spoken of as an "American elevator" (see GRANARIES).

ELF (O. Eng. *aelf*; cf. Ger. *Alp*, nightmare), a diminutive supernatural being of Teutonic mythology, usually of a more or less mischievous and malignant character, causing diseases and evil dreams, stealing children and substituting changelings, and thus somewhat different from the Romanic fairy, which usually has less sinister associations. The prehistoric arrowheads and other flint implements were in England early known as "elf-bolts" or "elf-arrows," and were looked on as the weapons of the elves, with which they injured cattle. So too a tangle in the hair was called an "elf-lock," as being caused by the mischief of the elves.

ELGAR, SIR EDWARD (1857–), English musical composer, son of W. H. Elgar, who was for many years organist in the Roman Catholic church of St George at Worcester, was born there on the 2nd of June 1857. His father's connexion with music at Worcester, with the Glee Club and with the Three Choirs Festivals, supplied him with varied opportunities for a musical education, and he learnt to play several instruments. In 1879 he became bandmaster at the county lunatic asylum, and held that post till 1884. He was also a member of an orchestra at Birmingham, and in 1883 an intermezzo by him was played there at a concert. In 1882 he became conductor of the Worcester Amateur Instrumental Society; and in 1885 he succeeded his father as organist at St George's, Worcester. There he wrote a certain amount of church music. In 1889 he moved to London, but finding no encouragement retired to Malvern in 1891; in 1904 he went to live at Hereford, and in 1905 was made professor of music at Birmingham University. To the public generally he was hardly known till his oratorio *The Dream of Gerontius* was performed at Birmingham in 1900, but this was at once received as a new revelation in English music, both at home and by Richard Strauss in Germany, and the composer was made a Mus. Doc. at Cambridge. His experience in writing church music for a Roman Catholic service cannot be overlooked in regard to this and other works by Elgar, who came to be regarded as the representative of a Catholic or neo-Catholic style of religious music, for which an appreciative public was ready in England at the moment, owing to the recent developments in the more artistic and sensuous side of the religious movement. And the same interest attached to his later oratorios, *The Apostles* (1903) and *The Kingdom* (1906). But Elgar's sudden rise into popularity, confirmed by his being knighted in 1904, drew attention to his other productions. In 1896 his *Scenes from the Saga of King Olaf* was recognized by musicians as a fine work, and in the same year his *Scenes from the Bavarian Highlands* and *Lux Christi* were performed; and apart from other important compositions, his song-cycle *Sea-Pictures* was sung at Norwich in 1899 by Clara Butt, and his orchestral *Variations on an original theme* were given at a Richter concert in the same year. In 1901 his popular march "Pomp and Circumstance" was played at a promenade concert, the stirring melody of his song "Land of Hope and Glory" being effectually utilized. It is impossible here to enumerate all Sir Edward Elgar's works, which have excited a good deal of criticism in musical circles without impairing his general recognition as one of the few front-rank English composers of his day; but his most important later production, his first orchestral symphony, produced in 1908 with immediate success, raised his reputation as a composer to an even higher place, as a work of marked power and beauty, developing the symphonic form with the originality of a real master of his art. In 1908 he resigned his professorship at Birmingham University.

ELGIN, a city of Kane county, Illinois, U.S.A., in the N. part of the state, 36 m. N.W. of Chicago. Pop. (1880) 8787; (1890) 17,823; (1900) 22,433, of whom 5419 were foreign-born; (1910 census) 25,976. Elgin is served by the Chicago & North-Western and the Chicago, Milwaukee & St Paul railways, and by interurban electric railways to Chicago, Aurora and Belvidere. The city is the seat of the Northern Illinois hospital for the insane, of the Elgin Academy (chartered 1839; opened 1856), and of St Mary's Academy (Roman Catholic); and has the Gail Borden public library, with 35,000 volumes in 1908. The city has six public parks, Lord's Park containing 112, and Wing Park 121 acres. The city is in a fine dairying region and is an important market for butter. Among Elgin's manufactures are watches and watch-cases, butter and other dairy products, cooperage (especially butter tubs), canned corn, shirts, foundry and machine-shop products, pipe-organs, and caskets and casket trimmings; in 1905 Elgin's total factory product was valued at $9,349,274. The Elgin National Watch factory, and the Borden milk-condensing works, are famous throughout the United States and beyond. The publishing office of the Dunkers, or German Brethren, is at Elgin; and several popular weeklies with large circulations are published here. A permanent settlement was made as early as 1835, and Elgin was chartered as a city in 1854 and was rechartered in 1880.

ELGIN, a royal, municipal and police burgh, and county town of Elginshire, Scotland, situated on the Lossie, 5 m. S. of Lossiemouth its port, on the Moray Firth, and 71¼ m. N.W. of Aberdeen, with stations on the Great North of Scotland and Highland railways. Pop. (1901) 8460. It is a place of very considerable antiquity, was created a royal burgh by Alexander I., and received its charter from Alexander II. in 1234. Edward I. stayed at the castle in 1296 and 1303, and it was to blot out the memory of his visit that the building was destroyed immediately after national independence had been reasserted, The hill on which it stood was renamed the Ladyhill, and on the scanty ruins of the castle now stands a monument to the 5th duke of Gordon, consisting of a column surmounted by a statue.

The burgh has suffered periodically from fire, notably in 1452, when half of it was burnt by the earl of Huntly. Montrose plundered it twice in 1645. In 1746 Prince Charles Edward spent a few days in Thunderton House. His hostess, Mrs Anderson, an ardent Jacobite, kept the sheets in which he slept, and was buried in them on her death, twenty-five years afterwards. For fifty years after this date the place retained the character and traditions of a sleepy cathedral city, but with the approach of the 19th century it was touched by a more modern spirit. As the result much that was picturesque disappeared, but the prosperity of Elgin was increased, so that now, owing to its pleasant situation in "the Garden of Scotland," its healthy climate, cheap living, and excellent educational facilities, it has become a flourishing community. The centre of interest is the cathedral of Moray, which was founded in 1224, when the church of the Holy Trinity was converted to this use. It was partially burned in 1270 and almost destroyed in 1390 by Alexander Stewart, the Wolf of Badenoch, natural son of Robert II., who had incurred the censure of the Church. In 1402 Alexander, lord of the Isles, set fire to the town, but spared the cathedral for a consideration, in memory of which mercy the Little Cross (so named to distinguish it from the Muckle or Market Cross, restored in 1888) was erected. After these outrages it was practically rebuilt on a scale of grandeur that made it the most magnificent example of church architecture in the north. Its design was that of a Jerusalem cross, with two flanking towers at the east end, two at the west end, and one in the centre, at the intersection of the roofs of the nave and transepts. It measured 282 ft. long from east to west by 120 ft. across the transepts, and consisted of the choir, the gable of which was pierced by two tiers of five lancet windows and the Omega rose window; the north transept, in which the Dunbars were buried, and the south transept, the doorway of which is interesting for its dog's-tooth ornamentation; and the nave of five aisles. The grand entrance was by the richly carved west door, above which was the Alpha window. The central steeple fell in 1506, but was rebuilt, the new tower with its spire reaching a height of 198 ft. By 1538 the edifice was complete in every part. Though the Reformation left it unscathed, it suffered wanton violence from time to time. By order of the privy council the lead was stripped off the roofs in 1567 and sold to Holland to pay the troops; but the ship conveying the spoils foundered in the North Sea. In 1637 the roof-tree of the choir perished during a gale, and three years later the rich timber screen was demolished. The central tower again collapsed in 1711, after which the edifice was allowed to go to ruin. Its stones were carted away, and the churchyard, overgrown with weeds, became the dumping-ground for rubbish. It lay thus scandalously neglected until 1824, when John Shanks, a "drouthy" cobbler, was appointed keeper. By a species of inspiration this man, hitherto a ne'er-do-well, conceived the notion of restoring the place to order. Undismayed, he attacked the mass of litter and with his own hands removed 3000 barrow-loads. When he died in 1841 he had cleared away all the rubbish, disclosed the original plan, and collected a quantity of fragments. A tablet, let into the wall, contains an epitaph by Lord Cockburn, recording Shanks's services to the venerable pile, which has since been entrusted to the custody of the commissioners of woods and forests. The chapter-house, to the north-east of the main structure, suffered least of all the buildings, and contains a 'Prentice pillar, of which a similar story is told to that of the ornate column in Roslin chapel. In the lavatory, or vestibule connecting the chapter-house with the choir, Marjory Anderson, a poor half-crazy creature, a soldier's widow, took up her quarters in 1748. She cradled her son in the piscina and lived on charity. In the course of time the lad joined the army and went to India, where he rose to the rank of major-general and amassed a fortune of £70,000 with which he endowed the Elgin Institution (commonly known as the Anderson Institution) at the east end of High Street, for the education of youth and the support of old age. Within the precincts of the cathedral grounds stood the bishop's palace (now in ruins), the houses of the dean and archdeacon (now North and South Colleges), and the manses of the canons. Other ecclesiastical buildings were the monasteries of Blackfriars (1230) and Greyfriars (1410) and the preceptory of Maisondieu (1240). They also were permitted to fall into decay, but the 3rd marquess of Bute undertook the restoration of the Greyfriars' chapel. The parish church, in the Greek style, was built in 1828. Gray's hospital, at the west end of High Street, was endowed by Dr Alexander Gray (1751–1808), and at the east end stands the Institution, already mentioned, founded by General Andrew Anderson (1746–1822). Other public buildings include the assembly rooms, the town-hall, the museum (in which the antiquities and natural history of the shire are abundantly illustrated), the district asylum, the academy, the county buildings and the court house, the market buildings, the Victoria school of science and art, and Lady Gordon-Cumming's children's home. In 1903 Mr G. A. Cooper presented his native town with a public park of 42 acres, containing lakes representing on a miniature scale the British Isles. Grant Lodge, an old mansion of the Grant family, occupying the south-west corner of the park, was converted into the public library. From the top of Ladyhill the view commands the links of the Lossie and the surrounding country, and a recreation ground is laid out on Lossie Green.

The industries include distilling and brewing, nursery gardening, tanning, saw and flour mills, iron-foundries and manufactures of woollens, tweeds and plaiding, and the quarrying of sandstone. Elgin combines with Banff, Cullen, Inverurie, Kintore and Peterhead to return one member to parliament, and the town is controlled by a council with provost and bailies.

Two miles and a half S. by W. of Elgin stands the church of Birnie, with the exception of the church at Mortlach in Banffshire probably the oldest place of public worship in Scotland still in use. It is not later than 1150 and, with its predecessor, was the cathedral of Moray during the rule of the first four bishops; the fourth bishop, Simon de Toeny, an Englishman, was buried in its precincts in 1184. In the church is preserved an old Celtic altar-bell of hammered iron, known as the "Ronnell bell." Such is the odour of sanctity of this venerable church that there is an old local saying that "to be thrice prayed for in the kirk of Birnie will either mend or end ye." Six miles to the S.W. of Elgin, charmingly situated in a secluded valley encircled by fir-clad heights, lie the picturesque remains of Pluscarden Priory, a Cistercian house founded by Alexander II. in 1230. The ruins, consisting of tower, choir, chapter-house, refectory and other apartments, are nearly hidden from view by their dense coating of ivy and the fine old trees, including many beautiful examples of copper beech, by which they are surrounded. Its last prior, Alexander Dunbar, died in 1560. The *Liber Pluscardensis*, a valuable authority on early Scots history, was compiled in the priory by Maurice Buchanan in 1461. The chronicle comes down to the death of James I. The 3rd marquess of Bute acquired the ruins in 1897.

ELGIN AND KINCARDINE, EARLS OF. THOMAS BRUCE, 7th earl of Elgin (1766–1841), British diplomatist and art collector, was born on the 20th of July 1766, and in 1771 succeeded his brother in the Scottish peerage as the 7th earl of Elgin (cr. 1633), and 11th of Kincardine (cr. 1647). He was educated at Harrow and Westminster, and, after studying for some time at the university of St Andrews, proceeded to the continent, where he studied international law at Paris, and military science in Germany. When his education was completed he entered the army, in which he rose to the rank of general. His chief attention was, however, devoted to diplomacy. In 1792 he was appointed envoy at Brussels, and in 1795 envoy extraordinary at Berlin; and from 1799 to 1802 he was envoy extraordinary at the Porte. It was during his stay at Constantinople that he formed the purpose of removing from Athens the celebrated sculptures now known as the Elgin Marbles. His doing so was censured by some as vandalism, and doubts were also expressed as to the artistic value of many of the marbles, but he vindicated himself in a pamphlet published in 1810, and entitled *Memorandum on the Subject of the Earl of Elgin's Pursuits in Greece.* In 1816 the collection was purchased by the nation for £36,000, and placed in the British Museum, the outlay incurred by Lord Elgin having been more than £50,000. Lord Elgin was a Scottish representative peer for fifty years. He died at Paris on the 14th of November 1841.

James Bruce, 8th earl of Elgin (1811–1863), British statesman, eldest son of the 7th earl by his second marriage, was born in 1811, and succeeded to the peerage as 8th earl of Elgin and 12th of Kincardine in 1841. He was educated at Eton and at Christ Church, Oxford, where he had as companions and rivals his younger predecessors in the office of governor-general of India, Dalhousie and Canning. He began his official career in 1842 at the age of thirty, as governor of Jamaica. During an administration of four years he succeeded in winning the respect of all classes. He improved the condition of the negroes and conciliated the planters by working through them. In 1846 Lord Grey appointed him governor-general of Canada. Son-in-law of the popular earl of Durham, he was well received by the colonists, and he set himself deliberately to carry out the Durham policy. In this his frank and genial manners aided him powerfully. His assent to the local measure for indemnifying those who had suffered in the troubles of 1837 led the mob of Montreal to pelt his carriage for the rewarding of rebels for rebellion, as Mr Gladstone described it. But long before his eight years' term of service expired he was the most popular man in Canada. His relations with the United States, his hearty support of the self-government and defence of the colony, and his settlement of the free-trade and fishery questions, led to his being raised in 1849 to the British peerage as Baron Elgin.

Soon after his return to England in 1854, Lord Palmerston offered him a seat in the cabinet as chancellor of the duchy of Lancaster, which he declined. But when, in 1856 the seizure of the "Arrow" by Commissioner Yeh plunged England into war with China, he at once accepted the appointment of special envoy with the expedition. On reaching Point de Galle he was met by a force summoned from Bombay to Calcutta by the news of the sepoy mutiny at Meerut on the 11th of May. His first idea, that the somewhat meagre intelligence would justify most energetic action in China, was at once changed when urgent letters from Lord Canning reached him at Singapore, the next port, on the 3rd of June. H.M.S. "Shannon" was at once sent on to Calcutta with the troops destined for China, and Lord Elgin himself followed it, when gloomier letters from India reached him. The arrival of the "Shannon" gave new life to the handful of white men fighting for civilization against fearful odds, and before the reinforcements from England arrived the back of the mutiny had been broken. Nor was the position in China seriously affected by the want of the troops. Lord Elgin sent in his ultimatum to Commissioner Yeh at Canton on the same day, the 12th of December, that he learned the relief of Lucknow, and he soon after sent Yeh a prisoner to Calcutta. By July 1858, after months of Chinese deception, he was able to leave the Gulf of Pechili with the emperor's assent to the Treaty of Tientsin. Subsequently he visited Japan, and obtained less considerable concessions from its government in the Treaty of Yeddo. It is true that the negotiations were confined to the really subordinate Tycoon or Shogun, but that visit proved the beginning of British influence in the most progressive country of Asia. Unfortunately, the Chinese difficulty was not yet at an end. After tedious disputes with the tariff commissioners as to the opium duty, and a visit to the upper waters of the Yang-tsze, Lord Elgin had reached England in May 1859. But when his brother and the allied forces attempted to proceed to Peking with the ratified treaty, they were fired on from the Taku forts at the mouth of the Peiho. The Chinese had resolved to try the fortune of war once more, and Lord Russell again sent out Lord Elgin as ambassador extraordinary to demand an apology for the attack, the execution of the treaty, and an indemnity for the military and naval expenditure. Sir Robert Napier (afterwards Lord Napier of Magdala) and Sir Hope Grant, with the French, so effectually routed the Tatar troops and sacked the Summer Palace that by the 24th of October 1860 a convention was concluded which was "entirely satisfactory to Her Majesty's government." Lord Elgin had not been a month at home when Lord Palmerston selected him to be viceroy and governor-general of India. He had now attained the object of his honourable ambition, after the office had been filled in most critical times by his juniors and old college companions, the marquis of Dalhousie and Earl Canning. He succeeded a statesman who had done much to reorganize the whole administration of India, shattered as it had been by the mutiny. But, as the first viceroy directly appointed by the Crown, and as subject to the secretary of state for India, Lord Elgin at once gave up all Lord Canning had fought for, in the co-ordinate independence, or rather the stimulating responsibility, of the governor-general, which had prevailed from the days of Clive and Warren Hastings. On the other hand, he loyally carried out the wise and equitable policy of his predecessor towards our feudatories with a firmness and a dignity that in the case of Holkar and Udaipur had a good effect. He did his best to check the aggression of the Dutch in Sumatra, which was contrary to treaty, and he supported Dost Mahommed in Kabul until that aged warrior entered the then neutral and disputed territory of Herat. Determined to maintain inviolate the integrity of our own north-west frontier, Lord Elgin assembled a camp of exercise at Lahore, and marched a force to the Peshawar border to punish those branches of the Yusufzai tribe who had violated the engagements of 1858.

It was in the midst of this "little war" that he died. Soon after his arrival at Calcutta, he had projected the usual tour to Simla, to be followed by an inspection of the Punjab and its warlike ring-fence of Pathans. He even contemplated the summoning of the central legislative council at Lahore. After passing the summer of 1863 in the cool retreat of Peterhoff, Simla, Lord Elgin began a march across the hills from Simla to Sialkot by the upper valleys of the Beas, the Ravi and the Chenab, chiefly to decide the two allied questions of tea cultivation and trade routes to Kashgar and Tibet. The climbing up to the Rotung Pass (13,000 ft.) which separates the Beas valley from that of the Chenab, and the crossing of the frail twig bridge across the Chundra torrent, prostrated him by the time he had descended into the smiling English-like Kangra valley. Thence he wrote his last letter to Sir Charles Wood, still full of hope and not free from anxiety as to the Sittana expedition. At the lovely hill station of Dharmsala, "the place of piety," he died of fatty degeneration of heart on the 20th of November 1863.

For his whole career see *Letters and Journals of James, Eighth Earl of Elgin*, edited by Walrond, but corrected by his brother-in-law, Dean Stanley; for the China missions see *Narrative of the Earl of Elgin's Mission to China and Japan*, by Laurence Oliphant, his private secretary; for the brief Indian administration see the *Friend of India* for 1862–1863.

Victor Alexander Bruce, 9th earl of Elgin (1849–   ), British statesman, was born on the 16th of May 1849, the son of the 8th earl, and was educated at Eton and Balliol College, Oxford. In 1863 he succeeded as 9th earl of Elgin and 13th of Kincardine. A Liberal in politics, he became first commissioner of works (1886), and subsequently viceroy of India (1894–1899). His administration in India was chiefly notable for the frontier risings of 1897–1898. The Afridis broke out into a fanatical revolt and through hesitation on the part of the government were allowed to seize the Khyber Pass, necessitating the Tirah Expedition. After his return to England he was nominated chairman of the royal commission to investigate the conduct of the South African War; and on the formation of Sir Henry Campbell-Bannerman's ministry in December 1905, he became a member of the cabinet as secretary of state for the colonies. In this capacity, though he showed many statesmanlike qualities, he was somewhat overshadowed by his brilliant under-secretary in the Commons, Mr Winston Churchill, whose speeches on colonial affairs were as aggressive as Lord Elgin's were cautious; and when in April 1908, Mr Asquith became prime minister, Lord Elgin retired from the cabinet.

ELGINSHIRE, or MORAY (Gaelic "among the sea-board men"), a northern county of Scotland, bounded N. by the Moray Firth, E. and S.E. by Banffshire, S. and S.W. by Inverness and W. by Nairnshire. It comprises only the eastern portion of the ancient province of Moray, which extended from the Spey to the Beauly and from the Grampians to the sea, embracing an area of about 3900 sq. m. The area of the county is 305,119 acres, or 477 sq. m.

Elginshire is naturally divided into two sections, the level and fertile coast and its hinterland—"the Laigh o' Moray," a tract 30 m. long by from 5 to 12 m. broad—and the hilly country in the south. There are, however, no high mountains. Carn Ruigh (1784 ft.), Larig Hill (1783) and Carn Kitty (1711) are the chief eminences in the south-central district until the ridge of the Cromdale Hills is reached on the Banffshire border, where the highest point is 2329 ft. above the sea. The two most important rivers, the Spey (*q.v.*) and the Findhorn, both have their sources in Inverness-shire. About 50 m. of the course of the Spey are in Elginshire, to which it may be roughly said to serve as the boundary line on the south-east and east. The Findhorn rises in the Monadliadh Mountains which form the watershed for several miles between it and the Spey. Of its total course of nearly 70 m. only the last 12 are in the county, where it separates the woods of Altyre from the Forest of Darnaway, before entering the Moray Firth in a bay on the north-eastern shore to which it has given its name. During the first 7 m. of its flow in Elginshire the stream passes through some of the finest scenery in Scotland. It is liable to sudden risings, and in the memorable Moray floods of August 1829 wrought the greatest havoc. Of other rivers the Lossie rises in the small lakes on the flanks of Carn Kitty and pursues a very winding course of 34 m. till it reaches the Moray Firth; Ballintomb Burn, Rothes Burn and Tulchan Burn are left-hand affluents of the Spey; the Dorbock and Divie, uniting their forces near Dunphail House, join the Findhorn at Relugas; and Muckle Water, a left-hand tributary of the Findhorn, comes from Nairnshire. The Spey and Findhorn are famous for salmon, but some of the smaller streams, too, afford good sport. The lochs are few and unimportant, among them being Loch Spynie, 2½ m. N., and Loch-na-Bo, 4 m. S.E. of Elgin; Loch of Blairs, 2½ m. S. of Forres; Loch Romach, 3 m. S. of Rafford; Loch Dallas, about 4 m. S.W. of Dallas, and Lochindorb in the S.W., 6 m. N.N.W. of Grantown. Loch Spynie was once a lake extending from the Firth to within 2½ m. of Elgin and covering an area of over 2000 acres. Its shores were the haunt of a great variety of birds, and its waters were full of salmon, sea-trout and pike. But early in the 19th century it was resolved to reclaim the land, and the drainage works then undertaken reduced the beautiful loch to a swamp of some 120 acres.

Lochindorb is now the largest lake, being 2 m. in length and fully ½ m. wide. In the upper end, on an island believed to be artificial, stand the ruins of Lochindorb Castle, in the 14th century the stronghold of the Wolf of Badenoch, and afterwards successively the property of the earl of Moray, the Campbells of Cawdor and the earl of Seafield. Sir Thomas Dick Lauder saw at Cawdor Castle a massive iron gate which, according to tradition, Sir Donald Campbell of Cawdor carried on his back from Lochindorb to Cawdor, a distance of 13 m. In the southern half of the county, amongst the hills, are several glens, among them the Glen of Rothes, Glen Lossie, Glen Ghealbaidh, Glen Tulchan and Glen Beag. Strathspey, though more of a valley than a glen, is remarkable for its extent and beauty.

Geology.—This county may be divided geologically into two areas, the hilly region to the south being composed of the crystalline schists of the Central Highlands and the fertile plain of Moray being made up of Old Red Sandstone and Triassic strata. In the Cromdale Hills in the south-east of the county the metamorphic series comprises schistose quartzite, quartz-schists, micaceous flagstones and mica-schists, which are granulitic and holocrystalline, the dark laminae in some cases containing heavy residues such as ilmenite and zircon. The greater portion of the metamorphic area west of the Spey consists of granulitic quartz-biotite-granulites and bands of muscovite-biotite-schist belonging to the Moine series of the Geological Survey (see SCOTLAND: *Geology*). In certain areas these are permeated by granitic material in the form of thin strings, knots and veins. Excellent sections of these rocks are exposed in the Findhorn, the Divie and the tributaries of the Spey. Near Grantown there is a group locally developed, comprising crystalline limestone with tremolite, kyanite gneiss, muscovite-biotite-schist and quartzite, the age and relations of which are still uncertain. The general strike of the crystalline schists, save where there are local deflections, is north-east and south-west, and the general dip is to the south-east. Between Lochindorb and Grantown there is a mass of granite belonging to the later intrusions of the Highlands represented by the Cairngorm granite. Within the county there are representatives of the middle and upper divisions of the Old Red Sandstone resting unconformably on the crystalline schists. The strata of the middle or Orcadian series consist of conglomerates, sandstones, shales and clays, with limestone nodules containing fish remains. This sequence is well displayed in the banks of the Spey north of Boat of Bridge and in the Tynet Burn east of Fochabers, the latter being one of the well-known localities for ichthyolites in the middle or Orcadian division. In the Tynet and Gollachie Burn sections, the fish bed is overlaid by conglomerates and red pebbly sandstones, passing upwards into a thin zone of andesite lavas, indicating contemporaneous volcanic action. West of the Tynet Burn and Spey sections there is no trace of the members of the Orcadian division till we reach the Muckle Burn and Lethen Bar in Nairnshire, save the coarse conglomerate filling the ancient hollow of the valley of Rothes which may belong to the middle series. In that direction they are overlapped by the Upper Old Red Sandstone, which in the river Lossie, in the Lochty Burn and the Findhorn rest directly on the metamorphic rocks. Even to the south of the main boundary of the upper division there are small outliers of that series resting on the crystalline schists. Hence there must be a discordance between the Middle and Upper Old Red Sandstone in this county. The strata of the upper division consist of red, grey and yellow false-bedded sandstones with conglomeratic bands, which are well seen in the Findhorn between Sluie and Cothall, where they are associated with a bed of cornstone, all dipping to the N.N.W. at gentle angles. South of Elgin they are exposed in the Lossie and at Scaat Craig, while to the north of that town they extend along the ridge from Bishopmill to Alves. By means of the fish remains, which occur at Scaat Craig, in the Bishopmill quarries, at Alves, in the Findhorn cliffs and in the Whitemyre quarry on the Muckle Burn, the Upper Old Red Sandstone in this county is arranged in two groups, the Alves and Rosebrae. In the area lying to the north of the Upper Old Red Sandstone ridge at Bishopmill and Quarrywood, the strata of Triassic age occur, where they consist of pale grey and yellow sandstones and a peculiar cherty and calcareous band, known as the cherty rock of Stotfield. The sandstones are visible in quarries on the north slope of Quarry Wood, at Findrassie, at Spynie and along the ridge and sea-shore between Burghead and Lossiemouth. They are invested with special interest on account of the remarkable series of reptilian remains obtained from them, comprising *Stagonolepis*, a crocodile allied to the modern caiman in form; *Telerpeton* and *Hyperodapedon*, species of lizards; *Dicynodonts* (*Gordonia* and *Geikia*) and a horned reptile, *Elginia mirabilis* (see SCOTLAND: *Geology*). The palaeontological evidence points to the conclusion that these reptiliferous sandstones must belong in part to the Trias, indeed it is possible that the lower portion may be of Permian age. In the Cutties Hillock quarry west of Elgin these reptiliferous beds rest directly on the sandstones containing *Holoptychius* of Upper Old Red Sandstone age, so that the apparent conformability must be entirely deceptive. Within the area occupied by the Trias west of Stotfield, flagstones appear, charged with fish scales of Upper Old Red age, where they form a low ridge protruding through the younger strata. Both the Upper Old Red and Triassic sandstones have been largely quarried for building purposes. On the shore at Lossiemouth there is a patch of greenish white sandstones yielding fossils characteristic of the Lower Oolite.

The glacial deposits distributed over the fertile plain of Moray and in the upland valleys are of interest. The low grounds were crossed by the ice descending the Moray Firth in an easterly and south-easterly direction, which carried boulders of granite from Strath Nairn and augen gneiss from Easter Ross. In the Elgin district, boulders belonging to the horizons of the Lower and Middle Lias, the Oxford Clay and the Upper Chalk are found both in the glacial deposits and on the surface of the ground. The largest transported mass occurs at Linksfield, where a succession of limestones and shales rests on boulder clay and is covered by it, which from the fossils may be of Rhaetic or Lower Lias age.

Climate and Agriculture.—The climate of the coast is equable and mild, even exotic fruits ripening readily in the open. The uplands are colder and damp. The average temperature in January is 38° F. and in July 58·5°, while for the year the mean is 47° F. The rainfall for the year averages 26 in. Considering its latitude and the extent of its arable land the standard of farming in Elginshire is high. The rich soil of the lowlands is well adapted for wheat, barley and oats. The acreage confined to the glens and straths under barley approximates that under oats. In the uplands, oats is the principal cereal. The breeding of live-stock is profitable, and some of the finest specimens of shorthorned and polled cattle and of crosses between the two are bred. On the larger farms in the Laigh Leicester sheep are kept all the year round, but in the uplands the Blackfaced take their place. Large numbers of horses and pigs are also raised.

Other Industries.—Whisky is the chief product, and the numerous distilleries are usually busy. There are woollen mills at Elgin and elsewhere and chemical works at Forres and Burghead. Owing to the absence of coal what little mineral wealth there is (iron and lead) cannot be remuneratively worked. The sandstone quarries, yielding a building-stone of superior quality, are practically inexhaustible. The plantations mainly consist of larch and fir and, to a smaller extent, of oak. Much timber was once floated down the Spey and other rivers, but, since the increased facilities of carriage afforded by the railways, trees have been felled on a wider scale. Boat-building is carried on at Burghead, Lossiemouth and Kingston—so-called from the fact that a firm from Kingston-on-Hull laid down a yard there in 1784—while at Garmouth the fishing fleet lies up during the winter and is also repaired there. The Firth fisheries are of considerable value. The boats go out from Findhorn, Burghead, Hopeman and Lossiemouth, which are all furnished with safe harbours. Findhorn has been twice visited by calamities. The first village was overwhelmed by the drifting sands of Culbin, and the second was buried beneath the waves in 1701. Kingston harbour is tidal, exposed, and liable to interruption from a shifting bar. The deep sea fisheries comprise haddock, cod, ling and herring, and the Spey, Findhorn and Lossie yield large quantities of salmon.

The Great North of Scotland railway enters the shire in the S.E. from Craigellachie, whence a branch runs up the Spey to Boat of Garten in Inverness-shire, and in the N.E. from Port Gordon, running in both cases to Elgin, from which a branch line extends to Lossiemouth. The Highland railway traverses the western limits of the shire running almost due north to Forres, whence it turns westward to Nairn and eastward to Elgin. From the county town it runs to Aberdeen via Orbliston and Keith, with a branch to Fochabers from Orbliston.

Population and Government.—The population was 43,471 in 1891 and 44,800 in 1901, when 1865 persons spoke both Gaelic and English, and 2 spoke Gaelic only. The chief towns are Elgin (pop. in 1901, 8460), Forres (4313) and Lossiemouth (3904), to which may be added Rothes (1621), Grantown (1568) and Burghead (1531). In conjunction with Nairnshire the county returns one member to parliament. Elgin and Forres are royal burghs; the municipal and police burghs include Burghead, Elgin, Forres, Grantown, Lossiemouth, and Rothes. Elginshire is included in one sheriffdom with Inverness and Nairn, and there is a resident sheriff-substitute at Elgin. The county is under school-board jurisdiction, several of the schools earning grants for higher education. There are academies at Elgin and Fochabers and science and art and technical schools at Elgin and Grantown. The bulk of the "residue" grant is spent in subsidizing the agricultural department of Aberdeen University and the science schools and art and technical classes in the county.

History.—Moray, in the wider sense, was first peopled by Picts of the Gaelic branch of Celts, of whom relics are found in the stone circle at Viewfield and at many places in Nairnshire. Christianity, introduced under the auspices of Columba (from whose time the site of Burghead church has probably been so occupied), flourished for a period until the Columban church was expelled in 717 by King Nectan. Thereafter the district was given over to internecine strife between the northern and southern Picts, which was ended by the crushing victory of Kenneth MacAlpine in 831, as one result of which the kingdom of Pictavia was superseded by the principality of Moravia. Still, settled order had not yet been secured, for the Norsemen raided the country first under Thorstein and then under two Sigurds. It was in the time of the second Sigurd that the Firth was fixed as the northern boundary of Moray. In spite of such interruptions as the battle of Torfness (Burghead) on the 14th of August 1040, in which Thorfinn, earl of Orkney and Shetland, overthrew a strong force of Scots under King Duncan, the consolidation of the kingdom was being gradually accomplished. After Macbeth ascended the throne the Scandinavians held their hands. Though Macbeth and his *fainéant* successor, "daft" Lulach, were the only kings whom Moray gave to Scotland, the province never lacked for able, if headstrong, men, and it continued to enjoy home rule under its own marmaer, or great steward (the equivalent of *earl*, the title that replaced it), until the dawn of the 12th century, when as an entity it ceased to exist. With a view to breaking up the power of the marmaers David I. and his successors colonized the seaboard with settlers from other parts of the kingdom. Nevertheless, from time to time the clansmen and their chiefs descended from their fastnesses and plundered the Laigh, keeping the people for generations in a state of panic. Meanwhile, the Church had become a civilizing force. In 1107 Alexander had founded the see of Moray and the churches of Birnie, Kinneddar and Spynie were in turn the cathedral of the early bishops, until in 1224 under the episcopate of Andrew of Moray (de Moravia), the church of the Holy Trinity in Elgin was chosen for the cathedral. Another factor that drew men together was the struggle for independence. In his effort to stamp out Scottish nationality Edward I. came as far north as Elgin, where he stayed for four days in July 1296, and whence he issued his writ for the parliament at Berwick. Wallace, however, had no doughtier supporter than Sir Andrew Moray of Bothwell, and Bruce recognized the assistance he had received from the men of the north by erecting Moray into an earldom on the morrow of Bannockburn and bestowing it upon Thomas Randolph (see MORAY, THOMAS RANDOLPH, EARL OF). Henceforward the history of the county resolved itself in the main into matters affecting the power of the Church and the ambitions of the Moray dynasties. The Church accepted the Reformation peacefully if not with gratitude. But there was strife between Covenanters and the adherents of Episcopacy until, prelacy itself being abolished in 1689, the bishopric of Moray came to an end after an existence of 581 years. (For the subsequent history of the earldom, which was successively held by the Randolphs, the Dunbars, the Douglases, the royal Stewarts and an illegitimate branch of the Stewarts, see MURRAY OR MORAY, EARLS OF.) Other celebrated Moray families who played a more or less strenuous part in local politics were the Gordons, the Grants and the Duffs. Still, national affairs occasionally evoked interest in Moray. In the civil war Montrose ravaged the villages which stood for the Covenanters, but most of the great lairds shifted in their allegiance, and the mass of the people were quite indifferent to the declining fortunes of the Stewarts. Charles II. landed at Garmouth on the 3rd of July 1650 on his return from his first exile in Holland, but hurried southwards to try the yoke of Presbytery. The fight at Cromdale (May day, 1690) shattered the Jacobite cause, for the efforts in 1715 and 1745 were too spasmodic and half-hearted to affect the loyalty of the district to Hanoverian rule. A few weeks before Culloden Prince Charles Edward stayed in Elgin for some days, and a month afterwards the duke of Cumberland passed through the town at the top of his speed and administered the *coup de grâce* to the Young Pretender on Drummossie Moor.

Twice Elginshire has been the scene of catastrophes without parallel in Scotland. In 1694 the barony of Culbin—a fine estate, with a rent roll in money and kind of £6000 a year, belonging to the Kinnairds, comprising 3600 acres of land, so fertile that it was called the Granary of Moray, a handsome mansion, a church and several houses—was buried under a mass of sand in a storm of extraordinary severity. The sandy waste measures 3 m. in length and 2 in breadth, and the sand, exceedingly fine and light, is constantly shifting and, at rare intervals, exposing traces of the vanished demesne. This wilderness of dome-shaped dunes divided by a loftier ridge lies to the north-west of Forres. The other calamity was the Moray floods of the 2nd and 3rd of

August 1829. The Findhorn rose 50 ft. above the ordinary level, inundating an area of 20 sq. m.; the Divie rose 40 ft., and the Lossie flooded all the low ground around Elgin. The floods tore down bridges and buildings, and obliterated farms and homesteads.

AUTHORITIES.—Lachlan Shaw, *History of the Province of Moray* (Gordon's edition, Glasgow, 1882); *A Survey of the Province of Moray* (Elgin, 1798); W. Rhind, *Sketches of the Past and Present State of Moray* (Edinburgh, 1839); E. Dunbar Dunbar, *Documents relating to the Province of Moray* (Edinburgh, 1895); C. A. Gordon, *History of the House of Gordon* (Aberdeen, 1890); C. Rampini, *History of Moray and Nairn* (Edinburgh, 1897); C. Innes, *Elgin, Past and Present* (Elgin, 1860); J. Macdonald, "Burghead" (*Proceedings of Glasgow Archaeological Soc.*), (1891); Sir T. Dick Lauder, *The Wolf of Badenoch* (Glasgow, 1886); *An Account of the Great Floods of August 1829 in the Province of Moray and Adjoining Districts* (Elgin, 1873).

ELGON, also known as MASAWA, an extinct volcano in British East Africa, cut by 1° N. and 34½° E., forming a vast isolated mass over 40 m. in diameter. The outer slopes are in great measure precipitous on the north, west and south, but fall more gradually to the east. The southern cliffs are remarkable for extensive caves, which have the appearance of water-worn caves on a coast line and have for ages served as habitations for the natives. The higher parts slope gradually upwards to the rim of an old crater, lying somewhat north of the centre of the mass, and measuring some 8 m. in diameter. The highest point of the rim is about 14,100 ft. above the sea. Steep spurs separated by narrow ravines run out from the mountain, affording the most picturesque scenery. The ravines are traversed by a great number of streams, which flow north-west and west to the Nile (through Lake Choga), south and south-east to Victoria Nyanza, and north-east to Lake Rudolf by the Turkwell, the head-stream of which rises within the crater, breaking through a deep cleft in its rim. To the north-west of the mountain a grassy plain, swampy in the rains, falls towards the chain of lakes ending in Choga; towards the north-east the country becomes more arid, while towards the south it is well wooded. The outer slopes are clothed in their upper regions with dense forest formed in part of bamboos, especially towards the south and west, in which directions the rainfall is greater than elsewhere. The lower slopes are exceptionally fertile on the west, and produce bananas in abundance. On the north-west and north the region between 6000 and 7000 ft. possesses a delightful climate, and is well watered by streams of ice-cold water. The district of Save on the north is a halting-place for Arab and Swahili caravans going north. On the west the slopes are densely inhabited by small Bantu-Negro tribes, who style their country Masawa (whence the alternative name for the mountain); but on the south and north there are tribes which seem akin to the Gallas. Of these, the best known are the El-gonyi, from whom the name Elgon has been derived. They formerly lived almost entirely in the caves, but many of them have descended to villages at the foot of the mountain. Elgon was first visited in 1883 by Joseph Thomson, who brought to light the cave-dwellings on the southern face. It was crossed from north to south, and its crater reached, in 1890 by F. J. Jackson and Ernest Gedge, while the first journey round it was made by C. W. Hobley in 1896. (E. HE.)

ELI (Hebrew for "high"? 1 Sam. chaps. i.-iv.), a member of the ancient priesthood founded in Egypt (1 Sam. ii. 27), priest of the temple of Shiloh, the sanctuary of the ark, and also "judge" over Israel. This was an unusual combination of offices, when it is considered that in the history preserved to us he appears in the weakness of extreme old age, unable to control the petulance and rapacity of his sons, Hophni and Phinehas, who disgraced the sanctuary and disgusted the people. While the central authority was thus weakened, the Philistines advanced against Israel, and gained a complete victory in the great battle of Ebenezer, where the ark was taken, and Hophni and Phinehas slain. On hearing the news Eli fell from his seat and died. In a passage not unlike the account of the birth of Benjamin (Gen. xxxv. 16 sqq.), it is added that the wife of Phinehas, overwhelmed at the loss of the ark and of her husband, died in child-birth, naming the babe Ichabod (1 Sam. iv. 19 sqq.). This name, which popular etymology explained by the words "the glory is removed (or, stronger, 'banished') from Israel" (cf. Hos. x. 5), should perhaps be altered from *I-kābōd* (as though "not glory") to Jōchebed (*Yōkebed*, a slight change in the original), the name which tradition also gave to the mother of Moses (*q.v.*). After these events the sanctuary of Shiloh appears to have been destroyed (cf. Jer. vii. 12, xxvi. 6, 9), and the descendants of Eli with the whole of their clan or "father's house" subsequently appear as settled at Nob (1 Sam. xxi. 1, xxii. 11 sqq., cp. xiv. 3), perhaps in the immediate neighbourhood of Jerusalem (Is. x. 32). In the massacre of the clan by Saul, and the subsequent substitution of the survivor Abiathar by Zadok (1 Kings ii. 27, 35), later writers saw the fulfilment of the prophecies of judgment which was said to have been uttered in the days of Eli against his corrupt house (1 Sam. ii. 27 sqq., iii. 11 sqq.).[1]

See further, SAMUEL, BOOKS OF; and on Eli as a descendant of a Levite clan (1 Sam. ii 27 sq.), see LEVITES (§ 3). (W. R. S.; S. A. C.)

ELIAS, of Cortona (*c.* 1180–1253), disciple of St Francis of Assisi, was born near Assisi, about 1180, of the working class, but became schoolmaster at Assisi and then notary at Bologna. In 1217 he was the head of the Franciscan mission to the Holy Land, and in 1219 St Francis made him first provincial minister of Syria. When St Francis was recalled from the East in 1220 he brought Elias with him. Elias played a leading part in the early history of the Franciscan order (see FRANCISCANS); Francis made him his vicar general in 1221; and he was the practical acting superior of the order till Francis' death in 1226, and the real superior till the general chapter of 1227. This chapter did not elect him minister general, but that of 1232 did; at the chapter of 1239 he was deposed. During these years he erected the basilica and monastery at Assisi which were entirely his creation—he collected the funds and carried the work through, being himself the builder and even the architect. Elias was a man of extraordinary ability, the friend both of Gregory IX. and of his opponent Frederick II. After his deposition Elias joined the party of the emperor and so incurred excommunication. Frederick sent him as ambassador to Constantinople. He dressed and lived as a Franciscan throughout and a small number of friars adhered to him; for these he built a church and monastery at Cortona. Unavailing efforts were made to bring about his reconciliation with the order and the Church; at last on his death-bed he made his submission to the pope and died in 1253, having received the Sacraments.

The best account of Elias is that be Ed. Lempp, *Frère Élie de Cortone* (1901), who points out the conflict of view, as to the relations between Elias and Francis, between the *Speculum perfectionis* and the *First Life*, by Thomas of Celano; Lempp and Sabatier accept the hostile picture given by the *Speculum perfectionis*. But see further FRANCIS OF ASSISI, SAINT, "Note on Sources," and especially the articles by Goetz, there referred to, in the *Hist. Vierteljahrsschrift*. There is a good article on Elias, but written before the new materials had been produced, in Wetzer und Welte, *Kirchenlexicon* (ed. 2). (E. C. B.)

ELIAS, JOHN (1774–1841), Welsh Nonconformist preacher and reformer, was born on the 2nd of May 1774, in the parish of Abererch, Carnarvonshire. In his youth he came under the influence of the Calvinistic Methodist revival and became a preacher at nineteen. In 1799 he married and settled at Llanfechell in Anglesey, giving up his trade as a weaver to become a small shopkeeper. His fame as a preacher increased, and under the direction of Thomas Charles of Bala he established numerous Sunday schools, and gave and secured considerable Welsh support to the founding of the London Missionary Society, the British and Foreign Bible Society and the Religious Tract Society. On Charles's death in 1814 he became the recognized leader of the Calvinistic Methodist Church, and the story of his life is simply a record of marvellously successful preaching tours. He died on the 8th of June 1841; ten thousand people attended his funeral.

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[1] On the old views relating to the succession of the priests, according to which the high-priesthood was diverted from the line of Eleazar and Phinehas into that of Ithamar, see Robertson Smith, *Old Test. in Jewish Church*, 2nd ed., p. 266.

His eloquence was so remarkable that he was known as "the Welsh Demosthenes." His strength lay in his intense conviction of an intimate connexion between sin and punishment and in his power of dramatic presentation. As an ecclesiastic he was not so successful; he helped to compile his church's Confession of Faith in 1823, and laid great stress on a clause which limited the scope of the atonement to the elect. He was a stout Tory in politics and had many friends among the Anglican clergy; he opposed the movement for Roman Catholic emancipation. Several of his sermons were published in Welsh.

ELIAS LEVITA (1469–1549), Jewish grammarian, was born at Neustadt on the Aisch, a place in Bavaria lying between Nuremberg and Würzburg. He preferred to call himself "Ashkenazi," the German, and bore also the nickname of "Bachur," the youth or student, which latter he gave as title to his Hebrew grammar. Before the end of the 15th century he went to Italy, which thenceforth remained his home. He lived first at Padua, went in 1509, after the capture of this town by the army of the League of Cambrai, to Venice, and finally in 1513 to Rome, where he found a patron in the learned general of the Augustinian Order, the future cardinal Egidio di Viterbo, whom he helped in his study of the Kabbalah, while he himself was inspired by him to literary work. The storming of Rome by the army of the Constable de Bourbon in 1527 compelled Elias to go to Venice, where he was employed as corrector in the printing-house of Daniel Bomberg. In the years 1541 and 1542 he lived at Isny, in Southern Württemberg, where he published several of his writings in the printing-house of the learned pastor Paul Fagius. The last years of his life he spent at Venice, continuously active in spite of ill-health and the weakness of old age. His monument in the graveyard of the Jewish community at Venice boasts of him that "he illuminated the darkness of grammar and turned it into light." The importance of Levita rests both in his numerous writings and in his personal activity. In the remarkable period which saw the rise of the Reformation and gave to the study of the Hebrew Bible and to its language an importance in the history of the world, it was Levita who furthered in an extraordinary manner the study of Hebrew in Christian circles by his activity as a teacher and by his writings. To his pupils especially belong Sebastian Minoter, who translated Levita's grammatical works into Latin, also George de Selve, bishop of Lavaur, the French ambassador in Venice (1536), who was instrumental in obtaining for Levita an invitation from Francis I. to come to Paris, which invitation, however, Levita did not accept. Levita's writings on Hebrew grammar (*Bachur*, a text-book, 1518; *Harkaba*, an explanation, alphabetically arranged, of irregular word-forms; a Table of Paradigms; *Pirke Elijahu*, a description—partly metrical—of phonetics, and other chapters of the grammar, 1520; his earliest work, a Commentary on Moses Kimḥi's Hebrew Grammar, 1508) were by reason of their methodical exposition, their clear articulation, their avoidance of prolixity, especially suited as an introduction to the study of the Hebrew language. Amongst Levita's other writings is the first dictionary of the Targumim (*Meturgeman*, 1541) and the first attempt at a lexicon in which much of the treasure of late Hebrew language was explained (*Tiskbi*, explanation of 712 new Hebrew vocables, as a supplement to the dictionaries of David Kimḥi and Nathan b. Yeḥiel, 1542). Scientifically most valuable, and of original importance, are the works of Levita on the *Massora*; his Concordance to the Massora (*Sefer Zikhronot* completed in the second revision 1536), of which hitherto only a small part has been published, and especially his most celebrated book *Massoreth Hamasoreth* (1538), published with English translation by Chr. D. Ginsburg, London, 1867. This was the first attempt to give a systematic account of the contents and history of the Massora. By his criticism of the Massora, and especially by proving that the punctuation of the books of the Hebrew Bible is of late origin, Levita exercised an epoch-making influence. Of his other writings may be mentioned his running commentary on David Kimḥi's Grammar and Dictionary (in the Bomberg editions 1545, 1546), his German translation of the Psalms (1545) and the *Baba-Buch* (more properly *Buovobuch*, a German recension of the Italian novel *Historia di Buovo d' Antona*, 1508).

Of the literature on Levita may be mentioned: Y. Levi, *Elia Levita und seine Leistungen als Grammatiker* (Breslau, 1888); W. Bacher, "E. Levita's wissenschaftliche Leistungen" in *Z. d. D. M. G.* xliii. (1889), p. 206-272. (W. Ba.)

ELIE, a village and watering-place of Fifeshire, Scotland, on the shore of the Firth of Forth. Pop. 687. It is 10 m. due S. of St Andrews, but 20 m. distant by the North British railway, which makes a great bend by following the coast. Though it retains some old houses, and the parish church dates from 1639, Elie is, as a whole, quite modern and is one of the most popular resorts in the county on account of its fine golf links and excellent bathing. The royal burgh of Earlsferry (pop. 317) is situated in the parish of Elie, which it adjoins on the west. Its charter, granted by Malcolm Canmore, having been burned, it was renewed by James VI. The chief structure is the town hall, which is modern but has an ancient steeple. The place derived its name from its use by the earls of Fife as a ferry to the opposite shore of Haddington, 8 m. distant. Macduff's cave near Kincraig Point is believed traditionally to have been that in which the thane took refuge from Macbeth. Two and a half miles north is Balcarres House, belonging to the earl of Crawford, where Lady Anne Barnard (1750–1825) was born.

ÉLIE DE BEAUMONT, JEAN BAPTISTE ARMAND LOUIS LÉONCE (1798–1874), French geologist, was born at Canon, in Calvados, on the 25th of September 1798. He was educated at the Lycée Henri IV. where he took the first prize in mathematics and physics; at the École Polytechnique, where he stood first at the exit examination in 1819; and at the École des Mines (1819–1822), where he began to show a decided preference for the science with which his name is associated. In 1823 he was selected along with Dufrénoy by Brochant de Villiers, the professor of geology in the École des Mines, to accompany him on a scientific tour to England and Scotland, in order to inspect the mining and metallurgical establishments of the country, and to study the principles on which Greenough's geological map of England (1820) had been prepared, with a view to the construction of a similar map of France. In 1835 he was appointed professor of geology at the École des Mines, in succession to Brochant de Villiers, whose assistant he had been in the duties of the chair since 1827. He held the office of engineer-in-chief of mines in France from 1833 until 1847, when he was appointed inspector-general; and in 1861 he became vice-president of the Conseil-Général des Mines and a grand officer of the Legion of Honour. His growing scientific reputation secured his election to the membership of the Academy of Berlin, of the Academy of Sciences of France and of the Royal Society of London. By a decree of the president he was made a senator of France in 1852, and on the death of Arago (1853) he was chosen perpetual secretary of the Academy of Sciences. Élie de Beaumont's name is widely known to geologists in connexion with his theory of the origin of mountain ranges, first propounded in a paper read to the Academy of Sciences in 1829, and afterwards elaborated in his *Notice sur le système des montagnes* (3 vols., 1852). According to his view, all mountain ranges parallel to the same great circle of the earth are of strictly contemporaneous origin, and between the great circles a relation of symmetry exists in the form of a pentagonal *réseau*. An elaborate statement and criticism of the theory was given in his anniversary address to the Geological Society of London in 1853 by William Hopkins (*Quart. Journ. Geol. Soc.*). The theory has not found general acceptance, but it proved of great value to geological science, owing to the extensive additions to the knowledge of the structure of mountain ranges which its author made in endeavouring to find facts to support it. Probably, however, the best service Élie de Beaumont rendered to science was in connexion with the geological map of France, in the preparation of which he had the leading share. During this period Élie de Beaumont published many important memoirs on the geology of the country. After his superannuation at the École des Mines he continued to superintend the issue of the detailed maps almost until his death, which occurred at Canon on the 21st of September 1874. His academic lectures for 1843–1844 were published in 2 vols., 1845–1849, under the title *Leçons de géologie pratique*.

A list of his works was published in the *Ann. des Mines*, vol. vii. 1875, p. 259.

ELIJAH (a Hebrew name meaning "Yah[weh] is God"), in the Bible, the greatest and sternest of the Hebrew prophets, makes his appearance in the narrative of the Old Testament with an abruptness not out of keeping with his character and work (1 Kings xvii. 1).[1] The first and most important part of his career lay in the reign of Ahab, *i.e.* during the first half of the 9th century B.C. He is introduced as predicting the drought[2] God was to send upon Israel as a punishment for the apostasy into which Ahab had been led by his heathen wife Jezebel. During the first portion of this period Elijah found a refuge by the brook Cherith, "before the Jordan." This description leaves it uncertain whether the brook was to the east of Jordan in Elijah's native Gilead, or—less probably—to the west in Samaria. Here he drank of the brook and was fed by ravens, who night and morning brought him bread and flesh.[3] When this had dried up, the prophet betook himself to Zarephath, a Phoenician town near Sidon. At the gate of the town he met the widow to whom he had been sent, gathering sticks for the preparation of what she believed was to be her last meal. She received the prophet with hospitality, sharing with him her all but exhausted store, in faith of his promise in the name of the God of Israel that the supply would not fail so long as the drought lasted. During this period her son died and was miraculously restored to life in answer to the prayers of the prophet (1 Kings xvii. 8-24).

Elijah emerged from his retirement in the third year, when, the famine having reached its worst, Ahab and his minister Obadiah had themselves to search the land for provender for the royal stables. To the latter Elijah suddenly appeared, and announced his intention of showing himself to Ahab. The king met Elijah with the reproach that he was "the troubler of Israel," which the prophet boldly flung back upon him who had forsaken the commandments of the Lord and followed the Baalim.[4] The retort was accompanied by a challenge—or rather a command—to the king to assemble on Mount Carmel "all Israel" and the four hundred and fifty prophets of Baal. (The four hundred prophets of Asherah have been added later.) From the allusion to an "altar of Jehovah that was broken down" (1 Kings xviii. 30) it has been inferred that Carmel was an ancient sacred place. (On Mount Carmel and Elijah's connexion with it in history and tradition see CARMEL.)

The scene on Carmel is perhaps the grandest in the life of Elijah, or indeed in the whole of the Old Testament. As a typical embodiment for all time of the conflict between superstition and true religion, it is lifted out of the range of mere individual biography into that of spiritual symbolism, and it has accordingly furnished at once a fruitful theme for the religious teacher and a lofty inspiration for the artist. The false prophets were allowed to invoke their god in whatever manner they pleased. The only interruption came in the mocking encouragement of Elijah (1 Kings xviii. 27), a rare instance of grim sarcastic humour occurring in the Bible. Its effect upon the false prophets was to increase their frenzy. The evening came,[5] and the god had made no sign. Elijah now stepped forward with the quiet confidence and dignity that became the prophet and representative of the true God. All Israel is represented symbolically in the twelve stones with which he built the altar; and the water which he poured upon the sacrifice and into the surrounding trench was apparently designed to prevent the suspicion of fraud! In striking contrast to the "vain repetitions" of the false prophets are the simple words with which Elijah makes his prayer to Yahweh. Once only, with the calm assurance of one who knew that his prayer would be answered, he invokes the God of his fathers. The answer comes at once: "The fire of the Lord (Gen. xix. 24, Lev. x. 2) fell and consumed the burnt offering, and the wood, and the stones, and the dust, and licked up the water that was in the trench." So convincing a sign was irresistible; all the people fell on their faces and acknowledged Yahweh as the true God. This was immediately followed by the destruction of the false prophets, slain by Elijah beside the brook Kishon (xviii. 40). The deed, though not without parallel in the Old Testament history, stamps the peculiarly vindictive character of Elijah's prophetic mission.[6]

On the evening of the day that had witnessed the decisive contest, Elijah proceeded once more to the top of Carmel, and there, with "his face between his knees" (possibly engaged in the prayer referred to in James v. 17 sq.), waited for the long-looked-for blessing. His servant, sent repeatedly to search the sky for signs, returned the seventh time reporting a little cloud arising out of the sea "like a man's hand." The sky was speedily full of clouds and a great rain was falling when Ahab, to escape the storm, set out in his chariot for Jezreel. As a proof of Elijah's supernatural power, it is stated that the prophet, for some unknown object, ran before the chariot to the entrance of Jezreel, a distance of at least 16 m. On being told what had taken place, Jezebel sent a messenger to Elijah with a vow that ere another day had passed his life would be even as the lives of the prophets of Baal, and the threat was enough to cause him to take to instant flight (xix. 1-3; cp. LXX. in v. 2). The first stage of the journey was to Beersheba, on the southern limits of Judah. Here he left his servant (according to old Jewish tradition, the widow's son of Zarephath, afterwards the prophet Jonah), and proceeded a day's journey into the wilderness. Resting under a solitary broom bush (a kind of *genista*), he gave vent to his disappointment in a prayer for death. By another of those many miraculous interpositions which occur in his history he was twice supplied with food and drink, in the strength of which he journeyed forty days and forty nights until he came to Horeb, where he lodged in a cave.[7] A hole "just large enough for a man's body" (Stanley), immediately below the summit of Jebel Mūsa, is still pointed out by tradition as the cave of Elijah.

If the scene on Carmel is the grandest, that on Horeb is spiritually the most profound in the story of Elijah (xix. 9 sqq.). Not in the strong wind that brake the rocks in pieces, not in the earthquake, not in the fire, but in the still small voice that followed the Lord made himself known. A threefold commission was laid upon him: he was to return to Damascus and anoint Hazael king of Syria, he was to anoint Jehu, the son of Nimshi, as king of Israel in place of Ahab; and as his own successor in the prophetic office he was to anoint Elisha (xix. 15-18).[1]

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[1] The text is uncertain. According to the LXX., he was a native of Tishbeh in Gilead; a more natural reading. Klostermann's conjecture that the original name of his home was Jabesh-Gilead is attractive but unnecessary. His appearance in the narrative, like Melchizedek, "without father, without mother" (Heb. vii. 3), gave rise to various rabbinical traditions, such as that he was Phinehas, the grandson of Aaron, returned to earth, or that he was an angel in human form.

[2] Its duration is vaguely stated; from Luke iv. 25, James v. 17, we learn that it lasted three years and a half; but according to Phoenician tradition (Jos. *Ant.* viii. 13. 2) only one year.

[3] The rationalistic view that the word translated "ravens" should be "Arabians" is improbable. Cheyne's suggestion that the unknown brook Cherith should be placed to the south of Judah agrees with Josephus (*Ant.* viii. 13. 2, "he departed into the southern parts") and with 1 Kings xix. 3, 8; "Jordan" may refer to another river, if it be not a gloss; see Cheyne, *Ency. Bib.*, *s.v.* "Cherith."

[4] The sudden introduction of Elijah in xvii. 1 may be accounted for by the supposition that the commencement of the narrative had been omitted by the editor of xvi. 29 sqq. Hence we are not told the cause of Ahab's hostility towards Elijah, nor is the allusion to Jezebel's massacre of the prophets (xviii. 3, 13) explained. It would appear from Obadiah's words in ver. 9 that he himself was in fear of his life. Later tradition supposed he was the captain of 2 Kings i. 13, or that the widow of 2 Kings iv. 1 had been his wife.

[5] The definition of time by the stated oblation (xviii. 29, 36) is very noteworthy (cp. 2 Kings iii. 20).

[6] It is obvious that a purely rationalistic interpretation of the great sign whereby Jahweh manifested himself would be out of place. But there is an interesting parallel in the legend of the kindling of the sacred fire and the igniting of the "thick water" in the time of Nehemiah (2 Macc. i. 18-36). Elsewhere, there were sacred fires kindled by the aid of magical invocations (*e.g.* Hypaepa. Pausanias v. 27. 3).

[7] Yahweh is here supposed to have his seat on the ancient mountain. "It was the God of the Exodus to whom he appealed, the ancient King of Israel in the journeyings through the wilderness." For the cave, cp. Ex. xxxiii. 22.

Leaving Horeb and proceeding northwards along the desert route to Damascus, Elijah met Elisha engaged at the plough probably near his native place, Abel-meholah, in the valley of the Jordan, and by the symbolical act of casting his mantle upon him, consecrated him to the prophetic office. This was the only command of the three which he fulfilled in person; the other two were carried out by his successor.[2] After the call of Elisha the narrative contains no notice of Elijah for several years, although the LXX., by placing 1 Kings xxi. before ch. xx., proceeds at once to the tragic story of Naboth's vineyard (see Jezebel). He is now the champion of freedom and purity of life, like Nathan when he confronted David for the murder of Uriah. Without any indication of whence or how he came, he again appeared, as usual with startling abruptness, in the vineyard when Ahab entered to take possession of it, and pronounced upon the king and his house that awful doom (1 Kings xxi. 17-24) which, though deferred for a time, was ultimately fulfilled to the letter (see Jehu).

With one more denunciation of the house of Ahab, Elijah's function as a messenger of wrath was fully discharged (2 Kings i.). When Ahaziah, the son of Ahab, having injured himself by falling through a lattice, sent to inquire of Baal-zebub, the god of Ekron, whether he should recover, the prophet was commanded to appear to the messengers and tell them that, for this resort to a false god, the king should die. The effect of his appearance was such that they turned back without attempting to fulfil their errand. Ahaziah despatched a captain with a band of fifty to arrest him. They came upon Elijah seated on "the mount,"—probably Carmel. The imperious terms in which he was summoned to come down were punished by fire from heaven, which descended at the bidding of Elijah and consumed the whole land. A second captain and fifty were despatched, behaved in a similar way, and met the same fate. The leader of a third troop took a humbler tone, sued for mercy, and obtained it. Elijah then went with them to the king, but only to repeat before his face the doom he had already made known to his messengers, which was almost immediately afterwards fulfilled. The spirit, even the style of this narrative, points unmistakably to its being of late origin. It shocks the moral sense with its sanguinary character more than, perhaps, any other Old Testament story.

The only mention of Elijah's name in the book of Chronicles (2 Chronicles xxi. 12-15) is where he is represented as sending a letter of rebuke and denunciation to Jehoram, son of Jehoshaphat, king of Judah. The chronological difficulties which are involved suggest that the floating traditions of this great personality were easily attached to well-known names whether strictly contemporary or not. It was before the death of Jehoshaphat that the last grand scene in Elijah's life occurred (2 Kings ii., see iii. 1). He had taken up his residence with Elisha at one of the prophetic guilds at Gilgal. His approaching end seems to have been known to the guilds at Bethel and Jericho, both of which they visited in their last journey. At the Jordan, Elijah, wrapping his prophet's mantle together, smote the water with it, and so by a last miracle passed over on dry ground. When they had crossed the master desired the disciple to ask some parting blessing. The request for a double portion (*i.e.* probably a first-born's portion, Deut. xxi. 17)[3] of the prophet's spirit Elijah characterized as a hard thing; but he promised to grant it if Elisha should see him when he was taken away. The end is told in words of simple sublimity: "And it came to pass, as they still went on and talked, that, behold, there appeared a chariot of fire, and horses of fire, which parted them both asunder; and Elijah went up by a whirlwind into heaven" (2 Kings ii. 11). It is scarcely necessary to point out, however, that through the figure the narrative evidently means to convey as fact that Elijah passed from earth, not by the gates of death, but by miraculous translation. Such a supernatural close is in perfect harmony with a career into every stage of which the supernatural enters as an essential feature. For whatever explanation may be offered of the miraculous element in Elijah's life, it must obviously be one that accounts not for a few miraculous incidents only, which might be mere excrescences, but for a series of miraculous events so closely connected and so continuous as to form the main thread of the history.

Elijah occupied an altogether peculiar place in later Jewish history and tradition. For the general belief that he should return for the restoration of Israel cf. Mal. iv. 5-6; Matt. xi. 14, xvi. 14; Luke ix. 8; John i. 21, and on the development of the thought see Bousset, *Antichrist*, *s.v.*, and the *Jewish Encyc.* vol. v. p. 126. In Mahommedan tradition Elijah is the everlasting youthful el-Khidr or el-Khadir.

Elijah is canonized both in the Greek and in the Latin Churches, his festival being kept in both on the 20th July—the date of his ascension in the nineteenth year of Jehoshaphat, according to Cornelius a Lapide. The natural and most reliable estimate of the career of Elijah is that which is based upon a critical examination of the narratives; see, in addition to Robertson Smith, *Prophets of Israel* (²), pp. 75 sqq., Cheyne, *Hallowing of Criticism*, the articles by Addis in *Encyc. Bib.*, and J. Strachan, Hastings' *Dict. Bib.*, H. Gunkel, *Elias, Yahve u. Baal* (Tübingen, 1906), the literature to Kings, Books of, and the histories referred to in Jews. There is difference of opinion as to the historical importance of both Elijah and Elisha; for a useful summary of views, as also for fuller bibliographical information, see W. R. Harper, *Amos and Hosea* (*Internat. Crit. Comm.*), pp. xxxiv.-xlix., and article Hebrew Religion.

(W. R. S.; S. A. C.)

ELIJAH WILNA, or Elijah ben Solomon, best known as the Gaon Elijah of Wilna (1720-1797), a noted Talmudist who hovered between the new and the old schools of thought, Orthodox in practice and feeling, his critical treatment of the rabbinic literature prepared the way for the scientific investigations of the 19th century. As a teacher he was one of the first to discriminate between the various strata in rabbinic records; to him was due the revival of interest in the older Midrash (*q.v.*) and in the Palestinian Talmud (*q.v.*), interest in which had been weak for some centuries before his time. He was an ascetic, and was a keen opponent of the emotional mysticism which was known as the new Hassidism.

See S. Schechter's *Studies in Judaism* (London, 1896). His voluminous writings are classified in the *Jewish Encyclopedia*, v. 134.

(I. A.)

ELIOT, CHARLES WILLIAM (1834-), American educationalist, the son of Samuel Atkins Eliot (1798-1862), mayor of Boston, representative in Congress, and in 1842-1853 treasurer of Harvard, was born in Boston on the 20th of March 1834. He graduated in 1853 at Harvard College, where he was successively tutor (1854-1858) and assistant professor of chemistry (1858-1863). He studied chemistry and foreign educational methods in Europe in 1863-1865, was professor of analytical chemistry in the newly established Massachusetts Institute of Technology (1865-1869), although absent fourteen months in Europe in 1867-1868; and in 1869 was elected president of Harvard University, a choice remarkable at once for his youth and his being a layman and scientist. With Johns Hopkins University, Harvard, in his presidency, led in the work of efficient graduate schools. Its elective system, which has spread far, although not originated by President Eliot, was thoroughly established by him, and is only one of many radical changes which he championed with great success. The raising of entrance requirements, which led to a corresponding raising of the standards of secondary schools, and the introduction of an element of choice in these entrance requirements, which allowed a limited election of studies to secondary pupils, became national tendencies primarily through President Eliot's potent influence. As chairman of a national Committee of Ten (1890) on secondary school studies, he urged the abandonment of brief disconnected "information" courses, the correlation of subjects taught, the equal rank in college requirements of subjects in which equal time, consecutiveness and concentration were demanded, and a more thorough study of English composition; and to a large degree he secured national sanction for these reforms and their working out by experts into a practicable and applicable system. He laboured to unify the entire educational system, minimize prescription, cast out monotony, and introduce freedom and enthusiasm; and he emphasized the need of special training for special work. He was first to suggest (1894) co-operation by colleges in holding common entrance examinations throughout the country, and it was largely through his efforts that standards were so approximated that this became possible. He contended that secondary schools maintained by public funds should shape their courses for the benefit of students whose education goes no further than such high schools, and not be mere training schools for the universities. His success as administrator and man of affairs and as an educational reformer made him one of the great figures of his time, in whose opinions on any topic the deepest interest was felt throughout the country. In November 1908 he resigned the presidency of Harvard, and retired from the position early in 1909, when he was succeeded by Professor Abbott Lawrence Lowell. In December 1908 he was elected president of the National Civil Service Reform League.

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[1] The theophany is clearly no rebuke to an impatient prophet, nor a lesson that the kingdom of heaven was to be built up by the slow and gentle operation of spiritual forces. It expresses the spirituality of Yahweh in a way that indicates a marked advance in the conception of his nature. See Skinner, *Century Bible*, "Kings," *ad loc.*

[2] The geographical indications imply that in one account the journey to Damascus and the anointing of Hazael and Jehu must have intervened, and were omitted because another account ascribed these acts to Elisha (2 Kings viii. ix.). In the latter we possess a more historical account of the anointing of Jehu, and Robertson Smith observes: "When the history in 1 Kings represents Elijah as personally commissioned to inaugurate [the revolution] by anointing Jehu and Hazael as well as Elisha, we see that the author's design is to gather up the whole contest between Yahweh and Baal in an ideal picture of Elijah and his work" (*Ency. Brit.* (9) art. Kings, vol. xiv. p. 85).

[3] Understood in Eccles. xlviii. 12 (Heb.) to mean that Elisha was *twice as great* as Elijah.

His writings include *The Happy Life* (1896); *Five American Contributions to Civilization, and Other Essays and Addresses* (1897); *Educational Reform, Essays and Addresses 1869–1897* (1898); *More Money for the Public Schools* (1903); *Four American Leaders* (1906), chapters on Franklin, Washington, Channing and Emerson; *University Administration* (1908); and with F. H. Storer, a *Compendious Manual of Qualitative Chemical Analysis* (Boston, 1869; many times reissued and revised). His annual reports as President of Harvard were notable contributions to the literature of education in America, and he delivered numerous public addresses, many of which have been reprinted.

See "President Eliot's Administration," by different hands, a summary of his work at Harvard in 1869–1894, in *The Harvard Graduates' Magazine*, vol. 2, pp. 449-504 (Boston, Mass., 1894); and E. Kuhnemann, *Charles W. Eliot, President of Harvard* (Boston, 1909).

His son, Charles Eliot (1859–1897), graduated at Harvard in 1882, studied landscape architecture at the Bussey Institution of Harvard and in Europe, successfully urged the incorporation of the Massachusetts Trustees of Public Reservations (1891) and of the Metropolitan Park Commission (1892) of Boston, became landscape architect to the Metropolitan Park Commission in 1892, and in 1893, with F. L. Olmsted and J. C. Olmsted, formed the firm of Olmsted, Olmsted & Eliot, which was employed by the Metropolitan Commission. His life was written by his father, *Charles Eliot, Landscape Architect* (Boston, 1902).

ELIOT, GEORGE, the pen-name of the famous English writer, *née* Mary Ann (or Marian) Evans (1819–1880), afterwards Mrs J. W. Cross, born at Arbury Farm, in Warwickshire, on the 22nd of November 1819. Her father, Robert Evans, was the agent of Mr Francis Newdigate, and the first twenty-one years of the great novelist's life were spent on the Arbury estate. She received an ordinary education at respectable schools till the age of seventeen, when her mother's death, and the marriage of her elder sister, called her home in the character of housekeeper. This, though it must have sharpened her sense, already too acute, of responsibility, was an immense advantage to her mind, and, later, to her career, for, delivered from the tiresome routine of lessons and class-work, she was able to work without pedantic interruptions at German, Italian and music, and to follow her unusually good taste in reading. The life, inasmuch as she was a girl still in her teens, was no doubt monotonous, even unhappy. Just as Cardinal Newman felt, with such different results, the sadness and chain of evangelical influences from his boyhood till the end of his days, so Marian Evans was subdued all through her youth by a severe religious training which, while it pinched her mind and crushed her spirit, attracted her idealism by the very hardness of its perfect counsels. It is not surprising to find, therefore, that when Mr Evans moved to Coventry in 1841, and so enlarged the circle of their acquaintance, she became much interested in some new friends, Mr and Mrs Charles Bray and Mr Charles Hennell. Mr Bray had literary taste and wrote works on the *Education of the Feelings*, the *Philosophy of Necessity*, and the like. Mr Hennell had published in 1838 *An Enquiry concerning the Origin of Christianity*. Miss Evans, then twenty-two, absorbed immediately these unexpected, and, at that time, daring habits of thought. So compelling was the atmosphere that it led to a complete change in her opinions. Kind in her affection, she was relentless in argument. She refused to go to church (for some time, at least), wrote painful letters to a former governess—the pious Miss Lewis—and barely avoided an irremediable quarrel with her father, a churchman of the old school. Here was rebellion indeed. But rebels come, for the most part, from the provinces where petty tyranny, exercised by small souls, show the scheme of the universe on the meanest possible scale. George Eliot was never orthodox again; she abandoned, with fierce determination, every creed, and although she passed, later, through various phases, she remained incessantly a rationalist in matters of faith and in all other matters. It is nevertheless true that she wrote admirably about religion and religious persons. She had learnt the evangelical point of view; she knew—none better—the strength of religious motives; vulgar doubts of this fact were as distasteful to her as they were to another eminent writer, to whom she refers in one of her letters (dated 1853) as "a Mr Huxley, who was the centre of interest" at some "agreeable evening." Her books abound in tributes to Christian virtue, and one of her own favourite characters was Dinah Morris in *Adam Bede*.

She undertook, about the beginning of 1844, the translation of Strauss's *Leben Jesu*. This work, published in 1846, was considered scholarly, but it met, in the nature of things, with no popular success. On the death of Mr Evans in 1849, she went abroad for some time, and we hear of no more literary ventures till 1851, when she accepted the assistant-editorship of the *Westminster Review*. For a while she had lodgings at the offices of that publication in the Strand, London. She wrote several notable papers, and became acquainted with many distinguished authors of that period—among them Herbert Spencer, Carlyle, Harriet Martineau, Francis Newman and George Henry Lewes. Her friendship with the last-named led to a closer relationship which she regarded as a marriage. Among the many criticisms passed upon this step (in view of the fact, among other considerations, that Lewes had a wife living at the time), no one has denied her courage in defying the law, or questioned the quality of her tact in a singularly false position. That she felt the deepest affection for Lewes is evident; that we owe the development of her genius to his influence and constant sympathy is all but certain. Yet it is also sure that what she gained from his intimate companionship was heavily paid for in the unceasing consciousness that most people thought her guilty of a grave mistake, and found her written words, with their endorsement of traditional morality, wholly at variance with the circumstances of her private life. Doubts of her suffering in this respect will be at once dismissed after a study of her journal and letters. Stilted and unnatural as these are to a tragic degree, one can read well enough between the lines, and also in the elaborate dedication of each manuscript to "my husband" (in terms of the strongest love), that self-repression, coupled with audacity, does not make for peace. Her sensitiveness to criticism was extreme; a flippant paragraph or an illiterate review with regard to her work actually affected her for days. The whole history of her union with Lewes is a complete illustration of the force of sheer will—in that case partly her own and not inconsiderably his—over a nature essentially unfitted for a bold stand against attacks. At first she and the man whom she had described "as a sort of miniature

Mirabeau in appearance," went abroad to Weimar and Berlin, but they returned to England the same year and settled, after several moves, in lodgings at East Sheen.

In 1854 she published *The Essence of Christianity*, a translation from Feuerbach, a philosopher to whom she had been introduced by Charles Bray. During 1855 she translated Spinoza's *Ethics*, wrote articles for the *Leader*, the *Westminster Review*, and the *Saturday Review*—then a new thing. It was not until the following year that she attempted the writing of fiction, and produced *The Sad Fortunes of the Reverend Amos Barton*—the first of the *Scenes of Clerical Life*. These, published in *Blackwood's Magazine*, were issued in two volumes in 1858. The press in general extended a languid welcome to this work, and although the author received much encouragement from private sources, notably from Charles Dickens, the critics were mostly non-committal, and it was not until the publication of *Adam Bede* in 1859 that enthusiasm was attracted to the quality of the earlier production. *Adam Bede*, in the judgment of many George Eliot's masterpiece, met with a success (in her own words) "triumphantly beyond anything she had dreamed of." In 1860 appeared *The Mill on the Floss*. After the sensational good fortune of *Adam Bede*, the criticism applied to the new novel seems to have been disappointing. We find Miss Evans telling her publisher that "she does not wish to see any newspaper articles." But the book made its way, and prepared an ever-growing army of readers for *Silas Marner* (1861), *Romola* (1862–1863), and *Felix Holt* (1866).

Silas Marner shows a reversion to her early manner—the manner of *Scenes of Clerical Life*. *Romola*, which is what is called an historical novel, owes it vitality not to the portraits of Savonarola or of the heroine, or to its vigorous pictures of Florentine life in the 15th century, but to its superb presentment of the treacherous, handsome Tito Melema, who belongs not to any one period but to every generation. *Felix Holt*, a novel dealing with political questions, is strained by a painfulness too severe for any reader's pleasure. Where other eminent authors have produced mechanical books, or books which were mere repetitions of their most popular effort, she erred only on the side of the ponderous and the distressing. *Felix Holt* is both, and it is the only one of her novels which lacks an unforgettable human note. *The Spanish Gypsy* (1868), a drama in blank verse, received more public response than most compositions of the kind executed by those connected with the drama or with poetry only; and she published in 1874 another volume of verses, *The Legend of Jubal and other Poems*.

Any depression which the author may have felt with regard to the faults found with some of the last-named books was completely cured by the praise bestowed on *Middlemarch* (1872). This profound study of certain types of English character was supreme at the time of its writing, and it remains supreme, of its school, in European literature. Thackeray is brilliant; Tolstoi is vivid to a point where life-likeness overwhelms any consideration of art; Balzac created a whole world; George Eliot did not create, but her exposition of the upper and middle class minds of her day is a masterpiece of scientific psychology. *Daniel Deronda* (1876), a production on the same lines, was less satisfactory. It exhibited the same human insight, the passionate earnestness, the insinuated special pleading for hard cases, the same intellectual strength, but the subject was unwieldy, almost forbidding, and, as a result, the novel, in spite of its distinction, has never been thoroughly liked. The death of Mr Lewes in 1878 was also the death-blow to her artistic vitality. She corrected the proofs of *Theophrastus Such* (a collection of essays), but she wrote no more. About two years later, however, she married Mr J. W. Cross, a gentleman whose friendship was especially congenial to a temperament so abnormally dependent on affectionate understanding as George Eliot's. But she never really recovered from her shock at the loss of George Lewes, and died at 4 Cheyne Walk, Chelsea, on the 22nd of December 1880.

No right estimate of her, whether as a woman, an artist or a philosopher, can be formed without a steady recollection of her infinite capacity for mental suffering, and her need of human support. The statement that there is no sex in genius, is on the face of it, absurd. George Sand, certainly the most independent and dazzling of all women authors, neither felt, nor wrote, nor thought as a man. Saint Teresa, another great writer on a totally different plane, was pre-eminently feminine in every word and idea. George Eliot, less reckless, less romantic than the Frenchwoman, less spiritual than the Spanish saint, was more masculine in style than either; but her outlook was not, for a moment, the man's outlook; her sincerity, with its odd reserves, was not quite the same as a man's sincerity, nor was her humour that genial, broad, unequivocal humour which is peculiarly virile. Hers approximated, curiously enough, to the satire of Jane Austen, both for its irony and its application to little everyday affairs. Men's humour, in its classic manifestations, is on the heroic rather than on the average scale: it is for the uncommon situations, not for the daily tea-table.

Her method of attacking a subject shows the influence of Jane Austen, especially in parts of *Middlemarch*; one can detect also the stronger influence of Mrs Gaskell, of Charlotte Brontë, and of Miss Edgeworth. It was, however, but an influence, and no more than a man writer, anxious to acquire a knowledge of the feminine point of view, might have absorbed from a study of these women novelists. One often hears that she is not artistic; that her characterization is less distinct than Jane Austen's; that she tells more than should be known of her heroes and heroines. But it should be remembered that Jane Austen dealt with familiar domestic types, whereas George Eliot excelled in the presentation of extraordinary souls. One woman drew members of polite society with correct notions, while the other woman depicted social rebels with ideas and ideals. In every one of George Eliot's books, the protagonists, tortured by dreams of perfection, are in revolt against the prudent compromises of the worldly. All through her stories, one hears the clash of "the heroic for earth too high," and the desperate philosophy, disguised it is true, of Omar Khayyam. In her day, Epicureanism had not reached the life of the people, nor passed into the education of the mob. Few dared to confess that the pursuit of pleasure, whether real or imagined, was the aim of mankind. The charm of Jane Austen is the charm of the untroubled and well-to-do materialist, who sees in a rich marriage, a comfortable house, carriages and an assured income the best to strive for; and in a fickle lover of either sex or the loss of money the severest calamities which can befall the human spirit. Jane Austen despised the greater number of her characters: George Eliot suffered with each of hers. Here, perhaps, we find the reason why she is accused of being inartistic. She could not be impersonal.

Again, George Eliot was a little scornful to those of both sexes who had neither special missions nor the consciousness of this deprivation. Men are seldom in favour of missions in any field. She demanded, too strenuously from the very beginning, an aim, more or less altruistic, from every individual; and as she advanced in life this claim became the more imperative, till at last it overpowered her art, and transformed a great delineator of humanity into an eloquent observer with far too many personal prejudices. But she was altogether free from cynicism, bitterness, or the least tendency to pride of intellect. She suffered from bodily weakness the greater part of her life, and, but for an extraordinary mental health—inherited from the fine yeoman stock from which she sprang—it is impossible that she could have retained, at all times, so sane a view of human conduct, or been the least sentimental among women writers of the first rank—the one wholly without morbidity in any disguise. The accumulation of mere book knowledge, as opposed to the friction of a life spent among all sorts and conditions of men, drove George Eliot at last to write as a specialist for specialists: joy was lost in the consuming desire for strict accuracy: her genius became more and more speculative, less and less emotional. The highly trained brain suppressed the impulsive heart,—the heart described with such candour and pathos as Maggie Tulliver's in *The Mill on the Floss*. For this reason—chiefly because philosophy is popularly associated with inactive depression, whereas human nature is held to be eternally exhilarating—her later works have not received so much praise as her earlier productions. But one has only to compare *Romola* or *Daniel Deronda* with the compositions of any author except herself to realize the greatness of her designs, and the astonishing gifts brought to their final accomplishment.

See also the *Life of George Eliot*, edited by J. W. Cross (3 vols., 1885–1887); *George Eliot*, by Sir Leslie Stephen, in the "English Men of Letters" series (1902); by Oscar Browning, "Great Writers" series (1890), with a bibliography by J. P. Anderson; by Mathilde Blind, "Eminent Women" series, a new edition of which also contains a bibliography (Boston, Mass., 1904). (P. M. T. C.)

ELIOT, SIR JOHN (1592–1632), English statesman, son of Richard Eliot, a member of an old Devonshire family lately settled in Cornwall, was born at his father's seat at Port Eliot in Cornwall in 1592. He matriculated at Exeter College, Oxford, on the 4th of December 1607, and leaving the university after a residence of three years he studied law at one of the inns of court. He also spent some months travelling in France, Spain and Italy, in company, for part of the time, with young George Villiers, afterwards duke of Buckingham. He was only twenty-two when he began his parliamentary career as member for St Germans in the "addled parliament" of 1614. In 1618 he was knighted, and next year through the patronage of Buckingham he obtained the appointment of vice-admiral of Devon, with large powers for the defence and control of the commerce of the county. It was not long before the characteristic energy with which he performed the duties in his office involved him in difficulties. After many attempts, in 1623 he succeeded by a clever but dangerous manœuvre in entrapping the famous pirate John Nutt, who had for years infested the southern coast, inflicting immense damage upon English commerce. The issue is noteworthy. The pirate, having a powerful protector at court in Sir George Calvert, the secretary of state, was pardoned; while the vice-admiral, upon charges which could not be substantiated, was flung into the Marshalsea, and detained there nearly four months.

A few weeks after his release Eliot was elected member of parliament for Newport (February 1624). On the 27th of February he delivered his first speech, in which he at once revealed his great powers as an orator, demanding boldly that the liberties and privileges of parliament, repudiated by James I. in the former parliament, should be secured. In the first parliament of Charles I., in 1625, he urged the enforcement of the laws against the Roman Catholics. Meanwhile he had continued the friend and supporter of Buckingham and greatly approved of the war with Spain. Buckingham's incompetence, however, and the bad faith with which both he and the king continued to treat the parliament, alienated Eliot completely from the administration. Distrust of his former friend quickly grew in Eliot's excitable mind to a certainty of his criminal ambition and treason to his country. Returned to the parliament of 1626 as member for St Germans, he found himself, in the absence of other chiefs of the opposition whom the king had secured by nominating them sheriffs, the leader of the House. He immediately demanded an inquiry into the recent disaster at Cadiz. On the 27th of March he made an open and daring attack upon Buckingham and his evil administration. He was not intimidated by the king's threatening intervention on the 29th, and persuaded the House to defer the actual grant of the subsidies and to present a remonstrance to the king, declaring its right to examine the conduct of ministers. On the 8th of May he was one of the managers who carried Buckingham's impeachment to the Lords, and on the 10th he delivered the charges against him, comparing him in the course of his speech to Sejanus. Next day Eliot was sent to the Tower. On the Commons declining to proceed with business as long as Eliot and Sir Dudley Digges (who had been imprisoned with him) were in confinement, they were released, and parliament was dissolved on the 15th of June. Eliot was immediately dismissed from his office of vice-admiral of Devon, and in 1627 he was again imprisoned for refusing to pay a forced loan, but liberated shortly before the assembling of the parliament of 1628, to which he was returned as member for Cornwall. He joined in the resistance now organized to arbitrary taxation, was foremost in the promotion of the Petition of Right, continued his outspoken censure of Buckingham, and after the latter's assassination in August, led the attack in the session of 1629 on the ritualists and Arminians.

In February the great question of the right of the king to levy tonnage and poundage came up for discussion; and on the king ordering an adjournment of parliament, the speaker, Sir John Finch, was held down in the chair while Eliot's resolutions against illegal taxation and innovations in religion were read to the House by Holles (*q.v.*). In consequence, Eliot, with eight other members, was imprisoned on the 4th of March in the Tower. He refused to answer in his examination, relying on his privilege of parliament, and on the 29th of October was removed to the Marshalsea. On the 26th of January he appeared at the bar of the king's bench, with Holles and Valentine, to answer a charge of conspiracy to resist the king's order, and refusing to acknowledge the jurisdiction of the court he was fined £2000 and ordered to be imprisoned during the king's pleasure and till he had made submission. This he steadfastly refused. While some of the prisoners appear to have had certain liberty allowed to them, Eliot's confinement in the Tower was made exceptionally severe. Charles's anger had been from the first directed chiefly against him, not only as his own political antagonist but as the prosecutor and bitter enemy of Buckingham; "an outlawed man," he described him, "desperate in mind and fortune."

Eliot languished in prison for some time, during which he wrote several works, his *Negotium posterorum*, an account of the parliament in 1625; *The Monarchie of Man*, a political treatise; *De jure majestatis, a Political Treatise of Government*; and *An Apology for Socrates*, his own defence. In the spring of 1632 he fell into a decline. In October he petitioned Charles for permission to go into the country, but leave could only be obtained at the price of submission, and was finally refused. He died on the 27th of November 1632. When his son requested permission to move the body to Port Eliot, Charles, whose resentment still survived, returned the curt refusal: "Let Sir John Eliot be buried in the church of that parish where he died." The manner of Eliot's death, not without suspicion of foul play, and as the result of the king's implacability and the severe treatment to which he had been subjected, had more effect, probably, than any other single incident in embittering and precipitating the dispute between king and parliament; and the tragic sacrifice of a man so gifted and patriotic, and actuated originally by no antagonistic feeling against the monarchy or the church, is the surest condemnation of the king's policy and administration. Eliot was essentially a great orator, inspired by enthusiasm and high ideals, which he was able to communicate to his hearers by his eloquence, but, like Chatham afterwards, he had not only the gifts but the failings of the orator, was incapable of well-reasoned and balanced judgment, and, though one of the greatest personalities of the time, was inferior to Pym both as a party leader and as a statesman.

Eliot married Rhadagund, daughter of Richard Gedie of Trebursye in Cornwall, by whom he had five sons, from the youngest of whom Nicholas the present earl of St Germans is descended, and four daughters.

The *Life of Sir J. Eliot*, by J. Forster (1864), is supplemented and corrected by Gardiner's *History of England*, vols. v.-vii., and the article in the *Dict. of Nat. Biog.*, by the same author. Eliot's writings, together with his Letter-Book, have been edited by Dr Grosart.

ELIOT, JOHN (1604–1690), American colonial clergyman, known as the "Apostle to the Indians," was born probably at Widford, Hertfordshire, England, where he was baptized on the 5th of August 1604. He was the son of Bennett Eliot, a middle-class farmer. Little is known of his boyhood and early manhood except that he took his degree of B.A. at Jesus College, Cambridge, in 1622. It seems probable that he entered the ministry of the Established Church, but there is nothing definitely known of him until 1629–1630, when he became an usher or assistant at the school of the Rev. Thomas Hooker, at Little Baddow, near Chelmsford. The influence of Hooker apparently determined him to become a Puritan, but his connexion with the school ceased in 1630, when Laud's persecutions drove Hooker into exile. The realization of the difficulties in the way of a nonconforming clergyman in England undoubtedly determined Eliot to emigrate to America in the autumn of 1631, where he settled first at Boston, assisting for a time at the First Church. In November 1632 he became "teacher" to the church at Roxbury, with which his connexion lasted until his death. There he married Hannah Mulford, who had been betrothed to him in England, and who became his constant helper. In the care of the Roxbury church he was associated with Thomas Welde from 1632 to 1641, with Samuel Danforth (1626–1674) from 1649 to 1674, and with Nehemiah Walter (1663–1750) from 1688 to 1690.

Inspired with the idea of converting the Indians, his first step was to perfect himself in their dialects, which he did by the assistance of a young Indian whom he received into his home. With his aid he translated the Ten Commandments and the Lord's Prayer. He first successfully preached to the Indians in their own tongue at Nonantum (Newton) in October 1646. At the third meeting several Indians declared themselves converted, and were soon followed by many others. Eliot induced the Massachusetts General Court to set aside land for their residence, the same body also voting him £10 to prosecute the work, and directing that two clergymen be annually elected by the clergy as preachers to the Indians. As soon as the success of Eliot's endeavours became known, the necessary funds flowed in upon him from private sources in both Old and New England. In July 1649 parliament incorporated the "Society for the Propagation of the Gospel in New England," which henceforth supported and directed the work inaugurated by Eliot. The first appeal for aid brought contributions of £11,000. In 1651 the Christian Indian town founded by Eliot was removed from Nonantum to Natick, where residences, a meeting-house, and a school-house were erected, and where Eliot preached, when able, once in every two weeks as long as he lived. To this community Eliot applied a plan of government by means of tens, fifties and hundreds, which he subsequently advocated as suitable for all England. Eliot's missionary labours encouraged others to follow in his footsteps. A second town under his direction was established at Ponkapog (Stoughton) in 1654, in which he had the assistance of Daniel Gookin (*c.* 1612–1687). His success was duplicated in Martha's Vineyard and Nantucket by the Mayhews, and by 1674 the unofficial census of the "praying Indians" numbered 4000. King Philip's War (1675–76) was a staggering blow to all missionary enterprise; and although few of the converted Indians proved disloyal, it was some years before adequate support could again be enlisted. Yet at Eliot's death, which occurred at Roxbury on the 21st of May 1690, the missions were at the height of their prosperity, and that the results of his labours were not permanent was due only to the racial traits of the New England tribes.

Of wider influence and more lasting value than his personal labours as a missionary was Eliot's work as a translator of the Bible and various religious works into the Massachusetts dialect of the Algonquian language. The first work completed was the *Catechism*, published in 1653 at Cambridge, Massachusetts, the first book to be printed in the Indian tongue. Several years elapsed before Eliot completed his task of translating the Bible. The New Testament was at last issued in 1661, and the Old Testament followed two years later. The New Testament was bound with it, and thus the whole Bible was completed. To it were added a Catechism and a metrical version of the Psalms. The title of this Bible, now a great rarity, is *Mamussee Wunneetupanatamwe Up-Biblum God naneeswe Nukkone Testament kah wonk Wusku Testament-Ne quoshkinnumuk nashpe Wuttinneumoh Christ noh assoowesit John Eliot*; literally translated, "The Whole Holy His-Bible God, both Old Testament and also New Testament. This turned by the-servant-of-Christ, who is called John Eliot."

This book was printed in 1663 at Cambridge, Mass., by Samuel Green and Marmaduke Johnson, and was the first Bible printed in America. In 1685 appeared a second edition, in the preparation of which Eliot was assisted by the Rev. John Cotton (1640–1699), the younger, of Plymouth, who also had a wide knowledge of the Indian tongue.

Besides his Bible, Eliot published at Cambridge in 1664 a translation of Baxter's *Call to the Unconverted*, and in 1665 an abridged translation of Bishop Bayly's *Practice of Piety*. With the assistance of his sons he completed (1664) his well-known *Indian Grammar Begun*, printed at Cambridge, Massachusetts, in 1666. It was reprinted in vol. ix. of the *Collections of the Massachusetts Historical Society*. *The Indian Primer*, comprising an exposition of the Lord's Prayer and a translation of the *Larger Catechism*, was published at Cambridge in 1669, and was reprinted under the editorial superintendence of Mr John Small of the university of Edinburgh in 1877. In 1671 Eliot printed in English a little volume entitled *Indian Dialogues*, followed in 1672 by his *Logick Primer*, both of which were intended for the instruction of the Indians in English. His last translation was Thomas Shepard's *Sincere Convert*, completed and published by Grindal Rawson in 1689. Eliot's literary activity, however, extended into other fields than that of Indian instruction. He was, with Richard Mather, one of the editors of the *Bay Psalm Book* (1640). Several tracts written wholly or in part by him in the nature of reports to the society which supported his missions were published at various times in England. In 1660 he published a curious treatise on government entitled *The Christian Commonwealth*, in which he found the ideal of government in the ancient Jewish state, and proposed the reorganization of the English government on the basis of a numerical subdivision of the inhabitants. His *Harmony of the Gospels* (1678) was a life of Jesus Christ.

Bibliography.—An account of Eliot's life and work is contained in Williston Walker's *Ten New England Leaders* (New York, 1901). There is a "Life of John Eliot," by Convers Francis, in *Sparks' American Biography*, vol. v. (New York, 1853); another by N. Adams (Boston, 1847); and a sketch in Cotton Mather's *Magnalia* (London, 1702). For a good account of his publications in the Indian language see the chapter on "The Indian Tongue and its Literature," by J. H. Trumbull, in vol. i. of the *Memorial History of Boston* (1882). (W. Wr.)

ELIS, or **Eleia**, an ancient district of southern Greece, bounded on the N. by Achaea, E. by Arcadia, S. by Messenia, and W. by the Ionian Sea. The local form of the name was Valis, or Valeia, and its meaning, in all probability, "the lowland." In its physical constitution Elis is practically one with Achaea and Arcadia; its mountains are mere offshoots of the Arcadian highlands, and its principal rivers are fed by Arcadian springs. From Erymanthus in the north, Skollis (now known as Mavri and Santameri in different parts of its length) stretches toward the west, and Pholoe along the eastern frontier; in the south a prolongation of Mount Lycaeon bore in ancient times the names of Minthe and Lapithus, which have given place respectively to Alvena and to Kaiapha and Smerna. These mountains are well clothed with vegetation, and present a soft and pleasing appearance in contrast to the picturesque wildness of the parent ranges. They gradually sink towards the west and die off into what was one of the richest alluvial tracts in the Peloponnesus. Except where it is broken by the rocky promontories of Chelonatas (now Chlemutzi) and Ichthys (now Katakolo), the coast lies low, with stretches of sand in the north and lagoons and marshes towards the south. During the summer months communication with the sea being established by means of canals, these lagoons yield a rich harvest of fish to the inhabitants, who at the same time, however, are almost driven from the coast by the swarms of gnats. The district for administrative purposes forms part of the nome of Elis and Achaea (see Greece).

Elis was divided into three districts—Hollow or Lowland Elis (ἡ κοίλη Ἦλις), Pisatis, or the territory of Pisa, and Triphylia, or the country of the three tribes. (1) *Hollow Elis*, the largest and most northern of the three, was watered by the Peneus and its tributary the Ladon, whose united stream forms the modern Gastouni. It included not only the champaign country originally designated by its name, but also the mountainous region of Acrorea, occupied by the offshoots of Erymanthus. Besides the capital city of Elis, it contained Cyllene, an Arcadian settlement on the sea-coast, whose inhabitants worshipped Hermes under the phallic symbol; Pylus, at the junction of the Peneus and the Ladon, which, like so many other places of the same name, claimed to be the city of Nestor, and the fortified frontier town of Lasion, the ruins of which are still visible at Kuti, near the village of Kumani. The district was famous in antiquity for its cattle and horses; and its byssus, supposed to have been introduced by the Phoenicians, was inferior only to that of Palestine. (2) *Pisatis* extended south from Hollow Elis to the right bank of the Alpheus, and was divided into eight departments called after as many towns. Of these Salmone, Heraclea, Cicysion, Dyspontium and Harpina are known—the last being the reputed burial-place of Marmax, the suitor of Hippodamia. From the time of the early investigators it has been disputed whether Pisa, which gave its name to the district, has ever been a city, or was only a fountain or a hill. By far the most important spot in Pisatis was the scene of the great Olympic games, on the northern bank of the Alpheus (see OLYMPIA). (3) *Triphylia* stretches south from the Alpheus to the Neda, which forms the boundary towards Messenia. Of the nine towns mentioned by Polybius, only two attained to any considerable influence—Lepreum and Macistus, which gave the names of Lepreatis and Macistia to the southern and northern halves of Triphylia. The former was the seat of a strongly independent population, and continued to take every opportunity of resisting the supremacy of the Eleans. In the time of Pausanias it was in a very decadent condition, and possessed only a poor brick-built temple of Demeter; but considerable remains of its outer walls are still in existence near the village of Strovitzi, on a part of the Minthe range.

The original inhabitants of Elis were called Caucones and Paroreatae. They are mentioned for the first time in Greek history under the title of Epeians, as setting out for the Trojan War, and they are described by Homer as living in a state of constant hostility with their neighbours the Pylians. At the close of the 11th century B.C. the Dorians invaded the Peloponnesus, and Elis fell to the share of Oxylus and the Aetolians. These people, amalgamating with the Epeians, formed a powerful kingdom in the north of Elis. After this many changes took place in the political distribution of the country, till at length it came to acknowledge only three tribes, each independent of the others. These tribes were the Epeians, Minyae and Eleans. Before the end of the 8th century B.C., however, the Eleans had vanquished both their rivals, and established their supremacy over the whole country. Among the other advantages which they thus gained was the right of celebrating the Olympic games, which had formerly been the prerogative of the Pisatans. The attempts which this people made to recover their lost privilege, during a period of nearly two hundred years, ended at length in the total destruction of their city by the Eleans. From the time of this event (572 B.C.) till the Peloponnesian War, the peace of Elis remained undisturbed. In that great contest Elis sided at first with Sparta; but that power, jealous of the increasing prosperity of its ally, availed itself of the first pretext to pick a quarrel. At the battle of Mantinea (418 B.C.) the Eleans fought against the Spartans, who, as soon as the war came to a close, took vengeance upon them by depriving them of Triphylia and the towns of the Acrorea. The Eleans made no attempt to re-establish their authority over these places, till the star of Thebes rose in the ascendant after the battle of Leuctra (371 B.C.). It is not unlikely that they would have effected their purpose had not the Arcadian confederacy come to the assistance of the Triphylians. In 366 B.C. hostilities broke out between them, and though the Eleans were at first successful, they were soon overpowered, and their capital very nearly fell into the hands of the enemy. Unable to make head against their opponents, they applied for assistance to the Spartans, who invaded Arcadia, and forced the Arcadians to recall their troops from Elis. The general result of this war was the restoration of their territory to the Eleans, who were also again invested with the right of holding the Olympic games. During the Macedonian supremacy in Greece they sided with the victors, but refused to fight against their countrymen. After the death of Alexander they renounced the Macedonian alliance. At a subsequent period they joined the Aetolian League, but persistently refused to identify themselves with the Achaeans. When the whole of Greece fell under the Roman yoke, the sanctity of Olympia secured for the Eleans a certain amount of indulgence. The games still continued to attract to the country large numbers of strangers, until they were finally put down by Theodosius in 394, two years previous to the utter destruction of the country by the Gothic invasion under Alaric. In later times Elis fell successively into the hands of the Franks and the Venetians, under whose rule it recovered to some extent its ancient prosperity. By the latter people the province of Belvedere on the Peneus was called, in consequence of its fertility, "the milch cow of the Morea."

ELIS, the chief city of the ancient Greek district of Elis, was situated on the river Peneus, just where it passes from the mountainous district of Acrorea into the champaign below. According to native tradition, it was originally founded by Oxylus, the leader of the Aetolians, whose statue stood in the market-place. In 471 B.C. it received a great extension by the incorporation (synoecism) of various small hamlets, whose inhabitants took up their abode in the city. Up to this date it only occupied the ridge of the hill now called Kalaskopi, to the south of the Peneus, but afterwards it spread out in several suburbs, and even to the other side of the stream. As all the athletes who intended to take part in the Olympic games were obliged to undergo a month's training in the city, its gymnasiums were among its principal institutions. They were three in number—the "Xystos," with its avenues of plane-trees, its plethrion or wrestling-place, its altars to Heracles, to Eros and Anteros, to Demeter and Kore (Cora), and its cenotaph of Achilles; the "Tetragonon," appropriated to boxing exercises; and the "Maltho," in the interior of which was a hall or council chamber called Lalichmion after its founder. The market-place was of the old-fashioned type, with porticoes at intervals and paths leading between them. It was called the Hippodrome because it was commonly used for exercising horses. Among the other objects of interest were the temple of Artemis Philomirax; the Hellanodicaeon, or office of the Hellanodicae; the Corcyrean Hall, a building in the Dorian style with two façades, built of spoils from Corcyra; a temple of Apollo Acesius; a temple of Silenus; an ancient structure supported on oaken pillars and reputed to be the burial-place of Oxylus; the building where the sixteen women of Elis were wont to weave a robe for the statue of Hera at Olympia; the temple of Aphrodite, with a statue of the goddess by Pheidias as Urania with a tortoise beneath her foot, and by Scopas as Pandemos, riding on a goat; and the shrine of Dionysus, whose festival, the Thyia, was yearly celebrated in the neighbourhood. On the acropolis was a temple of Athena, with a gold and ivory statue by Pheidias. The history of the town is closely identified with that of the country. In 399 B.C. it was occupied by Agis, king of Sparta. The acropolis was fortified in 312 by Telesphorus, the admiral of Antigonus, but it was shortly afterwards dismantled by Philemon, another of his generals. A view of the site is given by Stanhope. It is now called Palaeopolis. No traces of any buildings can be identified, the only remains visible dating from Roman times.

See Pausanias vi. 23-26; J. Spencer Stanhope, *Olympia and Elis* (1824), folio; W. M. Leake, *Morea* (1830); E. Curtius, *Peloponnesus* (1851–1852); Schiller, *Stämme und Staaten Griechenlands*; C. Bursian, *Geographie von Griechenland* (1868–1872); P. Gardner, "The Coins of Elis," in *Num. Chr.* (1879). (E. GR.)

ELIS, PHILOSOPHICAL SCHOOL OF. This school was founded by Phaedo, a pupil of Socrates. It existed for a very short time and was then transferred by Menedemus to Eretria, where it became known as the Eretrian school. Its chief members, beside Phaedo, were Anchipylus, Moschus and Pleistanus (see PHAEDO and MENEDEMUS).

ELISAVETGRAD, a fortress and town of Russia, in the government of Kherson, 196 m. by rail N.E. of Odessa on the Balta-Kremenchug railway, and on the Ingul river, in 48° 31′ N. and 32° 10′ E. The population increased from 23,725 in 1860 to

66,182 in 1900. The town is regularly built, with wide streets, some of them lined with trees, and is a wealthy town, which has become an industrial centre for the region especially on account of its steam flour-mills, in which it is second only to Odessa, its distilleries, mechanical workshops, tobacco and tallow factories and brickworks. It is an important centre for trade in cereals and flour for export, and in sheep, cattle, wool, leather and timber. Five fairs are held annually. It has a military school, a first-class meteorological station and a botanical garden. The town was founded in 1754 and named after the empress Elizabeth. The fortifications are now decayed.

ELISAVETPOL, a government of Russia, Transcaucasia, having the governments of Tiflis and Daghestan on the N., Baku on the E., and Erivan and Tiflis on the W. and Persia on the S. Area, 16,721 sq. m. It includes: (*a*) the southern slope of the main Caucasus range in the north-east, where Basardyuzi (14,770 ft.) and other peaks rise above the snow-line; (*b*) the arid and unproductive steppes beside the Kura, reaching 1000 ft. of altitude in the west and sinking to 100-200 ft. in the east, where irrigation is necessary; and (*c*) the northern slopes of the Transcaucasian escarpment and portions of the Armenian plateau, which is intersected towards its western boundary, near Lake Gok-cha, by chains of mountains consisting of trachytes and various crystalline rocks, and reaching 12,845 ft. in Mount Kapujikh. Elsewhere the country has the character of a plateau, 7000 to 8000 ft. high, deeply trenched by tributaries of the Aras. All varieties of climate are found from that of the snowclad peaks, Alpine meadows, and stony deserts of the high levels, to that of the hill slopes, clothed with gardens and vineyards, and of the arid Caspian steppes. Thus, at Shusha, on the plateau, at an altitude of 3680 ft., the average temperatures are: year 48°, January 26°, July 66°; annual rainfall, 26·4; while at Elisavetpol, in the valley of the Kura, they are: year 55°, January 32°·2, July 77° and rainfall only 10·3 in. Nearly one-fifth of the surface is under forests.

The population which was 885,379 in 1897 (only 392,124 women; 84,130 urban), and was estimated at 953,300 in 1906, consists chiefly of Tatars (56%) and Armenians (33%). The remainder are Kurds (4·7%), Russians and a few Germans, Jews, Kurins, Udins and Tates. Peasants form the great bulk of the population. Some of the Tatars and the Kurds are nomadic. Wheat, maize, barley, oats and rye are grown, also rice. Cultivation of cotton has begun, but the rearing of silkworms is of old standing, especially at Nukha (1650 tons of cocoons on the average are obtained every year). Nearly 8000 acres are under vines, the yield of wine averaging 82½ million gallons annually. Gardening reaches a high standard of perfection. Liquorice root is obtained to the extent of about 35,000 tons annually. The rearing of live-stock is largely carried on on the steppes. Copper, magnetic iron ore, cobalt and a small quantity of naphtha are extracted, and nearly 10,000 persons are employed in manufacturing industry—copper works and silk-mills. Carpet-weaving is widely spread. Owing to the Transcaucasian railway, which crosses the government, trade, both in the interior and with Persia, is very brisk. The government is divided into eight districts, Elisavetpol, Aresh, Jebrail, Jevanshir, Kazakh, Nukha, Shusha and Zangezur. The only towns, besides the capital, are Nukha (24,811 inhabitants in 1897) and Shusha (25,656).

ELISAVETPOL (formerly *Ganja*, alternative names being Kenjeh and Kanga), a town of Russia, capital of the government of the same name, 118 m. by rail S.E. of Tiflis and 3½ m. from the railway, at an altitude of 1446 ft. Pop. (1873) 15,439; (1897) 33,090. It is a very old town, which changed hands between Persians, Khazars and Arabs even in the 7th century, and later fell into the possession of Mongols, Georgians, Persians and Turks successively, until the Russians took it in 1804, when the change of name was made. It is a badly built place, with narrow streets and low-roofed, windowless houses, and is situated in a very unhealthy locality, but has been much improved, a new European quarter having been built on the site of the old fortress (erected by the Turks in 1712–1724). The inhabitants are chiefly Tatars and Armenians, famed for their excellent gardening, and also for silkworm breeding. It has a beautiful mosque, built by Shah Abbas of Persia in 1620; and a renowned "Green Mosque" amidst the ruins of old Ganja, 4 m. distant. The Persian poet, Shah Nizam (Nizam-ed-Din), was born here in 1141, and is said to have been buried (1203) close to the town. The Persians were defeated by the Russians under Paskevich outside this town in 1826.

ELISHA (a Hebrew name meaning "God is deliverance"), in the Bible, the disciple and successor of Elijah, was the son of Shaphat of Abel-meholah in the valley of the Jordan. He was symbolically elected to the prophetic office by Elijah some time during the reign of Ahab (1 Kings xix. 19-21), and he survived until the reign of Joash. His career thus appears to have extended over a period of nearly sixty years. The relation between Elijah and Elisha was of a particularly close kind, but the difference between them is much more striking than the resemblance. Elijah is the prophet of the wilderness, wandering, rugged and austere; Elisha is the prophet of civilized life, of the city and the court, with the dress, manners and appearance of ordinary "grave citizens." Elijah is the messenger of vengeance—sudden, fierce and overwhelming; Elisha is the messenger of mercy and restoration. Elijah's miracles, with few exceptions, are works of wrath and destruction; Elisha's miracles, with but one notable exception, are works of beneficence and healing. Elijah is the "prophet as fire" (Ecclus, xlviii. 1), an abnormal agent working for exceptional ends; Elisha is the "holy man of God which passeth by us continually" (2 Kings iv. 9), mixing in the common life of the people.

It is impossible to draw up a detailed chronology of his life. In most of the events narrated no further indication of time is given than by the words "the king of Israel," the name not being specified. There are some instances in which the order of time is obviously the reverse of the order of narrative, and there are other grounds for concluding that the narrative as we now have it is confused and incomplete. This may serve not only to explain the chronological difficulties, but also to throw some light on the altogether exceptional character of the miraculous element in Elisha's history. On the literary questions, see further Kings.

Not only are Elisha's miracles very numerous, even more so than those of Elijah, but they stand in a peculiar relation to the man and his work. With all the other prophets the primary function is spiritual teaching; miracles, even though numerous and many of them symbolical like Elisha's, are only accessory. With Elisha, on the other hand, miracles seem the principal function, and the teaching is altogether subsidiary. An explanation of the superabundance of miracles in Elisha's life is suggested by the fact that several of them were merely repetitions or doubles of those of his predecessor. Such were: his first miracle, when, returning across the Jordan, he made a dry path for himself in the same manner as Elijah (2 Kings ii. 14); the increase of the widow's pot of oil (iv. 1-7); and the restoration of the son of the woman of Shunem to life (iv. 18-37). The theory that stories from the earlier life have been imported by mistake into the later, even if tenable, applies only to three of the miracles, and leaves unexplained a much larger number which are not only not repetitions of those of Elijah, but have an entirely opposite character. The healing of the water of Jericho by putting salt in it (ii. 19-22), the provision of water for the army of Jehoshaphat in the arid desert (iii. 6-20), the neutralizing by meal of the poison in the pottage of the famine-stricken sons of the prophets at Jericho (iv. 38-41), the healing of Naaman the Syrian (v. 1-19), and the recovery of the iron axehead that had sunk in the water (vi. 1-7), are all instances of the beneficence which was the general characteristic of Elisha's wonder-working activity in contrast to that of Elijah. Another miracle of the same class, the feeding of a hundred men with twenty loaves so that something was left over (iv. 42-44), deserves mention as the most striking though not the only instance of a resemblance between the work of Elisha and that of Jesus (Matt. xiv. 13-21). The one distinct exception to the general beneficence of Elisha's activity—the destruction of the forty-two children who mocked him as he was going up to Bethel (2 Kings ii. 23-25)—presents an ethical difficulty which is scarcely removed by the suggestion that the narrative has lost some particulars which would have shown the real enormity of the children's offence. We may prefer to imagine that among the homely stories told of him was one which had for its main object the inculcation of respect for one's elders.[1] The leprosy brought upon Gehazi (v. 20-27), though a miracle of judgment, scarcely belongs to the same class as the other; and it will be observed that Gehazi's subsequent relations with the court (viii. 1-6) ignore the disease, a fatal hindrance to intercourse. Further, the healing of Naaman (alluded to in Luke iv. 27) presupposes peaceful relations between Israel and the Syrians, with which, however, contrast ch. vi. The wonder-working power of Elisha is represented as continuing even after his death. As the feeding of the hundred men and the cure of leprosy connect his work with that of Jesus, so the story that a dead man who was cast into his sepulchre was brought to life by the mere contact with his bones (2 Kings xiii. 21, cf. Ecclus. xlviii. 12-14) is the most striking instance of an analogy between his miracles and those recorded of medieval saints. Stanley (*Jewish Church*, 4th ed., ii. 276) in reference to this has remarked that in the life of Elisha alone "in the sacred history the gulf between biblical and ecclesiastical miracles almost disappears."

The place which Elisha filled in contemporary history was one of great influence and importance, and several narratives testify to his great reputation in Israel. On one occasion, when he delivered the army that had been brought out against Moab from a threatened dearth of water (2 Kings iii.),[2] he plainly intimates that, but for his regard to Jehoshaphat, the king of Judah, who was in alliance with Israel, he would not have interfered. Whether he was with the army or was supposed to be living in the desert is left obscure. An interesting touch is the influence of music upon the prophetic mind (v. 15). His next signal interference was during the incursions of the Syrians, when he disclosed the plans of the invaders to the "king of Israel" with such effect that they were again and again baffled. When the "king of Syria" was informed that "Elisha, the prophet that is in Israel, telleth the king of Israel the words that thou speakest in thy bed-chamber," he at once sent an army to take him captive in Dothan. At Elisha's prayer his terrified servant beheld an army of horses and chariots of fire surrounding the prophet. At a second prayer the invaders were struck blind, and in this state they were led by Elisha to Samaria, where their sight was restored. Their lives were spared at the command of the prophet, and they returned home so impressed that their incursions thenceforward ceased (vi. 8-23). This is immediately followed by the siege of Samaria by Benhadad which caused a famine of the severest kind. The calamity was imputed by the "king of Israel" to the influence of Elisha, and he ordered the prophet to be immediately put to death. Forewarned of the danger, Elisha ordered the messenger who had been sent to slay him to be detained at the door, and, when, immediately afterwards, the king himself came ("messenger" in vi. 33 should rather be *king*), predicted a great plenty within twenty-four hours. This was fulfilled by the flight of the Syrian army under the circumstances stated in ch. vii. After the episode with regard to the woman of Shunem (viii. 1-6), which is out of its chronological order, Elisha is represented as at Damascus (viii. 7-15). The reverence with which the foreign monarch Benhadad addressed Elisha deserves to be noted as showing the extent of the prophet's influence. In sending to know the issue of his illness, the king caused himself to be styled "*thy son* Benhadad." Equally remarkable is the very ambiguous nature of Elisha's reply (viii. 10).[3] The most important interference of Elisha in the history of his country constituted the fulfilment of the third of the commands laid upon Elijah. The work of anointing Jehu to be king over Israel was performed by deputy (ix. 1-3). During the forty-five years which the chronological scheme allows for the reigns of Jehu and Jehoahaz the narratives contain no notice of Elisha, but from the circumstances of his death (xiii. 14-21) it is clear that he had continued to enjoy the esteem of the dynasty which he had helped to found. Joash, the grandson of Jehu, waited on him on his deathbed, and addressed him in the words which he himself had used to Elijah: "My father, my father, the chariot of Israel and the horsemen thereof" (cf. ii. 12). By the result of a symbolic discharge of arrows he informed the king of his coming success against Syria, and immediately thereafter he died. The explicit statement that he was buried completes the contrast between him and his greater predecessor.

On the narratives, see KINGS. In general those where "the prophet appears as on friendly terms with the king, and possessed of influence at court (*e.g.* 2 Kings iv. 13, vi. 9, vi. 21, compared with xiii. 14), plainly belong to the time of Jehu's dynasty, though they are related before the fall of the house of Omri. We can distinguish portions of an historical narrative which speaks of Elisha in connexion with events of public interest, without making him the central figure, and a series of anecdotes of properly biographical character. . . . In the latter we may distinguish one circle connected with Gilgal, Jericho and the Jordan valley to which Abel-Meholah belongs (iv. 1-7? 38-44, v.? vi. 1-7). Here Elisha appears as the head of the prophetic gilds, having his fixed residence at Gilgal.[4] Another circle, which presupposes the accession of the house of Jehu, places him at Dothan or Carmel, and represents him as a personage of almost superhuman dignity. Here there is an obvious parallelism with the history of Elijah, especially with his ascension (cf. 2 Kings vi. 17 with ii. 11; xiii. 14 with ii. 12); and it is to this group of narratives that the ascension of Elijah forms the introduction" (Robertson Smith, *Ency. Brit.*, 9th ed., art. KINGS, vol. xiv. p. 186). This twofold representation finds a parallel in the narratives of Samuel, whose history and the conditions reflected therein are analogous to the life and times of Elisha.

Elisha is canonized in the Orthodox Eastern Church, his festival being on the 14th of June, under which date his life is entered in the *Acta sanctorum*.

See especially, W. R. Smith, *Prophets of Israel* (Index, *s.v.*), and the literature to ELIJAH; KINGS, BOOKS OF; PROPHET.

(W. R. S.; S. A. C.)

ELISHA BEN ABUYAH (*c.* A.D. 100), a unique figure among the Palestinian Jews of the first Christian century. He was born before the destruction of the Temple (which occurred in A.D. 70) and survived into the 2nd century. It is not easy to decide as to his exact attitude towards Judaism. That he refused to accept the current rabbinical views is certain, though the Talmud cites his legal decisions. Most authorities believe that he was a Gnostic; but while it is certain that he was not a Christian, it is possible that he was simply a Sadducee, and thus an opponent not of Judaism but of Pharisaism. His disciple, the famous Pharisee Meir, remained his steadfast friend, and his efforts to reclaim his former master are among the most pathetic incidents in the Talmud. In later ages Elisha (*aher* "the other," as he was named) was regarded as the type of a heretic whose pride of intellect betrayed him into infidelity to law and morals. Without much appropriateness Elisha has been sometimes described as the "Faust of the Talmud." (I. A.)

ELIXIR (from the Arabic *al-iksir*, probably an adaptation of the Gr. *ξήριον*, a powder used for drying wounds, from *ξηρός*, dry), in alchemy, the medium which would effect the transmutation of base metals into gold; it probably included all such substances—vapours, liquids, &c.—and had a wider meaning than "philosopher's stone." The same term, more fully *elixir*

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[1] Similarly Elijah enforces respect for the prophetic office in i. 9 sqq. Prof. Kennett points out to the present writer that the epithet "bald-head" may refer to the sign of mourning for Elisha's lost master (cf. Ez. vii. 18, Deut. xiv. 1); "Go up" is perhaps to be taken literally (in reference to Elijah's translation).

[2] The method of obtaining water (*v.* 16 sq.) is that which still gives its name to the Wādi el-Aḥsā ("valley of water pits") at the southern end of the Dead Sea (*Old Test. Jew. Church*, 2nd ed., 147). On the other hand, see Burney, *Heb. Text of Kings*, p. 270.

[3] R. V. marg. is an alteration to remove from Elisha the suggestion of an untruth.

[4] The Gilgal of Elisha is near the Jordan—comp. vi. 1 with iv. 38, ישבים, לפני,—and cannot be other than the great sanctuary 2 m. from Jericho, the local holiness of which is still attested in the *Onomastica*. It is true that in 2 Kings ii. 1 Bethel seems to lie between Gilgal and Jericho; but *v.* 25 shows that Gilgal was not originally represented as Elisha's residence in this narrative, which belongs to the Carmel-Dothan series. On the other hand, for the identification with the Gilgal (Jiljilia) S.W. of Shiloh, see G. A. Smith, *Ency. Bib.* (s.v. Gilgal); Burney, *op. cit.*, p. 264; Skinner, *Century Bible: Kings*, p. 278.

vitae, elixir of life, was given to the substance which would indefinitely prolong life; it was considered to be closely related to, or even identical with, the substance for transmuting metals. In pharmacy the word was formerly given to a strong extract or tincture, but it is only used now for an aromatic sweet preparation, containing one or more drugs, and in such expressions as "elixir of vitriol," a mixture of sulphuric acid, cinnamon, ginger and alcohol.

ELIZABETH (1533–1603), queen of England and Ireland, born on Sunday the 7th of September 1533, and, like all the Tudors except Henry VII., at Greenwich Palace, was the only surviving child of Henry VIII. by his second queen, Anne Boleyn. With such a mother and with Cranmer as her godfather she represented from her birth the principle of revolt from Rome, but the opponents of that movement attached little importance to her advent into the world. Charles V.'s ambassador, Chapuys, hardly deigned to mention the fact that the king's *amie* had given birth to a daughter, and both her parents were bitterly disappointed with her sex. She was, however, given precedence over Mary, her elder sister by sixteen years, and Mary never forgave the infant's offence. Even this dubious advantage only lasted three years until her mother was beheaded, and by a much more serious freak on Henry's part "divorced." Elizabeth has been censured for having made no effort in later years to clear her mother's memory; but no vindication of Anne's character could have rehabilitated Elizabeth's legitimacy. Her mother was not "divorced" for her alleged adultery, because that crime was no ground for divorce by Roman or English canon law. The marriage was declared invalid *ab initio* either on the ground of Anne's precontract with Lord Percy or more probably on the ground of the affinity established between Henry and Anne by Henry's previous relations with Mary Boleyn.

Elizabeth thus lost all hereditary title to the throne, and her early years of childhood can hardly have been happier than Mary's. Nor was her legitimacy ever legally established; but after Jane Seymour's death, when Henry seemed likely to have no further issue, she was by act of parliament placed next in order of the succession after Edward and Mary and their issue; and this statutory arrangement was confirmed by the will which Henry VIII. was empowered by statute to make. Queen Catherine Parr introduced some humanity into Henry's household, and Edward and Elizabeth were well and happily educated together, principally at old Hatfield House, which is now the marquess of Salisbury's stables. They were there when Henry's death called Edward VI. away to greater dignities, and Elizabeth was left in the care of Catherine Parr, who married in indecent haste Thomas, Lord Seymour, brother of the protector Somerset. This unprincipled adventurer, even before Catherine's death in September 1548, paid indelicate attentions to Elizabeth. Any attempt to marry her without the council's leave would have been treason on his part and would have deprived Elizabeth of her contingent right to the succession. Accordingly, when Seymour's other misbehaviour led to his arrest, his relations with Elizabeth were made the subject of a very trying investigation, which gave Elizabeth her first lessons in the feminine arts of self-defence. She proved equal to the occasion, partly because she was in all probability innocent of anything worse than a qualified acquiescence in Seymour's improprieties and a girlish admiration for his handsome face. He or his tragic fate may have touched a deeper chord, but it was carefully concealed; and although in later years Elizabeth seems to have cherished his memory, and certainly showed no love for his brother's children, at the time she only showed resentment at the indignities inflicted on herself.

For the rest of Edward's reign Elizabeth's life was less tempestuous. She hardly rivalled Lady Jane Grey as the ideal Puritan maiden, but she swam with the stream, and was regarded as a foil to her stubborn Catholic sister. She thus avoided the enmity and the still more dangerous favour of Northumberland; and some unknown history lies behind the duke's preference of the Lady Jane to Elizabeth as his son's wife and his own puppet for the throne. She thus escaped shipwreck in his crazy vessel, and rode by Mary's side in triumph into London on the failure of the plot. For a time she was safe enough; she would not renounce her Protestantism until Catholicism had been made the law of the land, but she followed Gardiner's advice to her father when he said it was better that he should make the law his will than try to make his will the law. As a presumptive ruler of England she was, like Cecil, and for that matter the future archbishop Parker also, too shrewd to commit herself to passive or active resistance to the law; and they merely anticipated Hobbes in holding that the individual committed no sin in subordinating his conscience to the will of the state, for the responsibility for the law was not his but the state's. Their position was well enough understood in those days; it was known that they were heretics at heart, and that when their turn came they would once more overthrow Catholicism and expect a similar submission from the Catholics.

It was not so much Elizabeth's religion as her nearness to the throne and the circumstances of her birth that endangered her life in Mary's reign. While Mary was popular Elizabeth was safe; but as soon as the Spanish marriage project had turned away English hearts Elizabeth inevitably became the centre of plots and the hope of the plotters. Had not Lady Jane still been alive to take off the edge of Mary's indignation and suspicion Elizabeth might have paid forfeit for Wyat's rebellion with her life instead of imprisonment. She may have had interviews with French agents who helped to foment the insurrection; but she was strong and wary enough to avoid Henry II.'s, as she had avoided Northumberland's, toils; for even in case of success she would have been the French king's puppet, placed on the throne, if at all, merely to keep it warm for Henry's prospective daughter-in-law, Mary Stuart. This did not make Mary Tudor any more friendly, and, although the story that Elizabeth favoured Courtenay and that Mary was jealous is a ridiculous fiction, the Spaniards cried loud and long for Elizabeth's execution. She was sent to the Tower in March 1554, but few Englishmen were fanatic enough to want a Tudor beheaded. The great nobles, the Howards, and Gardiner would not hear of such a proposal; and all the efforts of the court throughout Mary's reign failed to induce parliament to listen to the suggestion that Elizabeth should be deprived of her legal right to the succession. After two months in the Tower she was transferred to Sir Henry Bedingfield's charge at Woodstock, and at Christmas, when the realm had been reconciled to Rome and Mary was expecting issue, Elizabeth was once more received at court. In the autumn of 1555 she went down to Hatfield, where she spent most of the rest of Mary's reign, enjoying the lessons of Ascham and Baldassare Castiglione, and planting trees which still survive.

She had only to bide her time while Mary made straight her successor's path by uprooting whatever affection the English people had for the Catholic faith, Roman jurisdiction and Spanish control. The Protestant martyrs and Calais between them removed all the alternatives to an insular national English policy in church and in state; and no sovereign was better qualified to lead such a cause than the queen who ascended the throne amid universal, and the Spaniards thought indecent, rejoicings at Mary's death on the 17th of November 1558. "Mere English" she boasted of being, and after Englishmen's recent experience there was no surer title to popular favour. No sovereign since Harold had been so purely English in blood; her nearest foreign ancestor was Catherine of France, the widow of Henry V., and no English king or queen was more superbly insular in character or in policy. She was the unmistakable child of the age so far as Englishmen shared in its characteristics, for with her English aims she combined some Italian methods and ideas. "An Englishman Italianate," ran the current jingle, "is a devil incarnate," and Elizabeth was well versed in Italian scholarship and statecraft. Italians, especially Bernardino Ochino, had given her religious instruction, and the Italians who rejected Catholicism usually adopted far more advanced forms of heresy than Lutheranism, Zwinglianism, or even Calvinism. Elizabeth herself patronized Giacomo Acontio, who thought dogma a "stratagema Satanae," and her last favourite, Essex was accused of being the ringleader of "a damnable crew of atheists." A Spanish ambassador early in the reign thought that Elizabeth's own religion was equally negative, though she told him she agreed with nearly everything in the Augsburg Confession. She was probably not at liberty to say what she really thought, but she made up by saying a great many things which she did not mean. It is clear enough that, although, like her father, she was fond of ritual, she was absolutely devoid of the religious temperament, and that her ecclesiastical preferences were dictated by political considerations. She was sincere enough in her dislike of Roman jurisdiction and of Calvinism; a daughter of Anne Boleyn could have little affection for a system which made her a bastard, and all monarchs agreed at heart with James I.'s aphorism about "no bishop, no king." It was convenient, too, to profess Lutheran sympathies, for Lutheranism was now an established, monarchical and comparatively respectable religion, very different from the Calvinism against which monarchs directed the Counter-reformation from political motives. Lutheran dogma, however, had few adherents in England, though its political theory coincided with that of Anglicanism in the 16th century. The compromise that resulted from these conflicting forces suited Elizabeth very well; she had little dislike of Catholics who repudiated the papacy, but she was forced to rely mainly on Protestants, and had little respect for any form of ecclesiastical self-government. She valued uniformity in religion, not as a safeguard against heresy, but as a guarantee of the unity of the state. She respected the bishops only as supporters of her throne; and, although the well-known letter beginning "Proud Prelate" is an 18th-century forgery, it is hardly a travesty of Elizabeth's attitude.

The outlines of her foreign policy are sketched elsewhere (see English History), and her courtships were diplomatic. Contemporary gossip, which was probably justified, said that she was debarred from matrimony by a physical defect; and her cry when she heard that Mary queen of Scots had given birth to a son is the most womanly thing recorded of Elizabeth. Her features were as handsome as Mary's, but she had little fascination, and in spite of her many suitors no man lost his head over Elizabeth as men did over Mary. She was far too masculine in mind and temperament, and her extravagant addiction to the outward trappings of femininity was probably due to the absence or atrophy of deeper feminine instincts. In the same way the impossibility of marriage made her all the freer with her flirtations, and she carried some of them to lengths that scandalized a public unconscious of Elizabeth's security. She had every reason to keep them in the dark, and to convince other courts that she could and would marry if the provocation were sufficient. She could not marry Philip II., but she held out hopes to more than one of his Austrian cousins whenever France or Mary Stuart seemed to threaten; and later she encouraged two French princes when Philip had lost patience with Elizabeth and made Mary Stuart his protégée. Her other suitors were less important, except Leicester, who appealed to the least intellectual side of Elizabeth and was always a cause of distraction in her policy and her ministers.

Elizabeth was terribly handicapped by having no heirs of her body and no obvious English successor. She could not afford to recognize Mary's claim, for that would have been to alienate the Protestants, double the number of Catholics, and, in her own phrase, to spread a winding-sheet before her eyes; for all would have turned to the rising sun. Mary was dangerous enough as it was, and no one would willingly make his rival his heir. Elizabeth could hardly be expected to go out of her way and ask parliament to repeal its own acts for Mary's sake; probably it would have refused. Nor was it personal enmity on Elizabeth's part that brought Mary to the block. Parliament had long been ferociously demanding Mary's execution, not because she was guilty but because she was dangerous to the public peace. She alone could have given the Spanish Armada any real chance of success; and as the prospect of invasion loomed larger on the horizon, fiercer grew the popular determination to remove the only possible centre of a domestic rising, without which the external attack was bound to be a failure. Elizabeth resisted the demand, not from compassion or qualms of conscience, but because she dreaded the responsibility for Mary's death. She wished Paulet would manage the business on his own account, and when at last her signature was extorted she made a scapegoat of her secretary Davison who had the warrant executed.

The other great difficulty, apart from the succession, with which Elizabeth had to deal arose from the exuberant aggressiveness of England, which she could not, and perhaps did not want to, repress. Religion was not really the cause of her external dangers, for the time had passed for crusades, and no foreign power seriously contemplated an armed invasion of England for religion's sake. But no state could long tolerate the affronts which English seamen offered Spain. The common view that the British Empire has been won by purely defensive action is not tenable, and from the beginning of her reign Englishmen had taken the offensive, partly from religious but also from other motives. They were determined to break up the Spanish monopoly in the new world, and in the pursuit of this endeavour they were led to challenge Spain in the old. For nearly thirty years Philip put up with the capture of his treasure-ships, the raiding of his colonies and the open assistance rendered to his rebels. Only when he had reached the conclusion that his power would never be secure in the Netherlands or the New World until England was conquered, did he despatch the Spanish Armada. Elizabeth delayed the breach as long as she could, probably because she knew that war meant taxation, and that taxation was the most prolific parent of revolt.

With the defeat of the Spanish Armada Elizabeth's work was done, and during the last fifteen years of her reign she got more out of touch with her people. That period was one of gradual transition to the conditions of Stuart times; during it practically every claim was put forward that was made under the first two Stuarts either on behalf of parliament or the prerogative, and Elizabeth's attitude towards the Puritans was hardly distinguishable from James I.'s. But her past was in her favour, and so were her sex and her Tudor tact, which checked the growth of discontent and made Essex's rebellion a ridiculous fiasco. He was the last and the most wilful but perhaps the best of her favourites, and his tragic fate deepened the gloom of her closing years. The loneliness of a queen who had no husband or children and no relatives to mention must at all times have been oppressive; it grew desolating in old age after the deaths of Leicester, Walsingham, Burghley and Essex, and Elizabeth died, the last of her race, on the 24th of March 1603.

Bishop Creighton's *Queen Elizabeth* (1896) is the best biography; there are others by E. S. Beesly (*Twelve English Statesmen*, 1892); Lucy Aikin, *Memoirs of the Court of Queen Elizabeth* (1818); and T. Wright, *Queen Elizabeth and her Times* (1838). See also A. Jessopp's article in the *Dict. Nat. Biog.* (A. F. P.)

ELIZABETH [PETROVNA] (1709–1762), Empress of Russia, the daughter of Peter the Great and Martha Skovronskaya, born at Kolomenskoye, near Moscow, on the 18th of December 1709. Even as a child her parts were good, if not brilliant, but unfortunately her education was both imperfect and desultory. Her father had no leisure to devote to her training, and her mother was too illiterate to superintend her studies. She had a French governess, however, and at a later day picked up some Italian, German and Swedish, and could converse in these languages with more fluency than accuracy. From her earliest years she delighted every one by her extraordinary beauty and vivacity. It was Peter's intention to marry his second daughter to the young French king Louis XV., but the pride of the Bourbons revolted against any such alliance. Other connubial speculations foundered on the personal dislike of the princess for the various suitors proposed to her, so that on the death of her mother (May 1727) and the departure to Holstein of her beloved sister Anne, her only remaining near relation, the princess found herself at the age of eighteen practically her own mistress. So long as Menshikov remained in power, she was treated with liberality and distinction by the government of Peter II., but the Dolgorukis, who supplanted Menshikov and hated the memory of Peter the Great, practically banished Peter's daughter from court. Elizabeth had inherited her father's sensual temperament and, being free from all control, abandoned herself to her appetites without reserve. While still in her teens, she made a lover of Alexius Shubin, a sergeant in the Semenovsky Guards, and after his banishment to Siberia, minus his tongue, by order of the empress Anne, consoled herself with a handsome young Cossack, Alexius Razumovski, who, there is good reason to believe, subsequently became her husband. During the reign of her cousin Anne (1730–1740), Elizabeth effaced herself as much as possible; but under the regency of Anne Leopoldovna the course of events compelled the indolent but by no means incapable beauty to overthrow the existing government. The idea seems to have been first suggested to her by the French ambassador, La Chétardie, who was plotting to destroy the Austrian influence then dominant at the Russian court. It is a mistake to suppose, however, that La Chétardie took a leading part in the revolution which placed the daughter of Peter the Great on the Russian throne. As a matter of fact, beyond lending the tsesarevna 2000 ducats, instead of the 15,000 she demanded of him, he took no part whatever in the actual *coup d'état* which was as great a surprise to him as to every one else. The merit and glory of that singular affair belong to Elizabeth alone. The fear of being imprisoned in a convent for the rest of her life was the determining cause of her irresistible outburst of energy. At midnight on the 6th of December 1741, with a few personal friends, including her physician, Armand Lestocq, her chamberlain, Michael Ilarionvich Vorontsov, her future husband, Alexius Razumovski, and Alexander and Peter Shuvalov, two of the gentlemen of her household, she drove to the barracks of the Preobrazhensky Guards, enlisted their sympathies by a stirring speech, and led them to the Winter Palace, where the regent was reposing in absolute security. Having on the way thither had all the ministers arrested, she seized the regent and her children in their beds, and summoned all the notables, civil and ecclesiastical, to her presence. So swiftly and noiselessly indeed had the whole revolution proceeded that as late as eight o'clock the next morning very few people in the city were aware of it. Thus, at the age of three-and-thirty, this naturally indolent and self-indulgent woman, with little knowledge and no experience of affairs, suddenly found herself at the head of a great empire at one of the most critical periods of its existence. Fortunately for herself, and for Russia, Elizabeth Petrovna, with all her shortcomings, had inherited some of her father's genius for government. Her usually keen judgment and her diplomatic tact again and again recall Peter the Great. What in her sometimes seemed irresolution and procrastination, was, most often, a wise suspense of judgment under exceptionally difficult circumstances; and to this may be added that she was ever ready to sacrifice the prejudices of the woman to the duty of the sovereign.

After abolishing the cabinet council system in favour during the rule of the two Annes, and reconstituting the senate as it had been under Peter the Great,—with the chiefs of the departments of state, all of them now Russians again, as *ex-officio* members under the presidency of the sovereign,—the first care of the new empress was to compose her quarrel with Sweden. On the 23rd of January 1743, direct negotiations between the two powers were opened at Abo, and on the 7th of August 1743 Sweden ceded to Russia all the southern part of Finland east of the river Kymmene, which thus became the boundary between the two states, including the fortresses of Villmanstrand and Fredrikshamn. This triumphant issue was mainly due to the diplomatic ability of the new vice chancellor, Alexius Bestuzhev-Ryumin (*q.v.*), whom Elizabeth, much as she disliked him personally, had wisely placed at the head of foreign affairs immediately after her accession. He represented the anti-Franco-Prussian portion of her council, and his object was to bring about an Anglo-Austro-Russian alliance which, at that time, was undoubtedly Russia's proper system. Hence the reiterated attempts of Frederick the Great and Louis XV. to get rid of Bestuzhev, which made the Russian court during the earlier years of Elizabeth's reign the centre of a tangle of intrigue impossible to unravel by those who do not possess the clue to it (see BESTUZHEV-RYUMIN, ALEXIUS). Ultimately, however, the minister, strong in the support of Elizabeth, prevailed, and his faultless diplomacy, backed by the despatch of an auxiliary Russian corps of 30,000 men to the Rhine, greatly accelerated the peace negotiations which led to the treaty of Aix-la-Chapelle (October 18, 1748). By sheer tenacity of purpose, Bestuzhev had extricated his country from the Swedish imbroglio; reconciled his imperial mistress with the courts of Vienna and London, her natural allies; enabled Russia to assert herself effectually in Poland, Turkey and Sweden, and isolated the restless king of Prussia by environing him with hostile alliances. But all this would have been impossible but for the steady support of Elizabeth, who trusted him implicitly, despite the insinuations of the chancellor's innumerable enemies, most of whom were her personal friends.

The great event of Elizabeth's later years was the Seven Years' War. Elizabeth rightly regarded the treaty of Westminster (January 16, 1756, whereby Great Britain and Prussia agreed to unite their forces to oppose the entry into, or the passage through, Germany of the troops of every foreign power) as utterly subversive of the previous conventions between Great Britain and Russia. A by no means unwarrantable fear of the king of Prussia, who was "to be reduced within proper limits," so that "he might be no longer a danger to the empire," induced Elizabeth to accede to the treaty of Versailles, in other words the Franco-Austrian league against Prussia, and on the 17th of May 1757 the Russian army, 85,000 strong, advanced against Königsberg. Neither the serious illness of the empress, which began with a fainting-fit at Tsarskoe Selo (September 19, 1757), nor the fall of Bestuzhev (February 21, 1758), nor the cabals and intrigues of the various foreign powers at St Petersburg, interfered with the progress of the war, and the crushing defeat of Kunersdorf (August 12, 1759) at last brought Frederick to the verge of ruin. From that day forth he despaired of success, though he was saved for the moment by the jealousies of the Russian and Austrian commanders, which ruined the military plans of the allies. On the other hand, it is not too much to say that, from the end of 1759 to the end of 1761, the unshakable firmness of the Russian empress was the one constraining political force which held together the heterogeneous, incessantly jarring elements of the anti-Prussian combination. From the Russian point of view, Elizabeth's greatness as a statesman consists in her steady appreciation of Russian interests, and her determination to promote them at all hazards. She insisted throughout that the king of Prussia must be rendered harmless to his neighbours for the future, and that the only way to bring this about was to reduce him to the rank of an elector. Frederick himself was quite alive to his danger. "I am at the end of my resources," he wrote at the beginning of 1760, "the continuance of this war means for me utter ruin. Things may drag on perhaps till July, but then a catastrophe must come." On the 21st of May 1760 a fresh convention was signed between Russia and Austria, a secret clause of which, never communicated to the court of Versailles, guaranteed East Prussia to Russia, as an indemnity for war expenses. The failure of the campaign of 1760, so far as Russia and France were concerned, induced the court of Versailles, on the evening of the 22nd of January 1761, to present to the court of St Petersburg a despatch to the effect that the king of France by reason of the condition of his dominions absolutely desired peace. On the following day the Austrian ambassador, Esterhazy, presented a despatch of a similar tenor from his court. The Russian empress's reply was delivered to the two ambassadors on the 12th of February. It was inspired by the most uncompromising hostility towards the king of Prussia. Elizabeth would not consent to any pacific overtures until the original object of the league had been accomplished. Simultaneously, Elizabeth caused to be conveyed to Louis XV. a confidential letter in which she proposed the signature of a new treaty of alliance of a more comprehensive and explicit nature than the preceding treaties between the two powers, without the knowledge of Austria. Elizabeth's object in this mysterious negotiation seems to have been to reconcile France and Great Britain, in return for which signal service France was to throw all her forces into the German war. This project, which lacked neither ability nor audacity, foundered upon Louis XV.'s invincible jealousy of the growth of Russian influence in eastern Europe and his fear of offending the Porte. It was finally arranged by the allies that their envoys at Paris should fix the date for the assembling of a peace congress, and that, in the meantime, the war against Prussia should be vigorously prosecuted. The campaign of 1761 was almost as abortive as the campaign of 1760. Frederick acted on the defensive with consummate skill, and the capture of the Prussian fortress of Kolberg on Christmas day O.S. 1761, by Rumyantsev, was the sole Russian success. Frederick, however, was now at the last gasp. On the 6th of January 1762, he wrote to Finkenstein, "We ought now to think of preserving for my nephew, by way of negotiation, whatever fragments of my territory we can save from the avidity of my enemies," which means, if words mean anything, that he was resolved to seek a soldier's death on the first opportunity. A fortnight later he wrote to Prince Ferdinand of Brunswick, "The sky begins to clear. Courage, my dear fellow. I have received the news of a great event." The great event which snatched him from destruction was the death of the Russian empress (January 5, 1762).

See Robert Nisbet Bain, *The Daughter of Peter the Great* (London, 1899); Sergyei Solovev, *History of Russia* (Rus.), vols. xx.-xxii. (St Petersburg, 1857–1877); *Politische Correspondenz Friedrichs des Grossen*, vols. i.-xxi. (Berlin, 1879, &c.); Colonel Masslowski, *Der siebenjährige Krieg nach russischer Darstellung* (Berlin, 1888–1893); Kazimierz Waliszewski, *La Dernière des Romanov* (Paris, 1902). (R. N. B.)

ELIZABETH [AMÉLIE EUGÉNIE] (1837–1898), consort of Francis Joseph, emperor of Austria and king of Hungary, was the daughter of Duke Maximilian Joseph of Bavaria and Louisa Wilhelmina, daughter of Maximilian I. of Bavaria, and was born on the 24th of December 1837 at the castle of Possenhofen on Lake Starnberg. She inherited the quick intelligence and artistic taste displayed in general by members of the Wittelsbach royal house, and her education was the reverse of conventional. She accompanied her eccentric father on his hunting expeditions, becoming an expert rider and climber, visiting the peasants in their huts and sharing in rustic pleasures. The emperor of Austria, Francis Joseph, met the Bavarian ducal family at Ischl in August 1853, and immediately fell in love with Elizabeth, then a girl of sixteen, and reported to be the most beautiful princess in Europe. The marriage took place in Vienna on the 24th of April 1854. In the early days of her married life she frequently came into collision with Viennese prejudice. Her attempts to modify court etiquette, and her extreme fondness for horsemanship and frequent visits to the imperial riding school, scandalized Austrian society, while her predilection for Hungary and for everything Hungarian offended German sentiment. There is no doubt that her influence helped the establishment of the *Ausgleich* with Hungary, but outside Hungarian affairs the empress took small part in politics. She first visited Hungary in 1857, and ten years later was crowned queen. Her popularity with the Hungarians remained unchanged throughout her life; and the castle of Gödöllö, presented as a coronation gift, was one of her favourite residences. Elizabeth was one of the most charitable of royal ladies, and her popularity with her Austrian subjects was more than restored by her assiduous care for the wounded in the campaign of 1866. Besides her public benefactions she constantly exercised personal and private charity. Her eldest daughter died in infancy, Gisela (b. 1856) married the Prince Leopold of Bavaria; and her youngest daughter Marie Valerie (b. 1868) married the Archduke Franz Salvator. The tragic death of her only son, the crown prince Rudolph, in 1889, was a shock from which she never really recovered. She was also deeply affected by the suicide of her cousin Louis II. of Bavaria, and again by the fate of her sister Sophia, duchess of Alençon, who perished in the fire of the Paris charity bazaar in 1897. The empress had shown signs of lung disease in 1861, when she spent some months in Madeira; but she was able to resume her outdoor sports, and for some years before 1882, when she had to give up riding, was a frequent visitor on English and Irish hunting fields. In her later years her dislike of publicity increased. Much of her time was spent in travel or at the Achilleion, the palace she had built in the Greek style in Corfu. She was walking from her hotel at Geneva to the steamer when she was stabbed by the anarchist Luigi Luccheni, on the 10th of September 1898, and died of the wound within a few hours. This aimless and dastardly crime completed the list of misfortunes of the Austrian house, and aroused intense indignation throughout Europe.

See A. de Burgh, *Elizabeth, Empress of Austria, a Memoir* (London, 1898); E. Friedmann and J. Paves, *Kaiserin Elisabeth* (Berlin, 1898); and the anonymous *Martyrdom of an Empress* (1899), containing a quantity of court gossip.

ELIZABETH (1596–1662), consort of Frederick V., elector palatine and titular king of Bohemia, was the eldest daughter of James I. of Great Britain and of Anne of Denmark, and was born at Falkland Castle in Fifeshire in August 1596. She was entrusted to the care of the earl of Linlithgow, and after the departure of the royal family to England, to the countess of Kildare, subsequently residing with Lord and Lady Harington at Combe Abbey in Warwickshire. In November 1605 the Gunpowder Plot conspirators formed a plan to seize her person and proclaim her queen after the explosion, in consequence of which she was removed by Lord Harington to Coventry. In 1608 she appeared at court, where her beauty soon attracted admiration and became the theme of the poets, her suitors including the dauphin, Maurice, prince of Orange, Gustavus Adolphus, Philip III. of Spain, and Frederick V., the elector palatine. A union with the last-named was finally arranged, in spite of the queen's opposition, in order to strengthen the alliance with the Protestant powers in Germany, and the marriage took place on the 14th of February 1613 midst great rejoicing and festivities. The prince and princess entered Heidelberg on the 17th of June, and Elizabeth, by means of her English annuity, enjoyed five years of pleasure and of extravagant gaiety to which the small German court was totally unaccustomed. On the 26th of August 1618, Frederick, as a leading Protestant prince, was chosen king by the Bohemians, who deposed the emperor Ferdinand, then archduke of Styria. There is no evidence to show that his acceptance was instigated by the princess or that she had any influence in her husband's political career. She accompanied Frederick to Prague in October 1619, and was crowned on the 7th of November. Here her unrestrainable high spirits and levity gave great offence to the citizens. On the approach of misfortune, however, she showed great courage and fortitude. She left Prague on the 8th of November 1620, after the fatal battle of the White Hill, for Küstrin, travelling thence to Berlin and Wolfenbüttel, finally with Frederick taking refuge at the Hague with Prince Maurice of Orange. The help sought from James came only in the shape of useless embassies and negotiations; the two Palatinates were soon occupied by the Spaniards and the duke of Bavaria; and the romantic attachment and services of Duke Christian of Brunswick, of the 1st earl of Craven, and of other chivalrous young champions who were inspired by the beauty and grace of the "Queen of Hearts," as Elizabeth was now called, availed nothing. Her residence was at Rhenen near Arnheim, where she received many English visitors and endeavoured to maintain her spirits and fortitude, with straitened means and in spite of frequent disappointments. The victories of Gustavus Adolphus secured no permanent advantage, and his death at Lützen was followed by that of the elector at Mainz on the 29th of November 1632. Subsequent attempts of the princess to reinstate her son in his dominions were unsuccessful, and it was not till the peace of Westphalia in 1648 that he regained a portion of them, the Rhenish Palatinate. Meanwhile, Elizabeth's position in Holland grew more and more unsatisfactory. The payment of her English annuity of £12,000 ceased after the outbreak of the troubles with the parliament; the death of Charles I. in 1649 put an end to all hopes from that quarter; and the pension allowed her by the house of Orange ceased in 1650. Her children, in consequence of disputes, abandoned her, and her eldest son Charles Louis refused her a home in his restored electorate. Nor did Charles II. at his restoration show any desire to receive her in England. Parliament voted her £20,000 in 1660 for the payment of her debts, but Elizabeth did not receive the money, and on the 19th of May 1661 she left the Hague for England, in spite of the king's attempts to hinder her journey, receiving no official welcome on her arrival in London and being lodged at Lord Craven's house in Drury Lane. Charles, however, subsequently granted her a pension and treated her with kindness. On the 8th of February 1662 she removed to Leicester House in Leicester Fields, and died shortly afterwards on the 13th of the same month, being buried in Westminster Abbey. Her beauty, grace and vivacity exercised a great charm over her contemporaries, the enthusiasm for her, however, being probably not merely personal but one inspired also by her misfortunes and by the fact that these misfortunes were incurred in defence of the Protestant cause; later, as the ancestress of the Protestant Hanoverian dynasty, she obtained a conspicuous place in English history. She had thirteen children—Frederick Henry, drowned at sea in 1629; Charles Louis, elector palatine, whose daughter married Philip, duke of Orleans, and became the ancestress of the elder and Roman Catholic branch of the royal family of England; Elizabeth, abbess and friend of Descartes; Prince Rupert and Prince Maurice, who died unmarried; Louisa, abbess; Edward, who married Anne de Gonzaga, "princesse palatine," and had children; Henrietta Maria, who married Count Sigismund Ragotzki but died childless; Philip and Charlotte, who died childless; Sophia, who married Ernest Augustus, elector of Hanover, and was mother of George I. of England; and two others who died young.

Bibliography.—See the article in *Dict. of Nat. Biography* and authorities there collected; *Five Stuart Princesses*, ed. by R. S. Rait (1902); *Briefe der Elizabeth Stuart . . . an . . . den Kurfürsten Carl Ludwig von der Pfalz*, by A. Wendland (Bibliothek des literarischen Vereins, 228, Stuttgart, 1902); "Elizabeth Stuart," by J. O. Opel, in Sybel's *Historische Zeitschrift*, xxiii. 289; *Thomason Tracts* (Brit. Mus.), E., 138 (14), 122 (12), 118 (40), 119 (18). Important material regarding the princess exists in the MSS. of the earl of Craven, at Combe Abbey.

ELIZABETH [PAULINE ELIZABETH OTTILIE LOUISE] (1843–), consort of King Charles I. (*q.v.*) of Rumania, widely known by her literary name of "Carmen Sylva," was born on the 29th of December 1843. She was the daughter of Prince Hermann of Neuwied. She first met the future king of Rumania at Berlin in 1861, and was married to him on the 15th of November 1869. Her only child, a daughter, died in 1874. In the Russo-Turkish War of 1877–1878 she devoted herself to the care of the wounded, and founded the Order of Elizabeth (a gold cross on a blue ribbon) to reward distinguished service in such work. She fostered the higher education of women in Rumania, and established societies for various charitable objects. Early distinguished by her excellence as a pianist, organist and singer, she also showed considerable ability in painting and illuminating; but a lively poetic imagination led her to the path of literature, and more especially to poetry, folk-lore and ballads. In addition to numerous original works she put into literary form many of the legends current among the Rumanian peasantry.

"Carmen Sylva" wrote with facility in German, Rumanian, French and English. A few of her voluminous writings, which include poems, plays, novels, short stories, essays, collections of aphorisms, &c., may be singled out for special mention. Her earliest publications were *Sappho* and *Hammerstein*, two poems which appeared at Leipzig in 1880. In 1888 she received the Prix Botta, a prize awarded triennially by the French Academy, for her volume of prose aphorisms *Les Pensées d'une reine* (Paris, 1882), a German version of which is entitled *Vom Amboss* (Bonn, 1890). *Cuvinte Sufletesci*, religious meditations in Rumanian (Bucharest, 1888), was also translated into German (Bonn, 1890), under the name of *Seelen-Gespräche*. Several of the works of "Carmen Sylva" were written in collaboration with Mite Kremnitz, one of her maids of honour, who was born at Greifswald in 1857, and married Dr Kremnitz of Bucharest; these were published between 1881 and 1888, in some cases under the pseudonyms *Dito et Idem*, and includes the novel *Aus zwei Welten* (Leipzig, 1884), *Anna Boleyn* (Bonn, 1886), a tragedy, *In der Irre* (Bonn, 1888), a collection of short stories, &c. *Edleen Vaughan, or Paths of Peril*, a novel (London, 1894), and *Sweet Hours*, poems (London, 1904), were written in English. Among the translations made by "Carmen Sylva" are German versions of Pierre Loti's romance *Pêcheur d'Islande*, and of Paul de St Victor's dramatic criticisms *Les Deux Masques* (Paris, 1881–1884); and in particular *The Bard of the Dimbovitza*, a fine English version by "Carmen Sylva" and Alma Strettell of Helène Vacarescu's collection of Rumanian folk-songs, &c., entitled *Lieder aus dem Dimbovitzathal* (Bonn, 1889). *The Bard of the Dimbovitza* was first published in 1891, and was soon reissued and expanded. Translations from the original works of "Carmen Sylva" have appeared in all the principal languages of Europe and in Armenian.

See Rumania: *History*; also M. Kremnitz, *Carmen Sylva—eine Biographie* (Leipzig, 1903); and, for a full bibliography, G. Bengescu, *Carmen Sylva—bibliographie et extraits de ses œuvres* (Paris, 1904).

ELIZABETH (1635–1650), English princess, second daughter of Charles I., was born on the 28th of December 1635 at St James's Palace. On the outbreak of the Civil War and the departure of the king from London, while the two elder princes accompanied their father, the princess and the infant duke of Gloucester were left under the care of the parliament. In October 1642 Elizabeth sent a letter to the House of Lords begging that her old attendants might not be removed. In July 1644 the royal children were sent to Sir John Danvers at Chelsea, and in 1645 to the earl and countess of Northumberland. After the final defeat of the king they were joined in 1646 by James, and during 1647 paid several visits to the king at Caversham, near Reading, and Hampton Court, but were again separated by Charles's imprisonment at Carisbrooke Castle. On the 21st of April 1648 James was persuaded to escape by Elizabeth, who declared that were she a boy she would not long remain in confinement. The last sad meeting between Charles and his two children, at which the princess was overcome with grief, and of which she wrote a short and touching account, took place on the 29th of January 1649, the day before his execution. In June she was entrusted to the care of the earl and countess of Leicester at Penshurst, but in 1650, upon the landing of Charles II. in Scotland, the parliament ordered the royal children to be taken for security to Carisbrooke Castle. The princess fell ill from a wetting almost immediately upon her arrival, and died of fever on the 8th of September. She was buried in St Thomas's church at Newport, Isle of Wight, where the initials "E.S." alone marked her grave till 1856, when a monument was erected to her memory by Queen Victoria. The princess's sorrowful career and early death have attracted general interest and sympathy. She was said to have acquired considerable proficiency in Greek, Hebrew and Latin, as well as in Italian and French, and several books were dedicated to her, including the translation of the *Electra* of Sophocles by Christopher Wase in 1649. Her mild nature and gentleness towards her father's enemies gained her the name of "Temperance."

See *Lives of the Princesses of England*, by M. A. E. Green (1855), vol. vi.; *Notes and Queries*, 7th ser., ix. 444, x. 15.

ELIZABETH [Élisabeth Philippine Marie Hélène of France] (1764–1794), commonly called Madame Elizabeth, daughter of Louis the Dauphin and Marie Josephine of Saxony, and sister of Louis XVI., was born at Versailles on the 3rd of May 1764. Left an orphan at the age of three, she was brought up by Madame de Mackau, and had a residence at Montreuil, where she gave many proofs of her benevolent character. She refused all offers of marriage so that she might remain by the side of her brother, whom she loved passionately. At the outset of the Revolution she foresaw the gravity of events, and refused to leave the king, whom she accompanied in his flight on the 20th of June 1792, and with whom she was arrested at Varennes.

She was present at the Legislative Assembly when Louis was suspended, and was imprisoned in the Temple with the royal family. By the execution of the king and the removal of Marie Antoinette to the Conciergerie, Madame Elizabeth was deprived of her companions in the Temple prison, and on the 9th of May 1794 she was herself transferred to the Conciergerie, and haled before the revolutionary tribunal. Accused of assisting the king's flight, of supplying *émigrés* with funds, and of encouraging the resistance of the royal troops on the 10th of August 1792, she was condemned to death, and executed on the 10th of May 1794. Like her brother, she had all the domestic virtues, and, as was to be expected of a sister of Louis XVI., she was in favour of absolutist principles. Hers was one of the most touching tragedies of the Revolution; she perished because she was the sister of the king.

The *Mémoires de Madame Elisabeth* (Paris, 1858), by F. de Barghon and Fort-Rion, are of doubtful authenticity; and the collection of letters and documents published in 1865 by F. Feuillet de Conches must be used with caution (see the bibliographical note to the article MARIE ANTOINETTE). See le Comte A. F. C. Ferrand, *Éloge historique de Madame Élisabeth* (1814, containing 94 letters; 2nd ed., 1861, containing additional letters, but correspondence mutilated); Du Fresne de Beaucourt, *Étude sur Madame Élisabeth* (Paris, 1864); A. de Beauchesne, *Vie de Madame Élisabeth* (1869); La comtesse d'Armaillé, *Madame Élisabeth* (Paris, 1886); Madame d'Arvor, *Madame Élisabeth* (Paris, 1898); and Hon. Mrs Maxwell-Scott, *Madame Elizabeth of France* (1908).

ELIZABETH, SAINT (1207–1231), daughter of Andrew II., king of Hungary (d. 1235), by his first wife, Gertrude of Andechs-Meran (d. 1213), was born in Pressburg in 1207. At four years of age she was betrothed to Louis IV., landgrave of Thuringia, and conducted to the Wartburg, near Eisenach, to be educated under the direction of his parents. In spite of her decidedly worldly surroundings at the Thuringian court, she evinced from the first an aversion from even the most innocent pleasures, and stimulated by the example of her mother's sister, St Hedwig, wife of Henry VI., duke of Silesia-Breslau, devoted her whole time to religion and to works of charity. She was married at the age of fourteen, and acquired such influence over her husband that he adopted her point of view and zealously assisted her in all her charitable endeavours. According to the legend, much celebrated in German art, Louis at first desired to curtail her excessive charities, and forbade her unbounded gifts to the poor. One day, returning from hunting, he met his wife descending from the Wartburg with a heavy bundle filled with bread. He sternly bade her open it; she did so, and he saw nothing but a mass of red roses. The miracle completed his conversion. On the death of Louis "the Saint" in 1227, Elizabeth was deprived of the regency by his brother, Henry Raspe IV. (d. 1247), on the pretext that she was wasting the estates by her alms; and with her three infant children she was driven from her home without being allowed to carry with her even the barest necessaries of life. She lived for some time in great hardship, but ultimately her maternal uncle, Egbert, bishop of Bamberg, offered her an asylum in a house adjoining his palace. Through the intercession of some of the principal barons, the regency was again offered her, and her son Hermann was declared heir to the landgraviate; but renouncing all power, and making use of her wealth only for charitable purposes, she preferred to live in seclusion at Marburg under the direction of her confessor, the bigoted persecutor Conrad of Marburg. There she spent the remainder of her days in penances of unusual severity, and in ministrations to the sick, especially those afflicted with the most loathsome diseases. She died at Marburg on the 19th of November 1231, and four years afterwards was canonized by Gregory IX. on account of the frequent miracles reported to have been performed at her tomb.

The exhibition in the Royal Academy of P. H. Calderon's picture, "St Elizabeth of Hungary's Great Act of Renunciation," now in the Tate Gallery in London, roused considerable protest among Catholics. The saint is represented as kneeling nude before the altar, in the presence of her confessor and a couple of nuns. The passage this is intended to illustrate is in Lib. iv. § 1 of Dietrich of Apolda's *Vita*, which relates how, on a certain Good Friday, she went into a chapel and, in the presence of some Franciscan brothers, laid her hands on the bare altar, renounced her own will, her parents, children, relations, and all pomps of this kind (*hujus modi*) in imitation of Christ; and stripped herself utterly naked (*omnino se exuit et nudavit*) in order to follow Him naked, in the steps of poverty. A literal interpretation of this passage is not impossible; for ecstatic mystics of all ages have indulged in a like [illegible], and Conrad, who revelled in inflicting religious tortures, was quite capable of imposing this crowning humiliation upon his gentle victim. It is far more probable, however, that the passage is not to be taken literally.

Lives of St Elizabeth were written by Theodoricus (Dietrich) of Apolda (b. 1228), Caesarius of Heisterbach (d. *c* 1240), Conrad of Marburg and others (see Potthast, *Bibl. Hist. Med. Aev.* p. 1284). A metrical life in German exists by Johann Rothe (d. *c.* 1440), chaplain to the Landgravine Anne of Thuringia (Potthast, p. 985). *L'Histoire de Sainte Élisabeth de Hongrie*, by Montalembert, was published at Paris in 1836. Her life has also supplied the materials for a dramatic poem by Charles Kingsley, entitled the "Saint's Tragedy." The edition of this in vol. xvi. of the *Life and Works of Charles Kingsley* (London, 1902) has valuable notes, with many extracts from the original sources.

ELIZABETH, a city and the county-seat of Union county, New Jersey, U.S.A., on Elizabeth river, Newark Bay, and Arthur Kill, 10 m. S.W. of Jersey City. Pop. (1890) 37,764; (1900) 52,130, of whom 14,770 were foreign-born and 1139 were negroes; (1910 census) 73,409. It is served by the Pennsylvania, the Lehigh Valley and the Central of New Jersey railways. The site is level and the streets are broad and shaded. There are many residences of New York business men, and several historic buildings, including Liberty Hall, the mansion of William Livingston, first governor of the state; Boxwood Hall (now used as a home for aged women), the former home of Elias Boudinot; the old brick mansion of Jonathan Belcher (1681–1757), governor of the province from 1747 to 1757; the First Presbyterian Church; and the house occupied at different times by General Winfield Scott. The city has several parks, the Union county court house (1905), a public library and several charitable institutions. Elizabethport, that part of the city on Staten Island Sound, about 2 m. S.E. of the centre of Elizabeth, has a port open to vessels of 300 tons; it is an outlet of the Pennsylvania coal fields and is thus one of the most important coal shipping depots in the United States. Here, too, are a plant (covering more than 800 acres) of the Standard Oil Company and a large establishment for the manufacture of the "Singer" sewing machine—according to the U.S. census the largest manufactory of sewing machines in the world—employing more than 6000 workmen in 1905; among the other manufactures of Elizabeth are foundry and machine shop products (value in 1905, $3,887,139), wire, oil (value in 1905, $2,387,656), refined and smelted copper, the output of railway repair shops, edge tools and lager beer. The value of the manufactured products was $10,489,364 in 1890; $22,861,375 (factory product) in 1900; and $29,300,801 (factory product) in 1905.

Elizabeth was settled in 1665 by a company from Long Island for whom the land had been purchased from the Indians and a grant had been obtained from Richard Nicolls as agent for the duke of York. But about the same time the duke conveyed the entire province to John, Lord Berkeley, and Sir George Carteret, and these two conflicting grants gave rise to a long-continued controversy (see NEW JERSEY). The town was named in honour of Elizabeth, wife of Sir George Carteret, and was first known as Elizabethtown. From 1665 to 1686 it was the seat of government of the province, and the legislature sat here occasionally until 1790. In the home of the Rev. Jonathan Dickinson (1688–1747), its first president, the first sessions of the College of New Jersey (now Princeton University) were held in 1747, but immediately afterwards the college removed to Newark. In December 1776 and twice in June 1780 the British entered Elizabeth and made it a base of operations, but on each occasion they were soon driven out. Elizabeth became a "free town and borough" in 1739; the borough charter was confirmed by the legislature in 1789 and repealed in 1790, and Elizabeth was chartered as a city in 1855.

See E. F. Hatfield, *History of Elizabeth, New Jersey* (New York, 1868).

ELIZABETHAN STYLE, in architecture, the term given to the early Renaissance style in England, which flourished chiefly during the reign of Queen Elizabeth; it followed the Tudor style, and was succeeded in the beginning of the 16th century by the purer Italian style introduced by Inigo Jones. It responds to the Cinque-Cento period in Italy, the François I. style in France, and the Plateresque or Silversmith's style in Spain. During the reigns of Henry VIII. and Edward VI. many Italian artists came over, who carried out various decorative features at Hampton Court; Layer Marney, Suffolk (1522–1525); Sutton Place, Surrey (1529); Nonsuch Palace and elsewhere. Later in the century Flemish craftsmen succeeded the Italians, and the Royal Exchange in London (1566–1570) is one of the first important buildings designed by Henri de Paschen, an architect from Antwerp. Longford Castle, Wollaton, Hatfield, Blickling, Audley End, and Charterhouse (London) all show the style introduced by Flemish workmen.

ELIZABETH CITY, a town, port of entry and the county-seat of Pasquotank county, North Carolina, U.S.A., on the Pasquotank river, at the head of navigation, 46 m. S. by E. of Norfolk, Virginia. Pop. (1890) 3251; (1900) 6348 (3164 negroes); (1910) 8412. It is served by the Norfolk & Southern, and the Suffolk & Carolina railways, and is on the Dismal Swamp and Albemarle & Chesapeake canals. Elizabeth City is a winter meeting-place for hunters. It is the seat of a state normal school for negroes and of the Atlantic Collegiate Institute, is a trucking centre, has shipyards, and has a large wholesale trade in clothing, groceries and general merchandise; from it are shipped considerable quantities of fish, cotton and lumber. The town is the port of entry of the Albemarle customs district, but its foreign trade is unimportant. Among its manufactures are cotton goods, iron, lumber, nets and twine, bricks, and carriages and wagons. The oyster fisheries in the vicinity are of considerable importance. Elizabeth City was settled in 1793, and was first incorporated in the same year.

ELK, or Moose, the largest of all the deer tribe, distinguished from other members of the *Cervidae* by the form of the antlers of the males. These arise as cylindrical beams projecting on each side at right angles to the middle line of the skull, which after a short distance divide in a fork-like manner. The lower prong of this fork may be either simple, or divided into two or three tines, with some flattening. In the East Siberian elk (*Alces machlis bedfordiae*) the posterior division of the main fork divides into three tines, with no distinct flattening. In the common elk (*A. machlis* or *A. alces*), on the other hand, this branch usually expands into a broad palmation, with one large tine at the base, and a number of smaller snags on the free border; there is, however, a phase of the Scandinavian elk in which the antlers are simpler, and recall those of the East Siberian race. The palmation appears to be more marked in the North American race (*A. m. americanus*) than in the typical Scandinavian elk. The largest of all is the Alaskan race (*A. m. gigas*), which is said to stand 8 ft. in height, with a span of 6 ft. across the antlers. The great length of the legs gives a decidedly ungainly appearance to the elk. The muzzle is long and fleshy, with only a very small triangular naked patch below the nostrils; and the males have a peculiar sac, known as the bell, hanging from the neck. From the shortness of their necks, elks are unable to graze, and their chief food consists of young shoots and leaves of willow and birch. In North America during the winter one male and several females form a "moose-yard" in the forest, which they keep open by trampling the snow. Although generally timid, the males become very bold during the breeding season, when the females utter a loud call; and at such times they fight both with their antlers and their hoofs. The usual pace is a shambling trot, but when pressed elks break into a gallop. The female gives birth to one or two young at a time, which are not spotted. In America the elk is known as the moose, and the former name is transferred to the wapiti deer. (R. L.*)

ELKHART, a city of Elkhart county, Indiana, U.S.A., at the confluence of the Elkhart and St Joseph rivers, about 100 m. E. of Chicago. Pop. (1890) 11,360; (1900) 15,184, of whom 1353 were foreign-born; (1910 census) 19,282. Elkhart is at the junction of the western division with the main line of the Lake Shore & Michigan Southern railway, and is served by the Cleveland, Cincinnati, Chicago & St Louis, and the Northern Indiana railways (the latter electric). It is attractively situated and has fine business and public buildings, including a Carnegie library and the Clark hospital, with which a nurses' training school is connected. It has also several parks, including the beautiful Island Park and McNaughton Park, the latter the annual meeting-place of the St Joseph Valley Chautauqua. A valuable water-power is utilized for manufacturing purposes. There are extensive railway-car shops and iron and brass foundries, and the manufactures include band instruments, furniture, telephone supplies, electric transformers, bridges, paper, flour, starch, rubber goods, acetylene gas machines, printing presses, drugs and carriages. The total value of the factory product was $4,345,466 in 1905, an increase of 10·5% since 1900. At Elkhart is the main publishing house of the Mennonite Church in America, two weekly periodicals being issued, one in English, *The Herald of Truth*, and one in German, the *Mennonitische Rundschau*. The first settlement was made here about 1834; and Elkhart was chartered as a city in 1875.

ELKINGTON, GEORGE RICHARDS (1801–1865), founder of the electroplating industry in England, was born in Birmingham on the 17th of October 1801, the son of a spectacle manufacturer. Apprenticed to his uncles, silver platers in Birmingham, he became, on their death, sole proprietor of the business, but subsequently took his cousin, Henry Elkington, into partnership. The science of electrometallurgy was then in its infancy, but the Elkingtons were quick to recognize its possibilities. They had already taken out certain patents for the application of electricity to metals when, in 1840, John Wright, a Birmingham surgeon, discovered the valuable properties of a solution of cyanide of silver in cyanide of potassium for electroplating purposes. The Elkingtons purchased and patented Wright's process, subsequently acquiring the rights of other processes and improvements. Large new works for electroplating and electrogilding were opened in Birmingham in 1841, and in the following year Josiah Mason became a partner in the firm. George Richards Elkington died on the 22nd of September 1865, and Henry Elkington on the 26th of October 1852.

ELLA, or Ælla, the name of three Anglo-Saxon kings.

Ella (d. c. 514), king of the South Saxons and founder of the kingdom of Sussex, was a Saxon ealdorman, who landed near Arundel in Sussex with his three sons in 477. Defeating the Britons, who were driven into the forest of Andredsweald, Ella and his followers established themselves along the south coast, although their progress was slow and difficult. However, in 491, strengthened by the arrival of fresh bands of immigrants, they captured the Roman city of Anderida and "slew all that were therein." Ella, who is reckoned as the first Bretwalda, then became king of the South Saxons, and, when he died about 514, he was succeeded by his son Cissa.

Ella (d. 588), king of the Deirans, was the son of an ealdorman named Iffa, and became the first king of Deira when, in 559, the Deirans separated themselves from the neighbouring kingdom of Bernicia. The English slaves, who aroused the interest of Pope Gregory I. at Rome, were subjects of Ella, and on this occasion the pope, punning the name of their king, suggested that "Alleluia" should be sung in his land. When Ella died in 588 Deira was conquered by Bernicia. One of his sons was Edwin, afterwards king of the Northumbrians.

Ella (d. 867), king of the Northumbrians, became king about 862 on the deposition of Osbert, although he was not of royal birth. Afterwards he became reconciled with Osbert, and together they attacked the Danes, who had invaded Northumbria, and drove them into York. Rallying, however, the Danes defeated the Northumbrians, and in the encounter both Ella and Osbert were slain. In certain legends Ella is represented as having brought about the Danish invasion of Northumbria by cruel and unjust actions.

See *The Anglo-Saxon Chronicle*, edited by C. Plummer (Oxford, 1892–1899); Bede, *Historiae ecclesiasticae*, edited by C. Plummer (Oxford, 1896); Henry of Huntingdon, *Historia Anglorum*, edited by T. Arnold, Rolls Series (London, 1879); Asser, *De rebus gestis Aelfredi*, edited by W. H. Stevenson (Oxford, 1904); J. R. Green, *The Making of England* (London, 1897), and the *Dictionary of National Biography*, vol. i. (London, 1895).

ELLAND, an urban district in the Elland parliamentary division of Yorkshire, England, on the Calder, 2½ m. S. of Halifax by the Lancashire & Yorkshire railway. Pop. (1901) 10,412. The church of St Mary is Decorated and Perpendicular. Cotton-mills, woollen-factories, ironworks, flagstone quarries at Elland Edge, and fire-clay works employ the industrial population. Elland Hall, though almost rebuilt, retains the recollection of a remarkable family feud between the Ellands and the Beaumonts of Crosland Hall, the site of which may be traced in the vicinity. A nephew of Sir John Elland, in 1342, met death at the hands of a relative of the Beaumonts upon whom Sir John took vengeance, as also upon the heads of the allied houses of Lockwood and Quarmby. The children of these families were educated in the hope of avenging their parents, and after many years succeeded in doing so, cutting off Sir John Elland and his heir.

ELLENBOROUGH, EDWARD LAW, 1st Baron (1750–1818), English judge, was born on the 16th of November 1750, at Great Salkeld, in Cumberland, of which place his father, Edmund Law (1703–1787), afterwards bishop of Carlisle, was at the time rector. Educated at the Charterhouse and at Peterhouse, Cambridge, he passed as third wrangler, and was soon afterwards elected to a fellowship at Trinity. In spite of his father's strong wish that he should take orders, he chose the legal profession, and on quitting the university was entered at Lincoln's Inn. After spending five years as a special pleader under the bar, he was called to the bar in 1780. He chose the northern circuit, and in a very short time obtained a lucrative practice and a high reputation. In 1787 he was appointed principal counsel for Warren Hastings in the celebrated impeachment trial before the House of Lords, and the ability with which he conducted the defence was universally recognized. He had begun his political career as a Whig, but, like many others, he saw in the French Revolution a reason for changing sides, and became a supporter of Pitt. On the formation of the Addington ministry in 1801, he was appointed attorney-general and shortly afterwards was returned to the House of Commons as member for Newtown in the Isle of Wight. In 1802 he succeeded Lord Kenyon as chief justice of the king's bench. On being raised to the bench he was created a peer, taking his title from the village of Ellenborough in Cumberland, where his maternal ancestors had long held a small patrimony. In 1806, on the formation of Lord Grenville's ministry "of all the talents," Lord Ellenborough declined the offer of the great seal, but accepted a seat in the cabinet. His doing so while he retained the chief justiceship was much criticized at the time, and, though not without precedent, was open to such obvious objections on constitutional grounds that the experiment has not since been repeated. As a judge he had grave faults, though his decisions displayed profound legal knowledge, and in mercantile law especially were reckoned of high authority. He was harsh and overbearing to counsel, and in the political trials which were so frequent in his time showed an unmistakable bias against the accused. In the trial of William Hone (*q.v.*) for blasphemy in 1817, Ellenborough directed the jury to find a verdict of guilty, and their acquittal of the prisoner is generally said to have hastened his death. He resigned his judicial office in November 1818, and died on the 13th of December following.

Ellenborough was succeeded as 2nd baron by his eldest son, Edward, afterwards earl of Ellenborough, another son was Charles Ewan Law (1792–1850), recorder of London and member of parliament for Cambridge University from 1835 until his death in August 1850.

Three of Ellenborough's brothers attained some degree of fame. These were John Law (1745–1810), bishop of Elphin, Thomas Law (1759–1834), who settled in the United States in 1793, and married, as his second wife, Anne, a granddaughter of Martha Washington; and George Henry Law (1761–1845), bishop of Chester and of Bath and Wells. The connexion of the Law family with the English Church was kept up by George Henry's sons, three of whom took orders. Two of these were Henry Law (1797–1884), dean of Gloucester, and James Thomas Law (1790–1876), chancellor of the diocese of Lichfield.

ELLENBOROUGH, EDWARD LAW, Earl of (1790–1871), the eldest son of the 1st Lord Ellenborough, was born on the 8th of September 1790. He was educated at Eton and St John's College, Cambridge. He represented the subsequently disfranchised borough of St Michael's, Cornwall, in the House of Commons, until the death of his father in 1818 gave him a seat in the House of Lords. He was twice married; his only child died young; his second wife was divorced by act of parliament in 1830.

In the Wellington administration of 1828 Ellenborough was made lord privy seal; he took a considerable share in the business of the foreign office, as an unofficial assistant to Wellington, who was a great admirer of his talents. He aimed at succeeding Lord Dudley at the foreign office, but was forced to content himself with the presidency of the board of control, which he retained until the fall of the ministry in 1830. Ellenborough was an active administrator, and took a lively interest in questions of Indian policy. The revision of the company's charter was approaching, and he held that the government of India should be transferred directly to the crown. He was impressed with the growing importance of a knowledge of central Asia, in the event of a Russian advance towards the Indian frontier, and despatched Burnes on an exploring mission to that district. Ellenborough subsequently returned to the board of control in Peel's first and second administrations. He had only held office for a month on the third occasion when he was appointed by the court of directors to succeed Lord Auckland as governor-general of India. His Indian administration of two and a half years, or half the usual term of service, was from first to last a subject of hostile criticism. His own letters sent monthly to the queen, and his correspondence with the duke of Wellington, published in 1874, afford material for an intelligent and impartial judgment of his meteoric career. The events chiefly in dispute are his policy towards Afghanistan and the army and captives there, his conquest of Sind, and his campaign in Gwalior.

Ellenborough went to India in order "to restore peace to Asia," but the whole term of his office was occupied in war. On his arrival there the news that greeted him was that of the massacre of Kabul, and the sieges of Ghazni and Jalalabad, while the sepoys of Madras were on the verge of open mutiny. In his proclamation of the 15th of March 1842, as in his memorandum for the queen dated the 18th, he stated with characteristic clearness and eloquence the duty of first inflicting some signal and decisive blow on the Afghans, and then leaving them to govern themselves under the sovereign of their own choice. Unhappily, when he left his council for upper India, and learned the trifling failure of General England, he instructed Pollock and Nott, who were advancing triumphantly with their avenging columns to rescue the British captives, to fall back. The army proved true to the governor-general's earlier proclamation rather than to his later fears; the hostages were rescued, the scene of Sir Alexander Burnes's murder in the heart of Kabul was burned down. Dost Mahommed was quietly dismissed from a prison in Calcutta to the throne in the Bala Hissar, and Ellenborough presided over the painting of the elephants for an unprecedented military spectacle at Ferozepur, on the south bank of the Sutlej. But this was not the only piece of theatrical display which capped with ridicule the horrors and the follies of these four years in Afghanistan. When Sultan Mahmud, in 1024, sacked the Hindu temple of Somnath on the north-west coast of India, he carried off, with the treasures, the richly studded sandal-wood gates of the fane, and set them up in his capital of Ghazni. The Mahommedan puppet of the English, Shah Shuja, had been asked, when ruler of Afghanistan, to restore them to India; and what he had failed to do the Christian ruler of opposing Mahommedans and Hindus resolved to effect in the most solemn and public manner. In vain had Major (afterwards Sir Henry) Rawlinson proved that they were only reproductions of the original gates, to which the Ghazni moulvies clung merely as a source of offerings from the faithful who visited the old conqueror's tomb. In vain did the Hindu sepoys show the most chilling indifference to the belauded restoration. Ellenborough could not resist the temptation to copy Napoleon's magniloquent proclamation under the pyramids. The fraudulent folding doors were conveyed on a triumphal car to the fort of Agra, where they were found to be made not of sandalwood but of deal. That Somnath proclamation (immortalized in a speech by Macaulay) was the first step towards its author's recall.

Hardly had Ellenborough issued his medal with the legend "Pax Asiae Restituta" when he was at war with the amirs of Sind. The tributary amirs had on the whole been faithful, for Major (afterwards Sir James) Outram controlled them. But he had reported the opposition of a few, and Ellenborough ordered an inquiry. His instructions were admirable, in equity as well as energy, and if Outram had been left to carry them out all would have been well. But the duty was entrusted to Sir Charles Napier, with full political as well as military powers. And to add to the evil, Mir Ali Morad intrigued with both sides so effectually that he betrayed the amirs on the one hand, while he deluded Sir Charles Napier to their destruction on the other. Ellenborough was led on till events were beyond his control, and his own just and merciful instructions were forgotten. Sir Charles Napier made more than one confession like this: "We have no right to seize Sind, yet we shall do so, and a very advantageous, useful and humane piece of rascality it will be." The battles of Meeanee and Hyderabad followed; and the Indus became a British river from Karachi to Multan.

Sind had hardly been disposed of when troubles arose on both sides of the governor-general, who was then at Agra. On the north the disordered kingdom of the Sikhs was threatening the frontier. In Gwalior to the south, the feudatory Mahratta state, there were a large mutinous army, a Ranee only twelve years of age, an adopted chief of eight, and factions in the council of ministers. These conditions brought Gwalior to the verge of civil war. Ellenborough reviewed the danger in the minute of the 1st of November 1845, and told Sir Hugh Gough to advance. Further treachery and military licence rendered the battles of Maharajpur and Punniar, fought on the same day, inevitable though they were, a surprise to the combatants. The treaty that followed was as merciful as it was wise. The pacification of Gwalior also had its effect beyond the Sutlej, where anarchy was restrained for yet another year, and the work of civilization was left to Ellenborough's two successors. But by this time the patience of the directors was exhausted. They had no control over Ellenborough's policy; his despatches to them were haughty and disrespectful; and in June 1844 they exercised their power of recalling him.

On his return to England Ellenborough was created an earl and received the thanks of parliament; but his administration speedily became the theme of hostile debates, though it was successfully vindicated by Peel and Wellington. When Peel's cabinet was reconstituted in 1846 Ellenborough became first lord of the admiralty. In 1858 he took office under Lord Derby as president of the board of control, for the fourth time. It was then his congenial task to draft the new scheme for the government of India which the mutiny had rendered necessary. But his old fault of impetuosity again proved his stumbling-block. He wrote a caustic despatch censuring Lord Canning for the Oudh proclamation, and allowed it to be published in *The Times* without consulting his colleagues, who disavowed his action in this respect. General disapprobation was excited; votes of censure were announced in both Houses; and, to save the cabinet, Ellenborough resigned.

But for this act of rashness he might have enjoyed the task of carrying into effect the home constitution for the government of India which he sketched in his evidence before the select committee of the House of Commons on Indian territories on the 8th of June 1852. Paying off his old score against the East India Company, he then advocated the abolition of the court of directors as a governing body, the opening of the civil service to the army, the transference of the government to the crown, and the appointment of a council to advise the minister who should take the place of the president of the board of control. These suggestions of 1852 were carried out by his successor Lord Stanley, afterwards earl of Derby, in 1858, so closely even in details, that Lord Ellenborough must be pronounced the author, for good or evil, of the present home constitution of the government of India. Though acknowledged to be one of the foremost orators in the House of Lords, and taking a frequent part in debate, Ellenborough never held office again. He died at his seat, Southam House, near Cheltenham, on the 22nd of December 1871, when the barony reverted to his nephew Charles Edmund Law (1820–1890), the earldom becoming extinct.

See *History of the Indian Administration* (Bentley, 1874), edited by Lord Colchester; *Minutes of Evidence taken before the Select Committee on Indian Territories* (June 1852); volume i. of the *Calcutta Review*; the *Friend of India*, during the years 1842–1845; and John Hope, *The House of Scindea: A Sketch* (Longmans, 1863). The numerous books by and against Sir Charles Napier, on the conquest of Sind, should be consulted.

ELLERY, WILLIAM (1727–1820), American politician, a signer of the Declaration of Independence, was born in Newport, Rhode Island, on the 22nd of December 1727. He graduated from Harvard in 1747, engaged in trade, studied law, and was admitted to the bar in 1770. He was a member of the Rhode Island committee of safety in 1775–1776, and was a delegate in Congress in 1776–1781 and again in 1783–1785. Just after his first election to Congress, he was placed on the important marine committee, and he was made a member of the board of admiralty when it was established in 1779. In April 1786 he was elected commissioner of the continental loan office for the state of Rhode Island and from 1790 until his death at Newport, on the 15th of February 1820, he was collector of the customs for the district of Newport.

See Edward T. Channing, "Life of William Ellery," in vol. 6 of Jared Sparks's *American Biography* (Boston and London, 1836).

ELLESMERE, FRANCIS EGERTON, 1ST EARL OF (1800–1857), born in London on the 1st of January 1800, was the second son of the 1st duke of Sutherland. He was known by his patronymic as Lord Francis Leveson Gower until 1833, when he assumed the surname of Egerton alone, having succeeded on the death of his father to the estates which the latter inherited from the duke of Bridgewater. Educated at Eton and at Christ Church, Oxford, he entered parliament soon after attaining his majority as member for the pocket borough of Bletchingly in Surrey. He afterwards sat for Sutherlandshire and for South Lancashire, which he represented when he was elevated to the peerage as earl of Ellesmere and Viscount Brackley in 1846. In politics he was a moderate Conservative of independent views, as was shown by his supporting the proposal for establishing the university of London, by his making and carrying a motion for the endowment of the Roman Catholic clergy in Ireland, and by his advocating free trade long before Sir Robert Peel yielded on the question. Appointed a lord of the treasury in 1827, he held the post of chief secretary for Ireland from 1828 till July 1830, when he became secretary-at-war for a short time. His claims to remembrance are founded chiefly on his services to literature and the fine arts. Before he was twenty he printed for private circulation a volume of poems, which he followed up after a short interval by the publication of a translation of Goethe's *Faust*, one of the earliest that appeared in England, with some translations of German lyrics and a few original poems. In 1839 he visited the Mediterranean and the Holy Land. His impressions of travel were recorded in his very agreeably written *Mediterranean Sketches* (1843), and in the notes to a poem entitled *The Pilgrimage*. He published several other works in prose and verse, all displaying a fine literary taste. His literary reputation secured for him the position of rector of Aberdeen University in 1841. Lord Ellesmere was a munificent and yet discriminating patron of artists. To the splendid collection of pictures which he inherited from his great-uncle, the 3rd duke of Bridgewater, he made numerous additions, and he built a noble gallery to which the public were allowed free access. Lord Ellesmere served as president of the Royal Geographical Society and as president of the Royal Asiatic Society, and he was a trustee of the National Gallery. He died on the 18th of February 1857. He was succeeded by his son (1823–1862) as 2nd earl, and his grandson (b. 1847) as 3rd earl.

ELLESMERE, a market town in the Oswestry parliamentary division of Shropshire, England, on the main line of the Cambrian railway, 182 m. N.W. from London. Pop. of urban district (1901) 1945. It is prettily situated on the west shore of the mere or small lake from which it takes its name, while in the neighbourhood are other sheets of water, as Blake Mere, Cole Mere, White Mere, Newton Mere and Crose Mere. The church of St Mary is of various styles from Norman onward, but was partly rebuilt in 1848. The site of the castle is occupied by pleasure gardens, commanding an extensive view from high ground. The town hall contains a library and a natural history collection. The college is a large boys' school. The town is an important agricultural centre. Ellesmere canal, a famous work of Thomas Telford, connects the Severn with the Mersey, crossing the Vale of Llangollen by an immense aqueduct, 336 yds. long and 127 ft. high.

The manor of Ellesmere (*Ellesmeles*) belonged before the Conquest to Earl Edwin of Mercia, and was granted by William the Conqueror to Roger, earl of Shrewsbury, whose son, Robert de Belesme, forfeited it in 1112 for treason against Henry I. In 1177 Henry II. gave it with his sister in marriage to David, son of Owen, prince of North Wales, after whose death it was retained by King John, who in 1206 granted it to his daughter Joan on her marriage with Llewellyn, prince of North Wales; it was finally surrendered to Henry III. by David, son of Llewellyn, about 1240. Ellesmere owed its early importance to its position on the Welsh borders and to its castle, which was in ruins, however, in 1349. While Ellesmere was in the hands of Joan, lady of Wales, she granted to the borough all the free customs of Breteuil. The town was governed by a bailiff appointed by a jury at one of the court leets of the lord of the manor, until a local board was formed in 1859. In 1221 Henry III. granted Llewellyn, prince of Wales, a market on Thursdays in Ellesmere. The inquisition taken in 1383 after the death of Roger le Straunge (Lord Strange), lord of Ellesmere, shows that he also held two fairs there on the feasts of St Martin and the Nativity of the Virgin Mary. By 1597 the market had been discontinued on account of the plague by which many of the inhabitants had died, and the queen granted that Sir Edward Kynaston, Kt., and thirteen others might hold a market every Thursday and a fair on the 3rd of November. Since 1792 both have been discontinued. The commerce of Ellesmere has always been chiefly agricultural.

ELLICE (LAGOON) ISLANDS, an archipelago of the Pacific Ocean, lying between 5° and 11° S. and about 178° E., nearly midway between Fiji and Gilbert. It is under British protection, being annexed in 1892. It comprises a large number of low coralline islands and atolls, which are disposed in nine clusters extending over a distance of about 400 m. in the direction from N.W. to S.E. Their total area is 14 sq. m. and the population is about 2400. The chief groups, all yielding coco-nuts, pandanus fruit and yams, are Funafuti or Ellice, Nukulailai or Mitchell, Nurakita or Sophia, Nukufetau or De Peyster, Nui or Egg, Nanomana or Hudson, and Niutao or Lynx. Nearly all the natives are Christians, Protestant missions having been long established in several of the islands. Those of Nui speak the language of the Gilbert islanders, and have a tradition that they came some generations ago from that group. All the others are of Samoan speech, and their tradition that they came thirty generations back from Samoa is supported by recent research. They have an ancient spear which they believe was brought from Samoa, and they actually name the valley from which their ancestors started. A missionary visiting the Samoan valley found there a tradition of a party who put to sea never to return, and he also found the wood of which the staff was made growing plentifully in the district. Borings and soundings taken at Funafuti in 1897 indicate almost beyond doubt that the whole of this Polynesian region is an area of comparatively recent subsidence.

See *Geographical Journal*, passim; and *Atoll of Funafuti: Borings into a Coral Reef* (Report of Coral Reef Committee of Royal Society, London, 1904).

ELLICHPUR, or Illichpur, a town of India in the Amraoti district of Berar. Pop. (1901) 26,082. It is first mentioned authentically in the 13th century as "one of the famous cities of the Deccan." Though tributary to the Mahommedans after 1294, it remained under Hindu administration till 1318, when it came directly under the Mahommedans. It was afterwards capital of the province of Berar at intervals until the Mogul occupation, when the seat of the provincial governor was moved to Balapur. The town retains many relics of the nawabs of Berar. It has ginning factories and a considerable trade in cotton and forest produce. It is connected by good roads with Amraoti and Chikalda. It was formerly the headquarters of the district of Ellichpur, which had an area of 2605 sq. m. and a population in 1901 of 297,403. This district, however, was merged in that of Amraoti in 1905. The civil station of Paratwada, 2 m. from the town of Ellichpur, contains the principal public buildings.

ELLIOTSON, JOHN (1791–1868), English physician, was born at Southwark, London, on the 29th of October 1791. He studied medicine first at Edinburgh and then at Cambridge, in both which places he took the degree of M.D., and subsequently in London at St Thomas's and Guy's hospitals. In 1831 he was elected professor of the principles and practice of physic in London University, and in 1834 he became physician to University College hospital. He was a student of phrenology and mesmerism, and his interest in the latter eventually brought him into collision with the medical committee of the hospital, a circumstance which led him, in December 1838, to resign the offices held by him there and at the university. But he continued the practice of mesmerism, holding séances in his home and editing a magazine, *The Zoist*, devoted to the subject, and in 1849 he founded a mesmeric hospital. He died in London on the 29th of July 1868. Elliotson was one of the first teachers in London to appreciate the value of clinical lecturing, and one of the earliest among British physicians to advocate the employment of the stethoscope. He wrote a translation of Blumenbach's *Institutiones Physiologicae* (1817); *Cases of the Hydrocyanic or Prussic Acid* (1820); *Lectures on Diseases of the Heart* (1830); *Principles and Practice of Medicine* (1839); *Human Physiology* (1840); and *Surgical Operations in the Mesmeric State without Pain* (1843). He was the author of numerous papers in the *Transactions* of the Medico-Chirurgical Society, of which he was at one time president; and he was also a fellow both of the Royal College of Physicians and Royal Society, and founder and president of the Phrenological Society. W. M. Thackeray's *Pendennis* was dedicated to him.

ELLIOTT, EBENEZER (1781–1849), English poet, the "corn-law rhymer," was born at Masborough, near Rotherham, Yorkshire, on the 17th of March 1781. His father, who was an extreme Calvinist and a strong radical, was engaged in the iron trade. Young Ebenezer, although one of a large family, had a solitary and rather morbid childhood. He was sent to various schools, but was generally regarded as a dunce, and when he was sixteen years of age he entered his father's foundry, working for seven years with no wages beyond a little pocket money. In a fragment of autobiography printed in the *Athenaeum* (12th of January 1850) he says that he was entirely self-taught, and attributes his poetic development to long country walks undertaken in search of wild flowers, and to a collection of books, including the works of Young, Barrow, Shenstone and Milton, bequeathed to his father by a poor clergyman. At seventeen he wrote his *Vernal Walk* in imitation of Thomson. His earlier volumes of poems, dealing with romantic themes, received little but unfriendly comment. The faults of *Night*, the earliest of these, are pointed out in a long and friendly letter (30th of January 1819) from Robert Southey to the author.

Elliott's wife brought him some money, which was invested in his father's share of the iron foundry. But the affairs of the firm were then in a desperate condition, and money difficulties hastened his father's death. Elliott lost all his money, and when he was forty years old began business again in Sheffield on a small borrowed capital. He attributed his father's pecuniary losses and his own to the operation of the corn laws. He took an active part in the Chartist agitation, but withdrew his support when the agitation for the repeal of the corn laws was removed from the Chartist programme. The fervour of his political convictions effected a change in the style and tenor of his verse. The *Corn-Law Rhymes* (3rd ed., 1831), inspired by a fierce hatred of injustice, are vigorous, simple and full of vivid description. In 1833–1835 he published *The Splendid Village; Corn-Law Rhymes, and other Poems* (3 vols.), which included "The Village Patriarch" (1829), "The Ranter," an unsuccessful drama, "Keronah," and other pieces. He contributed verses from time to time to *Tait's Magazine* and to the *Sheffield and Rotherham Independent*. In the meantime he had been successful in business, but he remained the sturdy champion of the poor. In 1837 he again lost a great deal of money. This misfortune was also ascribed to the corn laws. He retired in 1841 with a small fortune and settled at Great Houghton, near Barnsley, where he died on the 1st of December 1849. In 1850 appeared two volumes of *More Prose and Verse by the Corn-Law Rhymer*. Elliott lives by his determined opposition to the "bread-tax," as he called it, and his poems on the subject are saved from the common fate of political poetry by their transparent sincerity and passionate earnestness.

An article by Thomas Carlyle in the *Edinburgh Review* (July 1832) is the best criticism on Elliott. Carlyle was attracted by Elliott's homely sincerity and genuine power, though he had small opinion of his political philosophy, and lamented his lack of humour and of the sense of proportion. He thought his poetry too imitative, detecting not only the truthful severity of Crabbe, but a "slight bravura dash of the fair tuneful Hemans." His descriptions of his native county reveal close observation and a vivid perception of natural beauty.

See an obituary notice in the *Gentleman's Magazine* (Feb. 1850). Two biographies were published in 1850, one by his son-in-law, John Watkins, and another by "January Searle" (G. S. Phillips). A new edition of his works by his son, Edwin Elliott, appeared in 1876.

ELLIPSE (adapted from Gr. ἔλλειψις, a deficiency, ἐλλείπειν, to fall behind), in mathematics, a conic section, having the form of a closed oval. It admits of several definitions framed according to the aspect from which the curve is considered. *In solido*, *i.e.* as a section of a cone or cylinder, it may be defined, after Menaechmus, as the perpendicular section of an "acute-angled" cone; or, after Apollonius of Perga, as the section of any cone by a plane at a less inclination to the base than a generator; or as an oblique section of a right cylinder. Definitions *in plano* are generally more useful; of these the most important are: (1) the ellipse is the conic section which has its eccentricity less than unity: this involves the notion of one directrix and one focus; (2) the ellipse is the locus of a point the sum of whose distances from two fixed points is constant: this involves the notion of two foci. Other geometrical definitions are: it is the oblique projection of a circle; the polar reciprocal of a circle for a point within it; and the conic which intersects the line at infinity in two imaginary points. Analytically it is defined by an equation of the second degree of which the highest terms represent two imaginary lines. The curve has important mechanical relations, in particular it is the orbit of a particle moving under the influence of a central force which varies inversely as the square of the distance of the particle; this is the gravitational law of force, and the curve consequently represents the orbits of the planets if only an individual planet and the sun be considered; the other planets, however, disturb this orbit (see MECHANICS).

The relation of the ellipse to the other conic sections is treated in the articles CONIC SECTION and GEOMETRY; in this article a summary of the properties of the curve will be given.

To investigate the form of the curve use may be made of the definition: the ellipse is the locus of a point which moves so that the ratio of its distance from a fixed point (the *focus*) to its distance from a straight line (the *directrix*) is constant and is less than unity. This ratio is termed the *eccentricity*, and will be denoted by e. Let KX (fig. 1) be the directrix, S the focus, and X the foot of the perpendicular from S to KX. If SX be divided at A so that $SA/AX=e$, then A is a point on the curve. SX may be also divided externally at A′, so that $SA'/A'X=e$, since e is less than unity; the points A and A′ are the *vertices*, and the line AA′ the *major axis* of the curve. It is obvious that the curve is symmetrical about AA′. If AA′ be bisected at C, and the line BCB′ be drawn perpendicular to AA′, then it is readily seen that the curve is symmetrical about this line also; since if we take S′ on AA′ so that $S'A'=SA$, and a line K′X′ parallel to KX such that $AX=A'X'$, then the same curve will be described if we regard K′X′ and S′ as the given directrix and focus, the eccentricity remaining the same. If B and B′ be points on the curve, BB′ is the *minor axis* and C the *centre* of the curve.

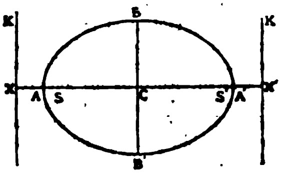

FIG. 1.

Metrical relations between the axes, eccentricity, distance between the foci, and between these quantities and the co-ordinates of points on the curve (referred to the axes and the centre), and focal distances are readily obtained by the methods of geometrical conics or analytically. The semi-major axis is generally denoted by a, and the semi-minor axis by b, and we have the relation $b^2=a^2(1-e^2)$. Also $a^2=CS.CX$, *i.e.* the square on the semi-major axis equals the rectangle contained by the distances of the focus and directrix from the centre; and $2a=SP+S'P$, where P is any point on the curve, *i.e.* the sum of the focal distances of any point on the curve equals the major axis. The most important relation between the co-ordinates of a point on an ellipse is: if N be the foot of the perpendicular from a point P, then the square on PN bears a constant ratio to the product of the segments AN, NA′ of the major axis, this ratio being the square of the ratio of the minor to the major axis; symbolically $PN^2=AN.NA'(CB/CA)^2$. From this or otherwise it is readily deduced that the ordinates of an ellipse and of the circle described on the major axis are in the ratio of the minor to the major axis. This circle is termed the *auxiliary circle*.

Of the properties of a tangent it may be noticed that the tangent at any point is equally inclined to the focal distances of that point; that the feet of the perpendiculars from the foci on any tangent always lie on the auxiliary circle, and the product of these perpendiculars is constant, and equal to the product of the distances of a focus from the two vertices. From any point without the curve two, and only two, tangents can be drawn; if OP, OP′ be two tangents from O, and S, S′ the foci, then the angles OSP, OSP′ are equal and also SOP, S′OP′. If the tangents be at right angles, then the locus of the point is a circle having the same centre as the ellipse; this is named the *director circle*.

The middle points of a system of parallel chords is a straight line, and the tangent at the point where this line meets the curve is parallel to the chords. The straight line and the line through the centre parallel to the chords are named *conjugate diameters*; each bisects the chords parallel to the other. An important metrical property of conjugate diameters is the sum of their squares equals the sum of the squares of the major and minor axis.

In analytical geometry, the equation $ax^2+2hxy+by^2+2gx+2fy+c=0$ represents an ellipse when $ab>h^2$; if the centre of the curve be the origin, the equation is $a'x^2+2h'xy+b'y^2=C'$, and if in addition a pair of conjugate diameters are the axes, the equation is further simplified to $Ax^2+By^2=C$. The simplest form is $x^2/a^2+y^2/b^2=1$, in which the centre is the origin and the major and minor axes the axes of co-ordinates. It is obvious that the co-ordinates of any point on an ellipse may be expressed in terms of a single parameter, the abscissa being $a\cos\phi$, and the ordinate $b\sin\phi$, since on eliminating ϕ between $x=a\cos\phi$ and $y=b\sin\phi$ we obtain the equation to the ellipse. The angle ϕ is termed the *eccentric angle*, and is geometrically represented as the angle between the axis of x (the major axis of the ellipse) and the radius of a point on the auxiliary circle which has the same abscissa as the point on the ellipse.

The equation to the tangent at θ is $x\cos\theta/a+y\sin\theta/b=1$, and to the normal $ax/\cos\theta-by/\sin\theta=a^2-b^2$.

The area of the ellipse is πab, where a, b are the semi-axes; this result may be deduced by regarding the ellipse as the orthogonal projection of a circle, or by means of the calculus. The perimeter can only be expressed as a series, the analytical evaluation leading to an integral termed *elliptic* (see FUNCTION, ii. *Complex*). There are several approximation formulae:—$S=\pi(a+b)$ makes the perimeter about 1/200th too small; $s=\pi\sqrt{2(a^2+b^2)}$ about 1/200th too great; $2s=\pi(a+b)+\pi\sqrt{2(a^2+b^2)}$ is within 1/30,000 of the truth.

An ellipse can generally be described to satisfy any five conditions. If five points be given, Pascal's theorem affords a solution; if five tangents, Brianchon's theorem is employed. The principle of involution solves such constructions as: given four tangents and one point, three tangents and two points, &c. If a tangent and its point of contact be given, it is only necessary to remember that a double point on the curve is given. A focus or directrix is equal to two conditions; hence such problems as: given a focus and three points; a focus, two points and one tangent; and a focus, one point and two tangents are soluble (very conveniently by employing the principle of reciprocation). Of practical importance are the following constructions:—(1) Given the axes; (2) given the major axis and the foci; (3) given the focus, eccentricity and directrix; (4) to construct an ellipse (approximately) by means of circular arcs.

(1) If the axes be given, we may avail ourselves of several constructions. (*a*) Let AA′, BB′ be the axes intersecting at right angles in a point C. Take a strip of paper or rule and mark off from a point P, distances P*a* and P*b* equal respectively to CA and CB. If now the strip be moved so that the point *a* is always on the minor axis, and the point *b* on the major axis, the point P describes the ellipse. This is known as the *trammel* construction.

(*b*) Let AA′, BB′ be the axes as before; describe on each as diameter a circle. Draw any number of radii of the two circles, and from the points of intersection with the major circle draw lines parallel to the minor axis, and from the points of intersection with the minor circle draw lines parallel to the major axis. The intersections of the lines drawn from corresponding points are points on the ellipse.

(2) If the major axis and foci be given, there is a convenient mechanical construction based on the property that the sum of the focal distances of any point is constant and equal to the major axis. Let AA′ be the axis and S, S′ the foci. Take a piece of thread of length AA′, and fix it at its extremities by means of pins at the foci. The thread is now stretched taut by a pencil, and the pencil moved; the curve traced out is the desired ellipse.

(3) If the directrix, focus and eccentricity be given, we may employ the general method for constructing a conic. Let S (fig. 2) be the focus, KX the directrix, X being the foot of the perpendicular from S to the directrix. Divide SX internally at A and externally at A′, so that the ratios SA/AX and SA′/A′X are each equal to the eccentricity. Then A, A′ are the vertices of the curve. Take any point R on the directrix, and draw the lines RAM, RSN; draw SL so that the angle LSN = angle NSA′. Let P be the intersection of the line SL with the line RAM, then it can be readily shown that P is a point on the ellipse. For, draw through P a line parallel to AA′, intersecting the directrix in Q and the line RSN in T. Then since XS and QT are parallel and are intersected by the lines RK, RM, RN, we have SA/AX = TP/PQ = SP/PQ, since the angle PST = angle PTS. By varying the position of R other points can be found, and, since the curve is symmetrical about both the major and minor axes, it is obvious that any point may be reflected in both the axes, thus giving 3 additional points.

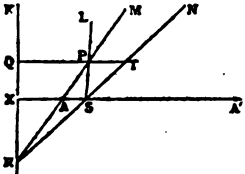

FIG. 2.

(4) If the axes be given, the curve can be approximately constructed by circular arcs in the following manner:—Let AA′, BB′ be the axes; determine D the intersection of lines through B and A parallel to the major and minor axes respectively. Bisect AD at E and join EB. Then the intersection of EB and DB′ determines a point P on the (true) curve. Bisect the chord PB at G, and draw through G a line perpendicular to PB, intersecting BB′ in O. An arc with centre O and radius OB forms part of a curve. Let this arc on the reverse side to P intersect a line through O parallel to the major axis in a point H. Then HA^1 will cut the circular arc in J. Let JO intersect the major axis in O_1. Then with centre O_1 and radius OJ, $= OA^1$, describe an arc. By reflecting the two arcs thus described over the centre the ellipse is approximately described.

ELLIPSOID, a quadric surface whose sections are ellipses. Analytically, it has for its equation $x^2/a^2+y^2/b^2+z^2/c^2=1$, *a*, *b*, *c* being its axes; the name is also given to the solid contained by this surface (see GEOMETRY: *Analytical*). The solids and surfaces of revolution of the ellipse are sometimes termed ellipsoids, but it is advisable to use the name spheroid (*q.v.*).

The ellipsoid appears in the mathematical investigation of physical properties of media in which the particular property varies in three directions within the media; such properties are the elasticity, giving rise to the strain ellipsoid, thermal expansion, ellipsoid of expansion, thermal conduction, refractive index (see CRYSTALLOGRAPHY), &c. In mechanics, the ellipsoid of gyration or inertia is such that the perpendicular from the centre to a tangent plane is equal to the radius of gyration of the given body about the perpendicular as axis; the "momental ellipsoid," also termed the "inverse ellipsoid of inertia" or Poinsot's ellipsoid, has the perpendicular inversely proportional to the radius of gyration; the "equimomental ellipsoid" is such that its moments of inertia about all axes are the same as those of a given body. (See MECHANICS.)

ELLIPTICITY, in astronomy, deviation from a circular or spherical form; applied to the elliptic orbits of heavenly bodies, or the spheroidal form of such bodies. (See also COMPRESSION.)

ELLIS (originally SHARPE), **ALEXANDER JOHN** (1814–1890), English philologist, mathematician, musician and writer on phonetics, was born at Hoxton on the 14th of June 1814. He was educated at Shrewsbury, Eton, and Trinity College, Cambridge, and took his degree in high mathematical honours. He was connected with many learned societies as member or president, and was governor of University College, London. He was the first in England to reduce the study of phonetics to a science. His most important work, to which the greater part of his life was devoted, is *On Early English Pronunciation, with special reference to Shakespeare and Chaucer* (1869–1889), in five parts, which he intended to supplement by a sixth, containing an abstract of the whole, an account of the views and criticisms of other inquirers in the same field, and a complete index, but ill-health prevented him from carrying out his intention. He had long been associated with Isaac Pitman in his attempts to reform English spelling, and published *A Plea for Phonotypy and Phonography* (1845) and *A Plea for Phonetic Spelling* (1848); and contributed the articles on "Phonetics" and "Speech-sounds" to the 9th edition of the *Ency. Brit.* He translated (with considerable additions) Helmholtz's *Sensations of Tone as a physiological Basis for the Theory of Music* (2nd ed., 1885); and was the author of several smaller works on music, chiefly in connexion with his favourite subject phonetics. He died in London on the 28th of October 1890.

ELLIS, GEORGE (1753–1815), English author, was born in London in 1753. Educated at Westminster school and at Trinity College, Cambridge, he began his literary career by some satirical verses on Bath society published in 1777, and *Poetical Tales*, by "Sir Gregory Gander," in 1778. He contributed to the *Rolliad* and the *Probationary Odes* political satires directed against Pitt's administration. He was employed in diplomatic business at the Hague in 1784; and in 1797 he accompanied Lord Malmesbury to Lille as secretary to the embassy. On his return he was introduced to Pitt, and the episode of the *Rolliad*, which had not been forgotten, was explained. He found continued scope for his powers as a political caricaturist in the columns of the *Anti-Jacobin*, a weekly paper which he founded in connexion with George Canning and William Gifford. For some years before the *Anti-Jacobin* was started Ellis had been working in the congenial field of Early English literature, in which he was one of the first to arouse interest. The first edition of his *Specimens of the Early English Poets* appeared in 1790; and this was followed by *Specimens of Early English Metrical Romances* (1805). He also edited Gregory Lewis Way's translation of select *Fabliaux* in 1796. Ellis was an intimate friend of Sir Walter Scott, who styled him "the first converser I ever saw," and dedicated to him the fifth canto of *Marmion*. Some of the correspondence between them is to be found in Lockhart's *Life*. He died on the 10th of April 1815. The monument erected to his memory in the parish church of Gunning Hill, Berks, bears a fine inscription by Canning.

ELLIS, SIR HENRY (1777–1869), English antiquary, was born in London on the 29th of November 1777. He was educated at Merchant Taylors' school, and at St John's College, Oxford, of which he was elected a fellow. After having held for a few months a sub-librarianship in the Bodleian, he was in 1800 appointed to a similar post in the British Museum. In 1827 he became chief librarian, and held that post until 1856, when he resigned on account of advancing age. In 1832 William IV. made him a knight of Hanover, and in the following year he received an English knighthood. He died on the 15th of January 1869. Sir Henry Ellis's life was one of very considerable literary activity. His first work of importance was the preparation of a new edition of Brand's *Popular Antiquities*, which appeared in 1813. In 1816 he was selected by the commissioners of public records to write the introduction to Domesday Book, a task which he discharged with much learning, though several of his views have not stood the test of later criticism. His *Original Letters Illustrative of English History* (first series, 1824; second series, 1827; third series, 1846) are compiled chiefly from manuscripts in the British Museum and the State Paper Office, and have been of considerable service to historical writers. To the Library of Entertaining Knowledge he contributed four volumes on the Elgin and Townley Marbles. Sir Henry was for many years a director and joint-secretary of the Society of Antiquaries.

ELLIS, ROBINSON (1834-), English classical scholar, was born at Barming, near Maidstone, on the 5th of September 1834. He was educated at Elizabeth College, Guernsey, Rugby, and Balliol College, Oxford. In 1858 he became fellow of Trinity College, Oxford, and in 1870 professor of Latin at University College, London. In 1876 he returned to Oxford, where from 1883 to 1893 he held the university readership in Latin. In 1893 he succeeded Henry Nettleship as professor. His chief work has been on Catullus, whom he began to study in 1859. His first *Commentary on Catullus* (1876) aroused great interest, and called forth a flood of criticism. In 1889 appeared a second and enlarged edition, which placed its author in the first rank of authorities on Catullus. Professor Ellis quotes largely from the early Italian commentators, maintaining that the land where the Renaissance originated had done more for scholarship than is commonly recognized. He has supplemented his critical work by a translation (1871, dedicated to Tennyson) of the poems in the metres of the originals. Another author to whom Professor Ellis has devoted many years' study is Manilius, the astrological poet. In 1891 he published *Noctes Manilianae*, a series of dissertations on the *Astronomica*, with emendations. He has also treated Avianus, Velleius Paterculus and the Christian poet Orientius, whom he edited for the Vienna *Corpus Scriptorum Ecclesiasticorum*. He edited the *Ibis* of Ovid, the *Aetna* of the younger Lucilius, and contributed to the *Anecdota Oxoniensia* various unedited Bodleian and other manuscripts. In 1907 he published *Appendix Vergiliana* (an edition of the minor poems); in 1908 *The Annalist Licinianus*.

ELLIS, WILLIAM (1794–1872), English Nonconformist missionary, was born in London on the 29th of August 1794. His boyhood and youth were spent at Wisbeach, where he worked as a market-gardener. In 1814 he offered himself to the London Missionary Society, and was accepted. During a year's training he acquired some knowledge of theology and of various practical arts, such as printing and bookbinding. He sailed for the South Sea Islands in January 1816, and remained in Polynesia, occupying various stations in succession, until 1824, when he was compelled to return home on account of the state of his wife's health. Though the period of his residence in the islands was thus comparatively short, his labours were very fruitful, contributing perhaps as much as those of any other missionary to bring about the extraordinary improvement in the religious, moral and social condition of the Pacific Archipelago that took place during the 19th century. Besides promoting the spiritual object of his mission, he introduced many other aids to the improvement of the condition of the people. His gardening experience enabled him successfully to acclimatize many species of tropical fruits and plants, and he set up and worked the first printing press in the South Seas. Returning home by way of the United States, where he advocated his work, Ellis was for some years employed as a travelling agent of the London Missionary Society, and in 1832 was appointed foreign secretary to the society, an office which he held for seven years. In 1837 he married his second wife, Sarah Stickney, a writer and teacher of some note in her generation. In 1841 he went to live at Hoddesdon, Herts, and ministered to a small Congregational church there. On behalf of the London Missionary Society he paid three visits to Madagascar (1853–1857), inquiring into the prospects for resuming the work that had been suspended by Queen Ranavolona's hostility. A further visit was paid in 1863. Ellis wrote accounts of all his travels, and Southey's praise (in the *Quarterly Review*) of his *Polynesian Researches* (2 vols., 1829) finds many echoes. He was a fearless, upright and tactful man, and a keen observer of nature. He died on the 25th of June 1872.

ELLISTON, ROBERT WILLIAM (1774–1831), English actor, was born in London on the 7th of April 1774, the son of a watchmaker. He was educated at St Paul's school, but ran away from home and made his first appearance on the stage as Tressel in *Richard III.* at Bath in 1791. Here he was later seen as Romeo, and in other leading parts, both comic and tragic, and he repeated his successes in London from 1796. He acted at Drury Lane from 1804 to 1809, and again from 1812; and from 1819 he was the lessee of the house, presenting Kean, Mme Vestris and Macready. Ill-health and misfortune culminated in his bankruptcy in 1826, when he made his last appearance at Drury Lane as Falstaff. But as lessee of the Surrey theatre he acted almost up to his death, which was hastened by intemperance. Leigh Hunt compared him favourably with Garrick; Byron thought him inimitable in high comedy; Macready praised his versatility. Elliston was the author of *The Venetian Outlaw* (1805), and, with Francis Godolphin Waldron, of *No Prelude* (1803), in both of which plays he appeared.

ELLORA, a village of India in the native state of Hyderabad, near the city of Daulatabad, famous for its rock temples, which are among the finest in India. They are first mentioned by Ma'sudi, the Arabic geographer of the 10th century, but merely as a celebrated place of pilgrimage. The caves differ from those of Ajanta in consequence of their being excavated in the sloping sides of a hill and not in a nearly perpendicular cliff. They extend along the face of the hill for a mile and a quarter, and are divided into three distinct series, the Buddhist, the Brahmanical and the Jain, and are arranged almost chronologically. The most splendid of the whole series is the Kailas, a perfect Dravidian temple, complete in all its parts, characterized by Fergusson as one of the most wonderful and interesting monuments of architectural art in India. It is not a mere interior chamber cut in the rock, but is a model of a complete temple such as might have been erected on the plain. In other words, the rock has been cut away externally as well as internally. First the great sunken court measuring 276 ft. by 154 ft. was hewn out of the solid trap-rock of the hillside, leaving the rock mass of the temple wholly detached in a cloistered court like a colossal boulder, save that a rock bridge once connected the upper storey of the temple with the upper row of galleried chambers surrounding three sides of the court. Colossal elephants and obelisks stand on either side of the open mandapam, or pavilion, containing the sacred bull; and beyond rises the monolithic Dravidian temple to Siva, 90 ft. in height, hollowed into vestibule, chamber and image-cells, all lavishly carved. Time and earthquakes have weathered and broken away bits of the great monument, and Moslem zealots strove to destroy the carved figures, but these defects are hardly noticed. The temple was built by Krishna I., Rashtrakuta, king of Malkhed in 760–783.

ELLORE, a town of British India, in the Kistna district of Madras, on the East Coast railway, 303 m. from Madras. Pop. (1901) 33,521. The two canal systems of the Godavari and the Kistna deltas meet here. There are manufactures of cotton and saltpetre, and an important Church of England high school. Ellore was formerly a military station, and the capital of the Northern Circars. At Pedda Vegi to the north of it are extensive ruins, which are believed to be remains of the Buddhist kingdom of Vengi. From these the Mahommedans, after their conquest of the district in 1470, obtained material for building a fort at Ellore.

ELLSWORTH, OLIVER (1745–1807), American statesman and jurist, was born at Windsor, Connecticut, on the 29th of April 1745. He studied at Yale and Princeton, graduating from the latter in 1766, studied theology for a year, then law, and began to practise at Hartford in 1771. He was state's attorney for Hartford county from 1777 to 1785, and achieved extraordinary success at the bar, amassing what was for his day a large fortune. From 1773 to 1775 he represented the town of Windsor in the general assembly of Connecticut, and in the latter year became a member of the important commission known as the "Pay Table," which supervised the colony's expenditures for military purposes during the War of Independence. In 1779 he again sat in the assembly, this time representing Hartford. From 1777 to 1783 he was a member of the Continental Congress, and in this body he served on three important committees, the marine committee, the board of treasury, and the committee of appeals, the predecessors respectively of the navy and treasury departments and the Supreme Court under the Federal Constitution. From 1780 to 1785 he was a member of the governor's council of Connecticut, which, with the lower house before 1784 and alone from 1784 to 1807, constituted a supreme court of errors; and from 1785 to 1789 he was a judge of the state superior court. In 1787, with Roger Sherman and William Samuel Johnson (1727–1819), he was one of Connecticut's delegates to the constitutional convention at Philadelphia, in which his services were numerous and important. In particular, when disagreement seemed inevitable on the question of representation, he, with Roger Sherman, proposed what is known as the "Connecticut Compromise," by which the Federal legislature was made to consist of two houses, the upper having equal representation from each state, the lower being chosen on the basis of population. Ellsworth also made a determined stand against a national paper currency. Being compelled to leave the convention before its adjournment, he did not sign the instrument, but used his influence to secure its ratification by his native state. From 1789 to 1796 he was one of the first senators from Connecticut under the new Constitution. In the senate he was looked upon as President Washington's personal spokesman and as the leader of the Administration party. His most important service to his country was without a doubt in connexion with the establishment of the Federal judiciary. As chairman of the committee having the matter in charge, he drafted the bill by the enactment of which the system of Federal courts, almost as it is to-day, was established. He also took a leading part in the senate in securing the passage of laws for funding the national debt, assuming the state debts and establishing a United States bank. It was Ellsworth who suggested to Washington the sending of John Jay to England to negotiate a new treaty with Great Britain, and he probably did more than any other man to induce the senate, despite widespread and violent opposition, to ratify that treaty when negotiated. By President Washington's appointment he became chief justice of the Supreme Court of the United States in March 1796, and in 1799 President John Adams sent him, with William Vans Murray (1762–1803) and William R. Davie (1756–1820), to negotiate a new treaty with France. It was largely through the influence of Ellsworth, who took the principal part in the negotiations, that Napoleon consented to a convention, of the 30th of September 1800, which secured for citizens of the United States their ships captured by France but not yet condemned as prizes, provided for freedom of commerce between the two nations, stipulated that "free ships shall give a freedom to goods," and contained provisions favourable to neutral commerce. While he was abroad, failing health compelled him (1800) to resign the chief-justiceship, and after some months in England he returned to America in 1801. In 1803 he was again elected to the governor's council, and in 1807, on the reorganization of the Connecticut judiciary, was appointed chief justice of the new Supreme Court. He never took office, however, but died at his home in Windsor on the 27th of November 1807.

See W. G Brown's *Oliver Ellsworth* (New York, 1905), an excellent biography. There is also an appreciative account of Ellsworth's life and work in H. C. Lodge's *A Fighting Frigate, and Other Essays and Addresses* (New York, 1902), which contains in an appendix an interesting letter by Senator George F. Hoar concerning Ellsworth's work in the constitutional convention.

ELLSWORTH, a city, port of entry and the county seat of Hancock county, Maine, U.S.A., at the head of navigation on the Union river (and about 3¾ m. from its mouth), about 30 m. S.E. of Bangor. Pop. (1890) 4804; (1900) 4297 (189 foreign-born); (1910) 3549. It is served by the Maine Central railway. The fall of the river, about 85 ft. in 2 m., furnishes good water-power, and the city has various manufactures, including lumber, shoes, woollens, sails, carriages and foundry and machine shop products, besides a large lumber trade. Shipbuilding was formerly important. There is a large United States fish hatchery here. The city is the port of entry for the Frenchman's Bay customs district, but its foreign trade is unimportant. Ellsworth was first settled in 1763 and for some time was called New Bowdoin; but when it was incorporated as a town in 1800 the present name was adopted in honour of Oliver Ellsworth. A city charter was secured in 1869.

ELLWANGEN, a town of Germany in the kingdom of Württemberg, on the Jagst, 12 m. S.S.E. from Crailsheim on the railway to Goldshöfe. Pop. 5000. It is romantically situated between two hills, one crowned by the castle of Hohen-Ellwangen, built in 1354 and now used as an agricultural college, and the other, the Schönenberg, by the pilgrimage church of Our Lady of Loreto, in the Jesuit style of architecture. The town possesses one Evangelical and five Roman Catholic churches, among the latter the Stiftskirche, the old abbey church, a Romanesque building dating from 1124, and the Gothic St Wolfgangskirche. The classical and modern schools (Gymnasium and Realschule) occupy the buildings of a suppressed Jesuit college. The industries include the making of parchment covers, of envelopes, of wooden hafts and handles for tools, &c., and tanneries. There are also a wool-market and a horse-market, the latter famous in Germany.

The Benedictine abbey of Ellwangen is said to have been founded in 764 by Herulf, bishop of Langres; there is, however, no record of it before 814. In 1460 the abbey was converted, with the consent of Pope Pius II., into a *Ritterstift* (college or institution for noble pensioners) under a secular provost, who, in 1555, was raised to the dignity of a prince of the Empire. The provostship was secularized in 1803 and its territories were assigned to Württemberg. The town of Ellwangen, which grew up round the abbey and received the status of a town about the middle of the 14th century, was until 1803 the capital of the provostship.

See Seckler, *Beschreibung der gefürsteten Probstei Ellwangen* (Stuttgart, 1864); *Beschreibung des Oberamts Ellwangen*, published by the statistical bureau (Landesamt) at Ellwangen (1888). For a list of the abbots and provosts see Stokvis, *Manuel d'histoire* (Leiden, 1890–1893), iii. p. 242.

ELLWOOD, THOMAS (1639–1714), English author, was born at Crowell, in Oxfordshire, in 1639. He is chiefly celebrated for his connexion with Milton, and the principal facts of his life are related in a very interesting autobiography, which contains much information as to his intercourse with the poet. While he was still young his father removed to London, where Thomas became acquainted with a Quaker family named Pennington and was led to join the Society of Friends, a connexion which subjected him to much persecution. It was through the Penningtons that he was introduced in 1662 to Milton in the capacity of Latin reader. He spent nearly every afternoon in the poet's house in Jewin Street, until the intercourse was interrupted by an illness which compelled him to go to the country. After a period of imprisonment in the old Bridewell prison and in Newgate for Quakerism, Ellwood resumed his visits to Milton, who was now residing at a house his friend had taken for him at Chalfont St Giles. In 1665 Ellwood was again arrested and imprisoned in Aylesbury gaol. When he visited Milton after his release the poet gave him the manuscript of the *Paradise Lost* to read. On returning the manuscript Ellwood said, "Thou hast said much here of Paradise lost; but what hast thou to say of Paradise found?" and when Milton long afterwards in London showed him *Paradise Regained*, it was with the remark, "This is owing to you, for you put it into my head at Chalfont." Ellwood was the friend of Fox and Penn, and was the author of several polemical works in defence of the Quaker position, of which *Forgery no Christianity* (1674) and *The Foundation of Tithes Shaken* (1678) deserve mention. His *Sacred Histories of the Old and New Testaments* appeared in 1705 and 1709. He also published some volumes of poems, among them a *Davideis* in five books. He died on the 1st of March 1714.

The History of the Life of Thomas Ellwood: written by his own hand (1714) has been many times reprinted.

ELM, the popular name for the trees and shrubs constituting the genus *Ulmus*, of the natural order Ulmaceae. The genus contains fifteen or sixteen species widely distributed throughout the north temperate zone, with the exception of western North America, and extending southwards as far as Mexico in the New and the Sikkim Himalayas in the Old World.

The common elm, *U. campestris*, a doubtful native of England, is found throughout a great part of Europe, in North Africa and in Asia Minor, whence it ranges as far east as north Asia and Japan. It grows in woods and hedge-rows, especially in the southern portion of Britain, and on almost all soils, but thrives best on a rich loam, in open, low-lying, moderately moist situations, attaining a height of 60 to 100, and in some few cases as much as 130 or 150 ft. The branches are numerous and spreading, and often pendulous at the extremities; the bark is rugged; the leaves are alternate, ovate, rough, doubly serrate, and, as in other species of *Ulmus*, unequal at the base. The flowers are small, hermaphrodite, numerous, in purplish-brown tufts, and each with a fringed basal bract; the bell-shaped calyx is often four-toothed and surrounds four free stamens; the pistil bears two spreading hairy styles. They appear before the leaves in March and April. The seed-vessels are green, membranous, one-seeded and deeply cleft. Unlike the wych elm, the common elm rarely perfects its seed in England, where it is propagated by means of root suckers from old trees, or preferably by layers from stools. In the first ten years of its growth it ordinarily reaches a height of 25 to 30 ft. The wood, at first brownish white, becomes, with growth, of a brown colour having a greenish shade. It is close-grained, free from knots, without apparent medullary rays, and is hard and tough, but will not take a polish. All parts of the trunk, including the sapwood, are available in carpentry. By drying, the wood loses over 60% of its weight, and has then a specific gravity of 0·588. It has considerable transverse strength, does not crack when once seasoned, and is remarkably durable under water, or if kept quite dry; though it decays rapidly on exposure to the weather, which in ten to eighteen months causes the bark to fall off, and gives to the wood a yellowish colour—a sign of deterioration in quality. To prevent shrinking and warping it may be preserved in water or mud, but it is best worked up soon after felling. Analyses of the ash of the wood have given a percentage of 47·8% of lime, 21·9% of potash, and 13·7% of soda. In summer, elm trees often exude an alkaline gummy substance, which by the action of the air becomes the brown insoluble body termed *ulmin*. Elm wood is used for keels and bilge-planks, the blocks and dead-eyes of rigging, and ships' pumps, for coffins, wheels, furniture, carved and turned articles, and for general carpenters' work; and previous to the common employment of cast iron was much in request for waterpipes. The inner bark of the elm is made into bast mats and ropes. It contains mucilage, with a little tannic acid, and was formerly much employed for the preparation of an antiscorbutic decoction, now obsolete. The bark of *Ulmus fulva*, the slippery or red elm of the United States and Canada, serves the North American Indians for the same purpose, and also as a vulnerary. The leaves as well as the young shoots of elms have been found a suitable food for live stock. For ornamental purposes elm trees are frequently planted, and in avenues, as at the park of Stratfieldsaye, in Hampshire, are highly effective. They were first used in France for the adornment of public walks in the reign of Francis I. In Italy, as in ancient times, it is still customary to train the vine upon the elm—a practice to which frequent allusion has been made by the poets. The cork-barked elm, *U. campestris*, var. *suberosa*, is distinguished chiefly by the thick deeply fissured bark with which its branches are covered. There are numerous cultivated forms differing in size and shape of leaf, and manner of growth.

The Scotch or wych elm, *U. montana*, is indigenous to Britain and is the common elm of the northern portion of the island; it usually attains a height of about 50 ft., but among tall-growing trees may reach 120 ft. It has drooping branches and a smoother and thinner bark, larger and more tapering leaves, and a far less deeply notched seed-vessel than *U. campestris*. The wood, though more porous than in that species, is a tough and hard material when properly seasoned, and, being very flexible when steamed, is well adapted for boat-building. Branches of the wych elm were formerly manufactured into bows, and if forked were employed as divining-rods. The weeping elm, the most ornamental member of the genus, is a variety of this species. The Dutch or sand elm is a tree very similar to the wych elm, but produces inferior timber. The American or white elm, *U. americana*, is a hardy and very handsome species, of which the old tree on Boston (Mass.) Common was a representative. This tree is supposed to have been in existence before the settlement of Boston, and at the time of its destruction by the storm of the 15th of February 1876 measured 22 ft. in circumference.

ELMACIN (ELMAKIN or ELMACINUS), **GEORGE** (*c.* 1223–1274), author of a history of the Saracens, which extends from the time of Mahomet to the year 1118 of our era. He was a Christian of Egypt, where he was born; is known in the east as Ibn-Amid; and after holding an official position under the sultans of Egypt, died at Damascus. His history is principally occupied with the affairs of the Saracen empire, but it contains passages which relate to the Eastern Christians. It was published in Arabic and Latin at Leiden in 1625. The Latin version is a translation by Erpenius, under the title, *Historia saracenica*, and from this a French translation was made by Wattier as *L'Histoire mahométane* (Paris, 1657).

ELMALI ("apple-town"), a small town of Asia Minor in the vilayet of Konia, the present administrative centre of the ancient Lycia, but not itself corresponding to any known ancient city. It lies about 25 m. inland, at the head of a long upland valley (5000 ft.) inhabited by direct descendants of the ancient Lycians, who have preserved a distinctive facial type, noticeable at once in the town population. There are about fifty Greek families, the rest of the population (4000) being Moslem. The district is agricultural and has no manufactures of importance.

ELMES, HARVEY LONSDALE (1813–1847), British architect, son of James Elmes (*q.v.*), was born at Chichester in 1813. After serving some time in his father's office, and under a surveyor at Bedford and an architect at Bath, he became partner with his father in 1835, and in the following year he was successful among 86 competitors for a design for St George's Hall, Liverpool. The foundation stone of this building was laid on the 28th of June 1838, but, Elmes being successful in a competition for the Assize Courts in the same city, it was finally decided to include the hall and courts in a single building. In accordance with this idea, Elmes prepared a fresh design, and the work of erection commenced in 1841. He superintended its progress till 1847, when from failing health he was compelled to delegate his duties to Charles Robert Cockerell, and leave for Jamaica, where he died of consumption on the 26th of November 1847.

ELMES, JAMES (1782–1862), British architect, civil engineer, and writer on the arts, was born in London on the 15th of October 1782. He was educated at Merchant Taylors' school, and, after studying building under his father, and architecture under George Gibson, became a student at the Royal Academy, where he gained the silver medal in 1804. He designed a large number of buildings in the metropolis, and was surveyor and civil engineer to the port of London, but is best known as a writer on the arts. In 1809 he became vice-president of the Royal Architectural Society, but this office, as well as that of surveyor of the port of London, he was compelled through partial loss of sight to resign in 1828. He died at Greenwich on the 2nd of April 1862. His publications were:—*Sir Christopher Wren and his Times* (1823); *Lectures on Architecture* (1823); *The Arts and Artists* (1825); *General and Biographical Dictionary of the Fine Arts* (1826); *Treatise on Architectural Jurisprudence* (1827), and *Thomas Clarkson: a Monograph* (1854).

ELMHAM, THOMAS (d. *c.* 1420), English chronicler, was probably born at North Elmham in Norfolk. He became a Benedictine monk at Canterbury, and then joining the Cluniacs, was prior of Lenton Abbey, near Nottingham; he was chaplain to Henry V., whom he accompanied to France in 1415, being present at Agincourt. Elmham wrote a history of the monastery of St Augustine at Canterbury, which has been edited by C. Hardwick for the Rolls Series (1858); and a *Liber metricus de Henrico V.*, edited by C. A. Cole in the *Memorials of Henry V.* (1858). It is very probable that Elmham wrote the famous *Gesta Henrici Quinti*, which is the best authority for the life of Henry V. from his accession to 1416. This work, often referred to as the "chaplain's life," and thought by some to have been written by Jean de Bordin, has been published for the English Historical Society by B. Williams (1850). Elmham, however, did not write the *Vita et Gesta Henrici V.*, which was attributed to him by T. Hearne and others.

See C. L. Kingsford, *Henry V.* (1901).

ELMINA, a town on the Gold Coast, British West Africa, in 5° 4′ N., 1° 20′ W. and about 8 m. W. of Cape Coast. Pop. about 4000. Facing the Atlantic on a rocky peninsula is Fort St George, considered the finest fort on the Guinea coast. It is built square with high walls, and has accommodation for 200 soldiers. On the land side were formerly two moats, cut in the rock on which the castle stands. The castle is the residence of the commissioner of the district and other officials. The houses in the native quarter are mostly built of stone, that material being plentiful in the vicinity.

Elmina is the earliest European settlement on the Gold Coast, and was visited by the Portuguese in 1481. Christopher Columbus is believed to have been one of the officers who took part in this voyage. The Portuguese at once began to build the castle now known as Fort St George, but it was not completed till eighty years afterwards. Another defensive work is Fort St Jago, built in 1666, which is behind the town and at some distance from the coast. (In the latter half of the 19th century it was converted into a prison.) Elmina was captured by the Dutch in 1637, and ceded to them by treaty in 1640. They made it the chief port for the produce of Ashanti. With the other Dutch possessions on the Guinea coast, it was transferred to Great Britain in April 1872. The king of Ashanti, claiming to be ground landlord, objected to its transfer, and the result was the Ashanti war of 1873–1874. For many years the greatest output of gold from this coast came from Elmina. The annual export is said to have been nearly £3,000,000 in the early years of the 18th century, but the figure is probably exaggerated. Since 1900 the bulk of the export trade in gold has been transferred to Sekondi (*q.v.*). Prempeh, the ex-king of Ashanti, was detained in the castle (1896) until his removal to the Seychelles. (See ASHANTI: *History*, and GOLD COAST: *History*.)

ELMIRA, a city and the county-seat of Chemung county, New York, U.S.A., 100 m. S.E. of Rochester, on the Chemung river, about 850 ft. above sea-level. Pop. (1890) 30,893; (1900) 35,672, of whom 5511 were foreign-born (1988 Irish and 1208 German); (1910 census) 37,176. It is served by the Erie, the Pennsylvania, the Delaware, Lackawanna & Western, the Lehigh Valley, and the Tioga Division railways, the last of which connects it with the Pennsylvania coalfields 48 m. away. The city is attractively situated on both sides of the river, and has a fine water-supply and park system, among the parks being Eldridge, Rorick's Glen, Riverside, Brand, Diven, Grove, Maple Avenue and Wisner; in the last-named is a statue of Thomas K. Beecher by J. S. Hartley. The city contains a Federal building, a state armoury, the Chemung county court house and other county buildings, the Elmira orphans' home, the Steele memorial library, home for the aged, the Arnot-Ogden memorial hospital, the Elmira free academy, and the Railway Commercial training school. Here, also, is Elmira College (Presbyterian) for women, founded in 1855. This institution, chartered in 1852 as Auburn Female University and then situated in Auburn, was rechartered in 1855 as the Elmira Female College; it was established largely through the influence and persistent efforts of the Rev. Samuel Robbins Brown (1810–1880) and his associates, notably Simeon Benjamin of Elmira, who gave generously to the newly founded college, and was the first distinctively collegiate institution for women in the United States, and the first, apparently, to grant degrees to women. The most widely known institution in the city is the Elmira reformatory, a state prison for first offenders between the ages of sixteen and thirty, on a system of general indeterminate sentences. Authorized by the state legislature in 1866 and opened in 1876 under the direction of Zebulon Reed Brockway (b. 1827), it was the first institution of the sort and has served as a model for many similar institutions both in the United States and in other countries (see JUVENILE OFFENDERS). Elmira is an important railway centre, with large repair shops, and has also extensive manufactories (value of production in 1900, $8,558,786, of which $6,596,603 was produced under the "factory system"; in 1905, under the "factory system," $6,984,095), including boot and shoe factories, a large factory for fire-extinguishing apparatus, iron and steel bridge works, steel rolling mills, large valve works, steel plate mills, knitting mills, furniture, glass and boiler factories, breweries and silk mills. Near the site of Elmira occurred on the 29th of August 1779 the battle of Newtown, in which General John Sullivan decisively defeated a force of Indians and Tories under Sir John Johnson and Joseph Brant. There were some settlers here at the close of the War of Independence, but no permanent settlement was made until 1788. The village was incorporated as Newtown in 1815, and was reincorporated as Elmira in 1828. A city charter was secured in 1864. In 1861 a state military camp was established here, and in 1864–1865 there was a prison camp here for Confederate soldiers.

ELMSHORN, a town of Germany, in the Prussian province of Schleswig-Holstein, on the Krückau, 19 m. by rail N.W. from Altona. Pop. (1905) 13,640. Its industries include weaving, dyeing, brewing, iron-founding and the manufacture of leather goods, boots and shoes and machines. There is a considerable shipping trade.

ELMSLEY, PETER (1773–1825), English classical scholar. He was educated at Westminster and Christ Church, Oxford, and having inherited a fortune from his uncle, a well-known bookseller, devoted himself to the study of classical authors and manuscripts. In 1798 he was appointed to the chapelry of Little Horkesley in Essex, which he held till his death. He travelled extensively in France and Italy, and spent the winter of 1818 in examining the MSS. in the Laurentian library at Florence. In 1819 he was commissioned, with Sir Humphry Davy, to decipher the papyri found at Herculaneum, but the results proved insignificant. In 1823 he was appointed principal of St Alban's Hall, Oxford, and Camden professor of ancient history. He died in Oxford on the 8th of March 1825. Elmsley was a man of most extensive learning and European reputation, and was considered to be the best ecclesiastical scholar in England. But it is chiefly by his collation of the MSS. of the Greek tragedians and his critical labours on the restoration of their text that he will be remembered. He edited the *Acharnians* of Aristophanes, and several of the plays and scholia of Sophocles and Euripides. He was the first to recognize the importance of the Laurentian MS. (see Sandys, *Hist. of Class. Schol.* iii. (1908).

ELNE, a town of south-western France in the department of Pyrénées-Orientales, 10 m. S.S.E. of Perpignan by rail. Pop. (1906) 3026. The hill on which it stands, once washed by the sea, which is now over 3 m. distant, commands a fine view over the plain of Rousseillon. From the 6th century till 1602 the town was the seat of a bishopric, which was transferred to Perpignan. The cathedral of St Eulalie, a Romanesque building completed about the beginning of the 12th century, has a beautiful cloister in the same style, with interesting sculptures and three early Christian sarcophagi. Remains of the ancient ramparts flanked by towers are still to be seen. Silk-worm cultivation is carried on. Elne, the ancient *Illiberis*, was named *Helena* by the emperor Constantine in memory of his mother. Hannibal encamped under its walls on his march to Rome in 218 B.C. The emperor Constans was assassinated there in A.D. 350. The town several times sustained siege and capture between its occupation by the Moors in the 8th century and its capitulation in 1641 to the troops of Louis XIII

EL OBEID, chief town of the mudiria (province) of Kordofan, Anglo-Egyptian Sudan, and 230 m. S.W. by S. of Khartum in a direct line. Pop. (1905) about 10,000. It is situated about 2000 ft. above the sea, at the northern foot of Jebel Kordofan, in 13° 11′ N. and 30° 14′ E. It is an important trade centre, the chief articles of commerce being gum, ivory, cattle and ostrich feathers. A considerable part of the trade of Darfur with Egypt passes through El Obeid.

El Obeid, which appears to be a place of considerable antiquity and the ancient capital of the country, was garrisoned by the Egyptians on their conquest of Kordofan in 1821. In September 1882 the town was assaulted by the troops of the mahdi, who, being repulsed, laid siege to the place, which capitulated on the 17th of January 1883. During the Mahdia the city was destroyed and deserted, and when Kordofan passed, in 1899, into the possession of the Anglo-Egyptian authorities nothing was left of El Obeid but a part of the old government offices. A new town was laid out in squares, the mudiria repaired and barracks built. (See KORDOFAN, and SUDAN: *Anglo-Egyptian.*)

ELOI [ELIGIUS], **SAINT** (588–659), apostle of the Belgians and Frisians, was born at Cadillac, near Limoges, in 588. Having at an early age shown artistic talent he was placed by his parents with the master of the mint at Limoges, where he made rapid progress in goldsmith's work. He became coiner to Clotaire II., king of the Franks, and treasurer to his successor Dagobert. Both kings entrusted him with important works, among which were the composition of the bas-reliefs which ornament the tomb of St Germain, bishop of Paris, and the execution (for Clotaire) of two chairs of gold, adorned with jewels, which at that time were reckoned *chefs-d'œuvre.* Though he was amassing great wealth, Eloi acquired a distaste for a worldly life, and resolved to become a priest. At first he retired to a monastery, but in 640 was raised to the bishopric of Noyon. He made frequent missionary excursions to the pagans of the Low Countries, and also founded a great many monasteries and churches. He died on the 1st of December 659. A mass of legend has gathered round the life of St Eloi, who as the patron saint of goldsmiths is still very popular.

His life was written by his friend and contemporary St Ouen (Audoenus); French translations of the *Vita S. Eligii auctore Audoeno* were published by L. de Montigny (Paris, 1626), by C. Barthélemy in *Etudes hist., litt. et art.* (*ib.* 1847), and by Parenty, with notes (2nd ed., *ib.* 1870). For bibliography see Potthast, *Bibliotheca hist. med. aevi* (Berlin, 1896), s.v. "Vita S. Eligii Noviomensis," and Ulysse Chevalier, *Rép. des sources hist., Bio-bibl.* (Paris, 1894), s. "Eloi."

ELONGATION, strictly "lengthening"; in astronomy, the apparent angular distance of a heavenly body from its centre of motion, as seen from the earth; designating especially the angular distance of the planet Mercury or Venus from the sun, or the apparent angle between a satellite and its primary. The greatest elongation of Venus is about 45°; that of Mercury generally ranges between 18° and 27°.

EL PASO, a city, port of entry, and the county-seat of El Paso county, Texas, U.S.A., on the E. bank of the Rio Grande, in the extreme W. part of the state, at an altitude of 3710 ft. Pop. (1880) 736; (1890) 10,338; (1900) 15,906, of whom 6309 were foreign-born and 466 were negroes; (1910 census) 39,279. Many of the inhabitants are of Mexican descent. El Paso is an important railway centre and is served by the following railways: the Atchison, Topeka & Santa Fé, of which it is the S. terminus; the El Paso & South-Western, which connects with the Chicago, Rock Island & El Paso (of the Rock Island system); the Galveston, Harrisburg & San Antonio, of which it is the W. terminus; the Mexican Central, of which it is the N. terminus; the Texas & Pacific, of which it is the W. terminus; a branch of the Southern Pacific, of which it is the E. terminus; and the short Rio Grande, Sierra Madre & Pacific, of which it is the N. terminus. The city is regularly laid out on level bottom lands, stretching to the tablelands and slopes to the N.E. and N.W. of the city. Opposite, on the W. bank of the river, is the Mexican town of Ciudad Juarez (until 1885 known as Paso del Norte), with which El Paso is connected by bridges and by electric railway. The climate is mild, warm and dry, El Paso being well known as a health resort, particularly for sufferers from pulmonary complaints. Among the city's public buildings are a handsome Federal building, a county court house, a city hall, a Y.M.C.A. building, a public library, a sanatorium for consumptives, and the Hotel Dieu, a hospital maintained by Roman Catholics. El Paso is the seat of St Joseph's Academy and of the El Paso Military Institute. Three miles E. of the city limits is Fort Bliss, a U.S. military post, with a reservation of about 2 sq. m. El Paso's situation on the Mexican frontier gives it a large trade with Mexico; it is the port of entry of the Paso del Norte customs district, one of the larger Mexican border districts, and in 1908 its imports were valued at $2,677,784 and its exports at $5,661,901. Wheat, boots and shoes, mining machinery, cement, lime, lumber, beer, and denatured alcohol are among the varied exports; the principal imports are ore, sugar, cigars, oranges, drawn work and Mexican curios. El Paso has extensive manufactories, especially railway car shops, which in 1905 employed 34·5% of the factory wage-earners. Just outside the city limits are important lead smelting works, to which are brought ores for treatment from western Texas, northern Mexico, New Mexico and Arizona. Among the city's manufactures are cement, denatured alcohol, ether, varnish, clothing and canned goods. The value of the city's total factory product in 1905 was $2,377,813, 96% greater than that in 1900. El Paso lies in a fertile agricultural valley, and in 1908 the erection of an immense dam was begun near Engle, New Mexico (100 m. above El Paso), by the U.S. government, to store the flood waters of the Rio Grande for irrigating this area. Before the Mexican War, following which the first United States settlement was made, the site of El Paso was known as Ponce de Leon Ranch, the land being owned by the Ponce de Leon family. El Paso was first chartered as a city in 1873, and in 1907 adopted the commission form of government.

ELPHINSTONE, MOUNTSTUART (1779–1859), Indian statesman and historian, fourth son of the 11th Baron Elphinstone in the peerage of Scotland, was born in 1779. Having received an appointment in the civil service of the East India Company, of which one of his uncles was a director, he reached Calcutta in the beginning of 1796. After filling several subordinate posts, he was appointed in 1801 assistant to the British resident at Poona, at the court of the peshwa, the most powerful of the Mahratta princes. Here he obtained his first opportunity of distinction, being attached in the capacity of diplomatist to the mission of Sir Arthur Wellesley to the Mahrattas. When, on the failure of negotiations, war broke out, Elphinstone, though a civilian, acted as virtual aide-de-camp to General Wellesley. He was present at the battle of Assaye, and displayed such courage and knowledge of tactics throughout the whole campaign that Wellesley told him he had mistaken his profession, and that he ought to have been a soldier. In 1804, when the war closed, he was appointed British resident at Nagpur. Here, the times being uneventful and his duties light, he occupied much of his leisure in reading classical and general literature, and acquired those studious habits which clung to him throughout life. In 1808 he was appointed the first British envoy to the court of Kabul, with the object of securing a friendly alliance with the Afghans; but this proved of little value, because Shah Shuja was driven from the throne by his brother before it could be ratified. The most valuable permanent result of the embassy was the literary fruit it bore several years afterwards in Elphinstone's great work on Kabul. After spending about a year in Calcutta arranging the report of his mission, Elphinstone was appointed in 1811 to the important and difficult post of resident at Poona. The difficulty arose from the general complication of Mahratta politics, and especially from the weak and treacherous character of the peshwa, which Elphinstone rightly read from the first. While the mask of friendship was kept up Elphinstone carried out the only suitable policy, that of vigilant quiescence, with admirable tact and patience; when in 1817 the mask was thrown aside and the peshwa ventured to declare war, the English resident proved for the second time the truth of Wellesley's assertion that he was born a soldier. Though his own account of his share in the campaign is characteristically modest, one can gather from it that the success of the British troops was chiefly owing to his assuming the command at an important crisis during the battle of Kirkee.

The peshwa being driven from his throne, his territories were annexed to the British dominions, and Elphinstone was nominated commissioner to administer them. He discharged the responsible task with rare judgment and ability. In 1819 he was appointed lieutenant-governor of Bombay and held this post till 1827, his principal achievement being the compilation of the "Elphinstone code." He may fairly be regarded as the founder of the system of state education in India, and he probably did more than any other Indian administrator to further every likely scheme for the promotion of native education. His connexion with the Bombay presidency was appropriately commemorated in the endowment of the Elphinstone College by the native communities, and in the erection of a marble statue by the European inhabitants.

Returning to England in 1829, after an interval of two years' travel, Elphinstone retained in his retirement and enfeebled health an important influence on public affairs. He twice refused the offer of the governor-generalship of India. Long before his return he had made his reputation as an author by his *Account of the Kingdom of Cabul and its Dependencies in Persia and India* (1815) Soon after his arrival in England he commenced the preparation of a work of wider scope, a history of India, which was published in 1841. It embraces the Hindu and Mahommedan periods, and is still a work of high authority. He died on the 20th of November 1859.

See J. S. Cotton, *Mountstuart Elphinstone* ("Rulers of India" series), (1892); T. E. Colebrooke, *Life of Mountstuart Elphinstone* (1884); and G. W. Forrest, *Official Writings of Mountstuart Elphinstone* (1884).

ELPHINSTONE, WILLIAM (1431–1514), Scottish statesman and prelate, founder of the university of Aberdeen, was born in Glasgow, and educated at the university of his native city, taking the degree of M.A. in 1452. After practising for a short time as a lawyer in the church courts, he was ordained priest, becoming rector of St Michael's church, Trongate, Glasgow, in 1465. Four years later he went to continue his studies at the university of Paris, where he became reader in canon law, and then, proceeding to Orleans, became lecturer in the university there. Before 1474 he had returned to Scotland, and was made rector of the university, and official of the see of Glasgow. Further promotion followed, but soon more important duties were entrusted to Elphinstone, who was made bishop of Ross in 1481. He was a member of the Scots parliament, and was sent by King James III. on diplomatic errands to Louis XI. of France, and to Edward IV. of England; in 1483 he was appointed bishop of Aberdeen, although his consecration was delayed for four years; and he was sent on missions to England, both before and after the death of Richard III. in 1485. Although he attended the meetings of parliament with great regularity he did not neglect his episcopal duties, and the fabric of the cathedral of Aberdeen owes much to his care. Early in 1488 the bishop was made lord high chancellor, but on the king's death in the following June he vacated this office, and retired to Aberdeen. As a diplomatist of repute, however, his services were quickly required by the new king, James IV., in whose interests he visited the kings of England and France, and the German king, Maximilian I. Having been made keeper of the privy seal in 1492, and having arranged a dispute between the Scotch and the Dutch, the bishop's concluding years were mainly spent in the foundation of the university of Aberdeen. The papal bull for this purpose was obtained in 1494, and the royal charter which made old Aberdeen the seat of a university is dated 1498. A small endowment was provided by the king, and the university, modelled on that of Paris and intended principally to be a school of law, soon became the most famous and popular of the Scots seats of learning, a result which was largely due to the wide experience and ripe wisdom of Elphinstone and of his friend, Hector Boece, the first rector. The building of the college of the Holy Virgin in Nativity, now King's College, was completed in 1506, and the bishop also rebuilt the choir of his cathedral, and built a bridge over the Dee. Continuing to participate in public affairs he opposed the policy of hostility towards England which led to the disaster at Flodden in September 1513, and died in Edinburgh on the 25th of October 1514. Elphinstone was partly responsible for the introduction of printing into Scotland, and for the production of the *Breviarium Aberdonense*. He may have written some of the lives in this collection, and gathered together materials concerning the history of Scotland; but he did not, as some have thought, continue the *Scotichronicon*, nor did he write the *Lives of Scottish Saints*.

See Hector Boece, *Murthlacensium et Aberdonensium episcoporum vitae*, edited and translated by J. Moir (Aberdeen, 1894); *Fasti Aberdonenses*, edited by C. Innes (Aberdeen, 1854); and A. Gardyne, *Theatre of Scottish Worthies and Lyf of W. Elphinston*, edited by D. Laing (Aberdeen, 1878).

EL RENO, a city and the county-seat of Canadian county, Oklahoma, U.S.A., on the N. fork of the Canadian river, about 26 m. W. of Oklahoma City. Pop. (1890) 285; (1900) 3383; (1907) 5370 (401 were of negro descent and 7 were Indians); (1910) 7872. It is served by the Chicago, Rock Island & Pacific, the Choctaw, Oklahoma & Gulf (owned by the Chicago, Rock Island & Pacific), and the St Louis, El Reno & Western railways, the last extending from El Reno to Guthrie. El Reno lies on the rolling prairie lands, about 1360 ft. above the sea, in an Indian corn, wheat, oats and cotton-producing and dairying region, and has a large grain elevator, a cotton compress, and various manufacturing establishments, among the products being flour, canned goods and crockery. El Reno has a Carnegie library, and within the city's limits is Bellamy's Lake (180 acres), a favourite resort. Near the city is a Government boarding school for the Indians of the Cheyenne and the Arapahoe Reservation. Fort Reno, a U.S. military post, was established near El Reno in 1876, and in 1908 became a supply depot of the quartermaster's department under the name of "Fort Reno Remount Depot." The first settlement here, apart from the fort, was made in the autumn of 1889; in 1892 El Reno received a city charter.

ELSFLETH, a maritime town of Germany, in the grand-duchy of Oldenburg, in a fertile district at the confluence of the Hunte with the Weser, on the railway Hude-Nordenham. Pop. 2000. It has an Evangelical church, a school of navigation, a harbour and docks. It has considerable trade in corn and timber and is one of the centres of the North Sea herring fishery.

ELSINORE (Dan. *Helsingör*), a seaport of Denmark in the *amt* (county) of Frederiksborg, on the east coast of the island of Zealand, 28 m. N. of Copenhagen by rail. Pop. (1901) 13,902. It stands at the narrowest part of the Sound, opposite the Swedish town of Helsingborg, 3 m. distant. Communication is maintained by means of a steam ferry. Its harbour admits vessels of 20 ft. draught, and the roadstead affords excellent anchorage. There are shipbuilding yards, with foundry, engineering shops, &c.; the chief export is agricultural produce; imports, iron, coal, cereals and yarn. Helsingör received town-privileges in 1425. In 1522 it was taken and burnt by Lübeck, but in 1535 was retaken by Christian II. It is celebrated as the Elsinore of Shakespeare's tragedy of *Hamlet*, and was the birthplace of Saxo Grammaticus, from whose history the story of Hamlet is derived. A pile of rocks surrounded by trees is shown as the grave of Hamlet, and Ophelia's brook is also pointed out, but both are, of course, inventions. On a tongue of land east of the town stands the castle of Kronberg or Kronenberg, a magnificent, solid and venerable Gothic structure built by Frederick II. towards the end of the 16th century, and extensively restored by Christian IV. after a fire in 1637. It was taken by the Swedes in 1658, but its possession was again given up to the Danes in 1660. From its turrets, one of which serves as a lighthouse, there are fine views of the straits and of the neighbouring countries. The Flag Battery is the "platform before the castle" where the ghost appears in *Hamlet*. Within it the principal object of interest is the apartment in which Matilda, queen of Christian VII. and sister of George III. of England, was imprisoned before she was taken to Hanover. The chapel contains fine wood-carving of the 17th century. North-west of the town is Marienlyst, originally a royal château, but now a seaside resort.

ELSSLER, FANNY (1810–1884), Austrian dancer, was born in Vienna on the 23rd of June 1810. From her earliest years she was trained for the ballet, and made her appearance at the Kärntner-Thor theatre in Vienna before she was seven. She almost invariably danced with her sister Theresa, who was two years her senior; and, after some years' experience together in Vienna, the two went in 1827 to Naples. Their success there—to which Fanny contributed more largely than her sister, who used to efface herself in order to heighten the effect of Fanny's more brilliant powers—led to an engagement in Berlin in 1830. This was the beginning of a series of triumphs for Fanny's personal beauty and skill in dancing. After captivating all hearts in Berlin and Vienna, and inspiring the aged statesman Friedrich von Gentz (*q.v.*) with a remarkable passion, she paid a visit to London, where she received much kindness at the hands of Mr and Mrs Grote, who practically adopted the little girl who was born three months after the mother's arrival in England. In September 1834 Fanny Elssler appeared at the Opera in Paris, a step to which she looked forward with much misgiving on account of Taglioni's supremacy on that stage. The result, however, was another triumph for her, and the temporary eclipse of Taglioni, who, although the finer artist of the two, could not for the moment compete with the newcomer's personal fascination. It was conspicuously in her performance of the Spanish *cachuca* that Fanny Elssler outshone all rivals. In 1840 she sailed with her sister for New York, and after two years' unmixed success they returned to Europe, where during the following five years Fanny appeared in Germany, Austria, France, England and Russia. In 1845, having amassed a fortune, she retired from the stage and settled near Hamburg. A few years later her sister Theresa contracted a morganatic marriage with Prince Adalbert of Prussia, and was ennobled under the title of Baroness von Barnim. Fanny Elssler died at Vienna on the 27th of November 1884. Theresa was left a widow in 1873, and died on the 19th of November 1878.

ELSTER, the name of two rivers of Germany. (1) The Schwarze (Black) Elster rises in the Lausitz range, on the southern border of Saxony, flows N. and N.W., and after a course of 112 m. enters the Elbe a little above Wittenberg. It is a sluggish stream, winding its way through sandy soil and frequently along a divided channel. (2) The Weisse (White) Elster rises in the north-western corner of Bohemia, a little north of Eger, cuts through the Vogtland in a deep and picturesque valley, passing Plauen, Greiz, Gera and Zeitz on its way north to Leipzig, just below which city it receives its most important tributary, the Pleisse. At Leipzig it divides, the main stream turning north-west and entering the Saale from the right a little above Halle; the other arm, the Luppe, flowing parallel to the main stream and south of it enters the Saale below Merseburg. Total length, 121 m.; total descent, 1286 ft.

ELSTER, a spa and inland atering-place of Germany, in the kingdom of Saxony, on the Weisse Elster, close to the Bohemian frontier on the railway Plauen-Eger, and 20 m. S. of the former. It has some industries of lace-making and weaving, and a population of about 2000, in addition to visitors. The mineral springs, saline-chalybeate, specific in cases of nervous disorders and feminine ailments, have been lately supplemented by baths of various kinds, and these, together with the natural attractions of the place as a climatic health resort, have combined to make it a fashionable watering-place during the summer season. The number of visitors amounts annually to about 10,000.

See Flechsig, *Bad Elster* (Leipzig, 1884).

ELSWICK, a ward of the city of Newcastle-upon-Tyne, England, in the western part of the borough, bordering the river Tyne. The name is well known in connexion with the great ordnance and naval works of Sir W. G. Armstrong, Mitchell & Co. Elswick Park, attached to the old mansion of the same name, is now a public recreation ground.

EL TEB, a halting-place in the Anglo-Egyptian Sudan near the coast of the Red Sea, 9 m. S.W. of the port of Trinkitat on the road to Tokar. At El Teb, on the 4th of February 1884, a heterogeneous force under General Valentine Baker, marching to the relief of the Egyptian garrison of Tokar, was completely routed by the Mahdists (see Egypt: *Military Operations*).

ELTON, CHARLES ISAAC (1839–1900), English lawyer and antiquary, was born at Southampton on the 6th of December 1839. Educated at Cheltenham and Balliol College, Oxford, he was elected a fellow of Queen's College in 1862. He was called to the bar at Lincoln's Inn in 1865. His remarkable knowledge of old real property law and custom helped him to an extensive conveyancing practice and he took silk in 1885. He sat in the House of Commons for West Somerset in 1884–1885 and from 1886 to 1892. In 1869 he succeeded to his uncle's property of Whitestaunton, near Chard, in Somerset. During the later years of his life he retired to a great extent from legal practice, and devoted much of his time to literary work. He died at Whitestaunton on the 23rd of April 1900. Elton's principal works were *The Tenures of Kent* (1867); *Treatise on Commons and Waste Lands* (1868); *Law of Copyholds* (1874); *Origins of English History* (1882); *Custom and Tenant Right* (1882).

ELTVILLE (Elfeld), a town of Germany, in the Prussian province of Hesse-Nassau, on the right bank of the Rhine, 5 m. S.W. from Wiesbaden, on the railway Frankfort-on-Main-Cologne, and with a branch to Schlangenbad. Pop. 3700. It has a Roman Catholic and a Protestant church, ruins of a feudal castle, a Latin school, and a monument to Gutenberg. It has a considerable trade in the wines of the district and two manufactories of sparkling wines. Eltville (originally *Adeldvile*, Lat. *Altavilla*) is first mentioned in a record of the year 882. It was given by the emperor Otto I. to the archbishops of Mainz, who often resided here. It received town rights in 1331 and was a place of importance during the middle ages. In 1465 Gutenberg set up his press at Eltville, under the patronage of Archbishop Adolphus of Nassau, shortly afterwards handing over its use to the brothers Heinrich and Nikolaus Bechtermünz. Several costly early examples of printed books issued by this press survive, the earliest being the *Vocabularium Latino-Teutonicum*, first printed in 1467.

ELTZ, a small river of Germany, a left bank tributary of the Mosel. It rises in the Eifel range, and, after a course of 5 m., joins the latter river at Moselkern. Just above its confluence stands the romantic castle of Eltz, crowning a rocky summit 900 ft. high, and famous as being one of the best preserved medieval strongholds of Germany. It is the ancestral seat of the counts of Eltz and contains numerous antiquities.

See Roth, *Geschichte der Herren und Grafen zu Eltz* (2 vols., Mainz, 1889–1890).

ELVAS, an episcopal city and frontier fortress of Portugal, in the district of Portalegre and formerly included in the province of Alemtejo; 170 m. E. of Lisbon, and 10 m. W. of the Spanish fortress of Badajoz, by the Madrid-Badajoz-Lisbon railway. Pop. (1900) 13,981. Elvas is finely situated on a hill 5 m. N.W. of the river Guadiana. It is defended by seven bastions and the two forts of Santa Luzia and Nossa Senhora da Graça. Its late Gothic cathedral, which has also many traces of Moorish influence in its architecture, dates from the reign of Emmanuel I. (1495–1521). A fine aqueduct, 4 m. long, supplies the city with pure water; it was begun early in the 15th century and completed in 1622. For some distance it includes four tiers of superimposed arches, with a total height of 120 ft. The surrounding lowlands are very fertile, and Elvas is celebrated for its excellent olives and plums, the last-named being exported, either fresh or dried, in large quantities. Brandy is distilled and pottery manufactured in the city. The fortress of Campo Maior, 10 m. N.E., is famous for its siege by the French and relief by the British under Marshal Beresford in 1811—an exploit commemorated in a ballad by Sir Walter Scott.

Elvas is the Roman *Alpesa* or *Helvas*, the Moorish *Balesh*, the Spanish *Yelves*. It was wrested from the Moors by Alphonso VIII. of Castile in 1166; but was temporarily recaptured before its final occupation by the Portuguese in 1226. In 1570 it became an episcopal see. From 1642 until modern times it was the chief frontier fortress S. of the Tagus; and it twice withstood sieges by the Spanish, in 1658 and 1711. The French under Marshal Junot took it in March 1808, but evacuated it in August, after the conclusion of the convention of Cintra (see PENINSULAR WAR).

ELVEY, SIR GEORGE JOB (1816–1893), English organist and composer, was born at Canterbury on the 27th of March 1816. He was a chorister at Canterbury cathedral under Highmore Skeats, the organist. Subsequently he became a pupil of his elder brother, Stephen, and then studied at the Royal Academy of Music under Cipriani Potter and Dr Crotch. In 1834 he gained the Gresham prize medal for his anthem, "Bow down thine ear," and in 1835 was appointed organist of St George's chapel, Windsor, a post he filled for 47 years, retiring in 1882. He took the degree of Mus.B. at Oxford in 1838, and in 1840 that of Mus.D. Anthems of his were commissioned for the Three Choirs Festivals of 1853 and 1857, and in 1871 he received the honour of knighthood. He died at Windlesham in Surrey on the 9th of December 1893. His works, which are nearly all for the Church, include two oratorios, a great number of anthems and services, and some pieces for the organ. A memoir of him, by his widow, was published in 1894.

ELVIRA, SYNOD OF, an ecclesiastical synod held in Spain, the date of which cannot be determined with exactness. The solution of the question hinges upon the interpretation of the canons, that is, upon whether they are to be taken as reflecting a recent, or as pointing to an imminent, persecution. Thus some argue for a date between 300 and 303, *i.e.* before the Diocletian persecution; others for a date between 303 and 314, after the persecution, but before the synod of Arles; still others for a date between the synod of Arles and the council of Nicaea, 325. Mansi, Hardouin, Hefele and Dale are in substantial agreement upon 305 or 306, and this is probably the closest approximation possible in the present state of the evidence. The place of meeting, Elvira, was not far from the modern Granada, if not, as Dale thinks, actually identical with it. There the nineteen bishops and twenty-four presbyters, from all parts of Spain, but chiefly from the south, assembled, probably at the instigation of Hosius of Cordova, but under the presidency of Felix of Accis, with a view to restoring order and discipline in the church. The eighty-one canons which were adopted reflect with considerable fulness the internal life and external relations of the Spanish Church of the 4th century. The social environment of Christians may be inferred from the canons prohibiting marriage and other intercourse with Jews, pagans and heretics, closing the offices of *flamen* and *duumvir* to Christians, forbidding all contact with idolatry and likewise participation in pagan festivals and public games. The state of morals is mirrored in the canons denouncing prevalent vices. The canons respecting the clergy exhibit the clergy as already a special class with peculiar privileges, a more exacting moral standard, heavier penalties for delinquency. The bishop has acquired control of the sacraments, presbyters and deacons acting only under his orders; the episcopate appears as a unit, bishops being bound to respect one another's disciplinary decrees. Worthy of special note are canon 33, enjoining celibacy upon all clerics and all who minister at the altar (the most ancient canon of celibacy); canon 36, forbidding pictures in churches; canon 38, permitting lay baptism under certain conditions; and canon 53, forbidding one bishop to restore a person excommunicated by another.

See Mansi ii. pp. 1-406; Hardouin i. pp. 247-258; Hefele (2nd ed.) i. pp. 148 sqq. (English translation, i. pp. 131 sqq.); Dale, *The Synod of Elvira* (London, 1882); and Hennecke, in Herzog-Hauck, *Realencyklopädie* (3rd ed.), s.v. "Elvira," especially bibliography. (T. F. C.)

EL WAD, a town in the Algerian Sahara, 125 m. in a straight line S.S.E. of Biskra, and 190 m. W. by S. of Gabes. Pop. (1906) 7586. El Wad is one of the most interesting places in Algeria. It is surrounded by huge hollows containing noble palm groves; and beyond these on every side stretches the limitless desert with its great billows of sand, the encroachments of which on the oasis are only held at bay by ceaseless toil. The town itself consists of a mass of one-storeyed stone houses, each surmounted by a little dome, clustering round the market-place with its mosque and minaret. By an exception rare in Saharan settlements, there are no defensive works save the fort containing the government offices, which the French have built on the south side of the town. The inhabitants are of two distinct tribes, one, the Aduan, of Berber stock, the other a branch of the Sha'ambah Arabs. El Wad possesses a curious currency known as *flous*, consisting of obsolete copper coins of Algerian and Tunisian dynasties. Seven flous are regarded as equal to the French five-centime piece.

El Wad oasis is one of a group known collectively as the Suf. Five miles N.W. is Kuinine (pop. 3541) and 6 m. farther N.W. Guemar (pop. 6885), an ancient fortified town noted for its manufacture of carpets. Linen weaving is carried on extensively in the Suf. Administratively El Wad is the capital of an annexe to the territory of Tuggurt.

ELWOOD, a city of Madison county, Indiana, U.S.A., on Duck Creek, about 38 m. N.E. of Indianapolis. Pop. (1880) 751; (1890) 2284; (1900) 12,950 (1386 foreign-born); (1910) 11,028. Elwood is served by the Lake Erie & Western and the Pittsburg, Cincinnati, Chicago & St Louis railways, and by an interurban electric line. Its rapid growth in population and as a manufacturing centre was due largely to its situation in the natural gas region; the failure of the gas supply in 1903 caused a decrease in manufacturing, but the city gradually adjusted itself to new conditions. It has large tin plate mills, iron and steel foundries, saw and planing mills, wooden-ware and furniture factories, bottling works and lamp-chimney factories, flour mills and packing houses. In 1905 the value of the city's factory product was $6,111,083; in 1900 it was $9,433,513; the glass product was valued at $223,766 in 1905, and at $1,011,803 in 1900. There are extensive brick-yards in the vicinity, and the surrounding agricultural country furnishes large supplies of grain, live-stock, poultry and produce, for which Elwood is the shipping centre. The site was first settled under the name of Quincy; the present name was adopted in 1869; and in 1891 Elwood received a city charter.

ELY, RICHARD THEODORE (1854–), American economist, was born at Ripley, New York, on the 13th of April 1854. Educated at Columbia and Heidelberg universities, he held the professorship of economics at Johns Hopkins University from 1881 to 1892, and was subsequently professor of economics at Wisconsin University. Professor Ely took an active part in the formation of the American Economic Association, was secretary from 1885 to 1892 and president from 1899 to 1901. He published a useful *Introduction to Political Economy* (1889); *Outlines of Economics* (1893); *The Labour Movement in America* (1883); *Problems of To-day* (1888); *Social Aspects of Christianity* (1889); *Socialism and Social Reform* (1894); *Monopolies and Trusts* (1900), and *Studies in the Evolution of Industrial Society* (1903).

ELY, a cathedral city and market-town, in the Newmarket parliamentary division of Cambridgeshire, England, 16 m. N.N.E. of Cambridge by the Great Eastern railway. Pop. of urban district (1901) 7713. It stands on a considerable eminence on the west (left) bank of the Ouse, in the Isle of Ely, which rises above the surrounding fens. Thus its situation, before the great drainage operations of the 17th century, was practically insular. The magnificent cathedral, towering above the town, is a landmark far over the wide surrounding level. The soil in the vicinity is fertile and market-gardening is carried on, fruit and vegetables (especially asparagus) being sent to the London markets. The town has a considerable manufacture of tobacco pipes and earthenware, and there are in the neighbourhood mills for the preparation of oil from flax, hemp and coleseed. Besides the cathedral Ely has in St Mary's church, lying almost under the shadow of the greater building, a fine structure ranging in style from Norman to Perpendicular, but in the main Early English. The sessions house and corn exchange are the principal public buildings. The grammar school, founded by Henry VIII. in 1541, occupies (together with other buildings) the room over the gateway of the monastery, known as the Porta, and the chapel built by Prior John de Crandon (1321–1341) is restored to use as a school chapel. A theological college was founded in 1876 and opened in 1881.

The foundation of the present cathedral was laid by its first Norman abbot, Simeon, in 1083. But the reputation of Ely had been established long before Etheldreda (Æthelthryth), daughter of Anna, king of East Anglia, was married to Ecgfrith, king of Northumbria, against her will, as she had vowed herself wholly to a religious life. Her husband opposed himself to her vow, but with the help of Wilfrid, archbishop of York, she took the veil, and found refuge from her husband in the marsh-girt Isle of Ely. Here she founded a religious house, in all probability a mixed community, in 673, becoming its first abbess, and giving the whole Isle of Ely to the foundation. In 870 the monastery was destroyed by the Danes, as were also the neighbouring foundations at Soham, Thorney, Crowland and Peterborough, and it remained in ruins till 970, when Æthelwold, bishop of Winchester, founded a new Benedictine monastery here. King Edgar in 970 endowed the monks with the former possessions of the convent and also granted them the secular causes of two hundreds within and of five hundreds without the marshes, all charges belonging to the king in secular disputes in all their lands and every fourth penny of public revenue in the province of Grantecestre. The wealth and importance of Ely rose, and its abbots held the post of chancellors of the king's court alternately with the abbots of Glastonbury and of St Augustine's, Canterbury. But Ely again became a scene of contest in the desperate final struggle against William the Conqueror of which Hereward "the Wake" was the hero. Finally, in 1071, the monks agreed to surrender the Isle of Ely to the king on condition of the confirmation of all the possessions and privileges, held by them in the time of Edward the Confessor. Abbot Simeon (1081–1094), who now began the reconstruction of the church, was related to William and brother to Walkelin, first Norman bishop of Winchester. Under Abbot Richard (1100–1107) the translation from the Saxon church of the bodies of St Etheldreda and of the two abbesses who had followed her, and their enshrinement in the new edifice, took place; and it was due to the honour in which the memory of the foundresses was held that Ely maintained the position of dignity which it kept henceforth until the dissolution of the monasteries. The feast of St Etheldreda, or St Awdrey as she was generally called, was the occasion every year for a large fair here, at which "trifling objects" were sold to pilgrims by way of souvenirs; whence the word "tawdrey," a contraction of St Awdrey. In 1109 the Isle of Ely, most of Cambridgeshire, and the abbeys of Thorney and Cetricht were separated from the diocese of Lincoln, and converted into a new diocese, Ely being the seat of the bishopric, and after the dissolution of the monasteries Henry VIII. converted the conventual church into a cathedral (1541). The diocese is extensive. It covers nearly the whole of Cambridgeshire, Huntingdonshire and Bedfordshire, part of Suffolk, and small portions of Essex, Norfolk, Northamptonshire, Hertfordshire and Buckinghamshire.

The cathedral is a cruciform structure, 537 ft. long and 190 ft. across the great transepts (exterior measurements). A relic of the Saxon foundation is preserved in the cross of St Osyth (*c.* 670), and a pre-Norman window is kept in the triforium, having been dug up near the cathedral. Of the work of the first two Norman abbots all that remains is the early Norman lower storey of the main transept. The foundations of Abbot Simeon's apse were discovered below the present choir. The nave, which is Norman throughout, is 208 ft. in length, 72 ft. 9 in. to the top of the walls, and 77 ft. 3 in. broad, including the aisles. The upper parts of the western tower and the transept were begun by Bishop Geoffrey Ridel (d. 1189), and continued by his successor William Longchamp, chancellor of England. The tower, which is 215 ft. high, is surmounted by a Decorated octagon with partly detached side turrets, and underwent alteration and strengthening in the Perpendicular period. The north-western transept wing is in ruins; it is not known when it fell. The Galilee, or western porch, by which the cathedral is entered, is the work of Bishop Eustace (d. 1215), and is a perfect example of Early English style. In 1322 the Norman central tower, erected by Abbot Simeon, fell. Alan of Walsingham, sacrist of the church, designed its restoration in the form of the present octagon, a beautiful and unique conception. Instead of the ordinary four-arched central crossing, an octagon is formed at the crossing, the arches of the nave aisles and choir aisles being set obliquely. Both without and within, the octagon is the principal feature in the unusual general appearance of the cathedral, which gives it a peculiar eminence among English churches. The octagon was completed in 1328, and upon the ribbed vaulting of wood above it rose the lofty lantern, octagonal also, with its angles set opposite those of the octagon below. The total height of the structure is 170 ft. 7 in. Alan of Walsingham was further employed by Bishop John of Hotham (d. 1337) as architect of the Lady chapel, a beautiful example of Decorated work, which served from 1566 onward as a parish church. Of the seven bays of the choir the four easternmost, as well as the two beyond forming the retrochoir, were built by Bishop Hugh of Northwold (d. 1254). The three western bays were destroyed by the fall of the tower in 1321, and were rebuilt by Alan of Walsingham. The earlier portion is a superb example of Early English work, while the later is perhaps the best example of pure Decorated in England. The wooden canopies of the choir stalls are Decorated (1337) and very elaborate. The Perpendicular style is represented by windows and certain other details, including supporting arches to the western tower. There are also some splendid chantry chapels and tombs in this style—the chapels of Bishop John Alcock (d. 1500) and Bishop Nicolas West (d. 1534), in the north and south choir aisles respectively, are completely covered with the most delicate ornamentation; while the tomb of Bishop Richard Redman (d. 1505) has a remarkably beautiful canopy. Among earlier monuments the canopied tomb of Bishop William de Luda (1290–1298) and the finely-carved effigy of Bishop Northwold (1254) are notable. Between 1845 and 1884 the cathedral underwent restoration under the direction of Sir Gilbert Scott. The work included the erection of the modern reredos and choir-screen, both designed by Scott, and the painting of the nave roof by Styleman le Strange (d. 1862), who was succeeded by Gambier Parry. Parry also richly ornamented the octagon and lantern in the style of the 14th century.

Remains of the monastic buildings are fragmentary but numerous. Mention has been made of the Ely "Porta" or gateway (1396), which is occupied by the grammar school, and of Prior John de Cranden's beautiful little Decorated chapel. But many of the remains, the bulk of which are incorporated in the deanery and canons' and other residences to the south of the cathedral, are of much earlier date. Thus the fine early Norman undercroft of the prior's hall is probably of the time of Abbot Simeon. Another notable fragment is the transitional Norman chancel of the infirmary chapel. The remnants of the cloisters show a reconstruction in the 15th century, but the prior's and monks' doorways from the cloisters into the cathedral are highly decorated late Norman. The bishop's palace to the west of the cathedral has towers erected by Bishop Alcock at the close of the 15th century. In the muniment room of the chapter is preserved, among many ancient documents of great interest, the *liber Eliensis*, a history of the monastery by the monk known as Thomas of Ely (d. *c.* 1174), of which the first part, which extends to the year 960, contains a life of St Etheldreda, while the second is continued to the year 1107.

Ely, which according to Bede (*Hist. eccl.* iv. 19) derives its name from the quantity of eels in the waters about it (A.S. *æl*, eel, *-ig*, island), was a borough by prescription at least as early as the reign of William the Conqueror. It owed its importance entirely to the monastery, and for a long time the abbot and afterwards the bishop had almost absolute power in the town. The bailiff who governed the town was chosen by the bishop until 1850, when a local board was appointed. Richard I.

granted the bishop of Ely a fair there, and in 1319–1320 John of Hotham, a later bishop, received licence to hold a fair on the vigil and day of Ascension and for twenty days following. The markets are claimed by an undated charter by the bishop, who also continues to hold the fairs. In 1295 Ely sent two members to parliament, but has never been represented since.

See C. W. Stubbs, *Ely Cathedral* (London, 1897); *Victoria County History, Cambridgeshire.*

ELYOT, SIR THOMAS (*c.* 1490–1546), English diplomatist and scholar. His father, Sir Richard Elyot (d. 1522), who held considerable estates in Wiltshire, was made (1503) serjeant-at-law and attorney-general to the queen consort, and soon afterwards was commissioned to act as justice of assize on the western circuit, becoming in 1513 judge of common pleas. Thomas was the son of his first marriage with Alice Fynderne, but neither the date nor place of his birth is accurately known. Anthony à Wood claimed him as an *alumnus* of St Mary Hall, Oxford, while C. H. Cooper in the *Athenae Cantabrigienses* put in a claim for Jesus College, Cambridge. Elyot himself says in the preface to his *Dictionary* that he was educated under the paternal roof, and was from the age of twelve his own tutor. He supplies, in the introduction to his *Castell of Helth*, a list of the authors he had read in philosophy and medicine, adding that a "worshipful physician" read to him Galen and some other authors. In 1511 he accompanied his father on the western circuit as clerk to the assize, and he held this position until 1528. In addition to his father's lands in Wiltshire and Oxfordshire he inherited in 1523 the Cambridge estates of his cousin, Thomas Fynderne. His title was disputed, but Wolsey decided in his favour, and also made him clerk of the privy council. Elyot, in a letter addressed to Thomas Cromwell, says that he never received the emoluments of this office, while the barren honour of knighthood conferred on him when he was displaced in 1530 merely put him to further expense. In that year he sat on the commission appointed to inquire into the Cambridgeshire estates of his former patron, Cardinal Wolsey. He married Margaret Barrow, who is described (Stapleton, *Vita Thomae Mori*, p. 59, ed. 1558) as a student in the "school" of Sir Thomas More.

In 1531 he produced the *Boke named the Governour*, dedicated to King Henry VIII. The work advanced him in the king's favour, and in the close of the year he received instructions to proceed to the court of the emperor Charles V. to induce him to take a more favourable view of Henry's projected divorce from Catherine of Aragon. With this was combined another commission, on which one of the king's agents, Stephen Vaughan, was already engaged. He was, if possible, to apprehend William Tyndale. It is probable that Elyot was suspected, as Vaughan certainly was, of lukewarmness in carrying out the king's wishes, but this has not prevented his being much abused by Protestant writers. As ambassador Elyot had been involved in ruinous expense, and on his return he wrote to Thomas Cromwell, begging to be excused from serving as sheriff of Cambridgeshire and Huntingdonshire, on the score of his poverty. The request was not granted. He was one of the commissioners in the inquiry instituted by Cromwell prior to the suppression of the monasteries, but he did not obtain any share of the spoils. There is little doubt that his known friendship for Thomas More militated against his chances of success, for in a letter addressed to Cromwell he admitted his friendship for More, but protested that he rated higher his duty to the king. William Roper, in his *Life* of More, says that Elyot was on a second embassy to Charles V., in the winter of 1535–1536, when he received at Naples the news of More's execution. He had been kept in the dark by his own government, but heard the news from the emperor. The story of an earlier embassy to Rome (1532), mentioned by Burnet, rests on a late endorsement of instructions dated from that year, which cannot be regarded as authoritative. In 1542 he represented the borough of Cambridge in parliament. He had purchased from Cromwell the manor of Carleton in Cambridgeshire, where he died on the 26th of March 1546.

Sir Thomas Elyot received little reward for his services to the state, but his scholarship and his books were held in high esteem by his contemporaries. The *Boke named the Governour* was printed by Thomas Berthelet (1531, 1534, 1536, 1544, &c.). It is a treatise on moral philosophy, intended to direct the education of those destined to fill high positions, and to inculcate those moral principles which alone could fit them for the performance of their duties. The subject was a favourite one in the 16th century, and the book, which contained many citations from classical authors, was very popular. Elyot expressly acknowledges his obligations to Erasmus's *Institutio Principis Christiani*; but he makes no reference to the *De regno et regis institutione* of Francesco Patrizzi (d. 1494), bishop of Gaeta, on which his work was undoubtedly modelled. As a prose writer, Elyot enriched the English language with many new words. In 1534 he published *The Castell of Helth*, a popular treatise on medicine, intended to place a scientific knowledge of the art within the reach of those unacquainted with Greek. This work, though scoffed at by the faculty, was appreciated by the general public, and speedily went through many editions. His Latin *Dictionary*, the earliest comprehensive dictionary of the language, was completed in 1538. The copy of the first edition in the British Museum contains an autograph letter from Elyot to Thomas Cromwell, to whom it originally belonged. It was edited and enlarged in 1548 by Thomas Cooper, bishop of Winchester, who called it *Bibliotheca Eliotae*, and it formed the basis in 1565 of Cooper's *Thesaurus linguae Romanae et Britannicae.*

Elyot's translations include:—The *Doctrinal of Princes* (1534), from Isocrates; *Cyprianus, A Swete and Devoute Sermon of Holy Saynt Ciprian of the Mortalitie of Man* (1534); *Rules of a Christian Life* (1534), from Pico della Mirandola; *The Education or Bringing up of Children* (*c.* 1535), from Plutarch; and *Howe one may take Profite of his Enymes* (1535), from the same author is generally attributed to him. He also wrote: *The Knowledge which maketh a Wise Man* and *Pasquyll the Playne* (1533); *The Bankette of Sapience* (1534), a collection of moral sayings; *Preservative agaynste Deth* (1545), which contains many quotations from the Fathers; *Defence of Good Women* (1545). His *Image of Governance, compiled of the Actes and Sentences notable of the most noble Emperor Alexander Severus* (1540) professed to be a translation from a Greek MS. of the emperor's secretary Encolpius (or Eucolpius, as Elyot calls him), which had been lent him by a gentleman of Naples, called Pudericus, who asked to have it back before the translation was complete. In these circumstances Elyot, as he asserts in his preface, supplied the other maxims from different sources. He was violently assailed by Humphrey Hody and later by William Wotton for putting forward a pseudo-translation; but Mr H. H. S. Croft has discovered that there was a Neapolitan gentleman at that time bearing the name of Poderico, or, Latinized, Pudericus, with whom Elyot may well have been acquainted. Roger Ascham mentions his *De rebus memorabilibus Angliae*; and Webbe quotes a few lines of a lost translation of the *Ars poëtica* of Horace.

A learned edition of the *Governour* (2 vols., 1880), by H. H. S. Croft, contains, besides copious notes, a valuable glossary of 16th century English words.

ELYRIA, a city and the county-seat of Lorain county, Ohio, U.S.A., on the Black river, 8 m. from Lake Erie, and about 25 m. W.S.W. of Cleveland. Pop. (1890) 5611; (1900) 8791, of whom 1397 were foreign-born; (1910 census) 14,825. It is served by the Baltimore & Ohio, and the Lake Shore & Michigan Southern railways. Elyria is about 720 ft. above sea-level, and lies at the junction of the two forks of the Black river, each of which falls about 50 ft. here, furnishing water-power. Among the city's manufactures are oxide of tin and other chemicals, iron and steel, leather goods, automobiles and bicycles, electrical and telephone supplies, butted tubing, gas engines, screws and bolts, silk, lace and hosiery. In 1905 the city's factory products were valued at $2,933,450—140.2% more than their value in 1900. Flagging, building-stones and grindstones, taken from quarries in the vicinity (known as the Berea Grit quarries), are shipped from Elyria in large quantities. Elyria was founded about 1819 by Heman Ely, in whose honour it was named; it was selected as the site for the county seat in 1823, and was chartered as a city in 1892.

ELYSIUM, in Greek mythology, the Elysian fields, the abode of the righteous after their removal from earth. In Homer (*Od.* iv. 563) this region is a plain at the farthest end of the earth on the banks of the river Oceanus, where the fair-haired

Rhadamanthys rules, and where the people are vexed by neither snow nor storm, heat nor cold, the air being always tempered by the zephyr wafted from the ocean. It is no dwelling of the dead nor part of the lower world, but distinguished heroes are translated thither without dying, to live a life of perfect happiness. In Hesiod (*W. and D.* 166) the same description is given of the Islands of the Blessed under the rule of Cronus, which yield three harvests yearly. Here, according to Pindar, Rhadamanthys sits by the side of his father Cronus and administers judgment (*Ol.* ii. 61, *Frag.* 95). All who have successfully gone through a triple probation on earth are admitted to share these blessings. In later accounts (*Aeneid*, vi. 541) Elysium was regarded as part of the underworld, the home of the righteous dead adjudged worthy of it by the tribunal of Minos, Rhadamanthys and Aeacus. Those who had lived evil lives were thrust down into Tartarus, where they suffered endless torments.

ELZE, KARL (1821–1889), German scholar and Shakespearian critic, was born at Dessau on the 22nd of May 1821. Having studied (1839–1843) classical philology, and modern, but especially English, literature at the university of Leipzig, he was a master for a time in the Gymnasium (classical school) at Dessau, and in 1875 was appointed extraordinary, and in 1876 ordinary, professor of English philology at the university of Halle, in which city he died on the 21st of January 1889. Elze began his literary career with the *Englischer Liederschatz* (1851), an anthology of English lyrics, edited for a while a critical periodical *Atlantis*, and in 1857 published an edition of Shakespeare's *Hamlet* with critical notes. He also edited Chapman's *Alphonsus* (1867) and wrote biographies of Walter Scott, Byron and Shakespeare; *Abhandlungen zu Shakespeare* (English translation by D. Schmitz, as *Essays on Shakespeare*, London, 1874), and the excellent treatise, *Notes on Elizabethan Dramatists with conjectural emendations of the text* (3 vols., Halle, 1880–1886, new ed. 1889).

ELZEVIR, the name of a celebrated family of Dutch printers belonging to the 17th century. The original name of the family was Elsevier, or Elzevier, and their French editions mostly retain this name; but in their Latin editions, which are the more numerous, the name is spelt Elzeverius, which was gradually corrupted in English into Elzevir as a generic term for their books. The family originally came from Louvain, and there Louis, who first made the name Elzevir famous, was born in 1540. He learned the business of a bookbinder, and having been compelled in 1580, on account of his Protestantism and his adherence to the cause of the insurgent provinces, to leave his native country, he established himself as bookbinder and bookseller in Leiden. His *Eutropius*, which appeared in 1592, was long regarded as the earliest Elzevir, but the first is now known to be *Drusii Ebraicarum quaestionum ac responsionum libri duo*, which was produced in 1583. In all he published about 150 works. He died on the 4th of February 1617. Of his five sons, Matthieu, Louis, Gilles, Joost and Bonaventure, who all adopted their father's profession, Bonaventure, who was born in 1583, is the most celebrated. He began business as a printer in 1608, and in 1626 took into partnership Abraham, a son of Matthieu, born at Leiden in 1592. Abraham died on the 14th of August 1652, and Bonaventure about a month afterwards. The fame of the Elzevir editions rests chiefly on the works issued by this firm. Their Greek and Hebrew impressions are considered inferior to those of the Aldi and the Estiennes, but their small editions in 12mo, 16mo and 24mo, for elegance of design, neatness, clearness and regularity of type, and beauty of paper, cannot be surpassed. Especially may be mentioned the two editions of the New Testament in Greek (Ἡ *καινὴ διαθήκη*, *Novum Testamentum*, &c.), published in 1624 and 1633, of which the latter is the more beautiful and the more sought after; the *Psalterium Davidis*, 1653; *Virgilii opera*, 1636; *Terentii comediae*, 1635; but the works which gave their press its chief celebrity are their collection of French authors on history and politics in 24mo, known under the name of the *Petites Républiques*, and their series of Latin, French and Italian classics in small 12mo. Jean, son of Abraham, born in 1622, had since 1647 been in partnership with his father and uncle, and when they died Daniel, son of Bonaventure, born in 1626, joined him. Their partnership did not last more than two years, and after its dissolution Jean carried on the business alone till his death in 1661. In 1654 Daniel joined his cousin Louis (the third of that name and son of the second Louis), who was born in 1604, and had established a printing press at Amsterdam in 1638. From 1655 to 1666 they published a series of Latin classics in 8vo, *cum notis variorum*; *Cicero* in 4to; the *Etymologicon linguae Latinae*; and a magnificent *Corpus juris civilis* in folio, 2 vols., 1663. Louis died in 1670, and Daniel in 1680. Besides Bonaventure, another son of Matthieu, Isaac, born in 1593, established a printing press at Leiden, where he carried on business from 1616 to 1625; but none of his editions attained much fame. The last representatives of the Elzevir printers were Peter, grandson of Joost, who from 1667 to 1675 was a bookseller at Utrecht, and printed seven or eight volumes of little consequence; and Abraham, son of the first Abraham, who from 1681 to 1712 was university printer at Leiden.

Some of the Elzevir editions bear no other typographical mark than simply the words *Apud Elzevirios*, or *Ex officina Elzeviriana*, under the *rubrique* of the town. But the majority bear one of their special devices, four of which are recognized as in common use. Louis Elzevir, the founder of the family, usually adopted the arms of the United Provinces, an eagle on a cippus holding in its claws a sheaf of seven arrows, with the motto *Concordia res parvae crescunt*. About 1620 the Leiden Elzevirs adopted a new device, known as "the solitary," and consisting of an elm tree, a fruitful vine and a man alone, with a motto *Non solus*. They also used another device, a palm tree with the motto, *Assurgo pressa*. The Elzevirs of Amsterdam used for their principal device a figure of Minerva with owl, shield and olive tree, and the motto, *Ne extra oleas*. The earliest productions of the Elzevir press are marked with an angel bearing a book and a scythe, and various other devices occur at different times. When the Elzevirs did not wish to put their name to their works they generally marked them with a sphere, but of course the mere fact that a work printed in the 17th century bears this mark is no proof that it is theirs. The total number of works of all kinds which came from the presses of the Elzevirs is given by Willems as 1608; there were also many forgeries.

See "Notice de la collection d'auteurs latins, français, et italiens, imprimée de format petit en 12, par les Elsévier," in Brunet's *Manuel du libraire* (Paris, 1820); A. de Reume, *Recherches historiques, généalogiques, et bibliographiques sur les Elsévier* (Brussels, 1847); Paul Dupont, *Histoire de l'imprimerie*, in two vols. (Paris, 1854); Pieters, *Annales de l'imprimerie Elsévirienne* (2nd ed., Ghent, 1858); Walther, *Les Elsevériennes de la bibliothèque impériale de St-Pétersbourg* (St Petersburg, 1864); Alphonse Willems, *Les Elzévier* (Brussels, 1880), with a history of the Elzevir family and their printing establishments, a chronological list and detailed description of all words printed by them, their various typographical marks, and a plate illustrating the types used by them; Kelchner, *Catalogus librorum officinae Elsevirianae* (Paris, 1880); Frick, *Die Elzevirschen Republiken* (Halle, 1892); Berghman, *Études sur la bibliographie Elzévirienne* (Stockholm, 1885), and *Nouvelles études, &c.* (ib. 1897).

EMANATION (Lat. *emanatio*, from *e-*, out, *manare*, to flow), in philosophy and theology, the name of one of the three chief theories of existence, *i.e.* of the relation between God and men—the One and the Many, the Universal and the Particular. This theory has been propounded in many forms, but the central idea is that the universe of individuals consists of the involuntary "outpourings" of the ultimate divine essence. That essence is not only all-inclusive, but absolutely perfect, while the "emanated" individuals degenerate in proportion to the degree of their distance from the essence. The existence of evil in opposition to the perfect goodness of God, as thus explained, need not be attributed to God's agency, inasmuch as the whole emanation-process is governed by necessary—as it were mechanical—laws, which may be compared to those of the physical universe. The doctrine of emanation is thus to be distinguished from the cosmogonic theory of Judaism and Christianity, which explains human existence as due to a single creative act of a moral agent. The God of Judaism and

Christianity is essentially a *person* in close *personal* relation to his creatures; emanation is the denial of personality both for God and for man. The emanation theory is to be contrasted, on the other hand, with the theory of evolution. The two theories are alike in so far as both recognize the existence of individuals as due to a necessary process of differentiation and a scale of existence. They differ, however, fundamentally in this respect, that, whereas evolution regards the process as from the indeterminate lower towards the determinate higher, emanation regards it as from the highest to the indefinitely lower.

There is considerable superficial similarity between evolution and emanation, especially in their formal statements. The process of evolution from the indeterminate to the determinate is often expressed as a progress from the universal to the particular. Thus the primordial matter assumed by the early Greek physicists may be said to be the universal substance out of which particular things arise. The doctrine of emanation also regards the world as a process of particularization. Yet the resemblance is more apparent than real. The universal is, as Herbert Spencer remarked, a subjective idea, and the general forms, existing *ante res*, which play so prominent a part in Greek and medieval philosophy, do not in the least correspond to the homogeneous matter of the physical evolutionists. The one process is a logical operation, the other a physical. The theory of emanation, which had its source in certain moral and religious ideas, aims first of all at explaining the origin of mental or spiritual existence as an effluence from the divine and absolute spirit. In the next place, it seeks to account for the general laws of the world, for the universal forms of existence, as ideas which emanate from the Deity. By some it was developed into a complete philosophy of the world, in which matter itself is viewed as the lowest emanation from the absolute. In this form it stands in sharp antithesis to the doctrine of evolution, both because the former views the world of particular things and events as essentially unreal and illusory, and because the latter, so far as it goes, looks on matter as eternal, and seeks to explain the general forms of things as we perceive them by help of simpler assumptions. In certain theories known as doctrines of emanation, only mental existence is referred to the absolute source, while matter is viewed as eternal and distinct from the divine nature. In this form the doctrine of emanation approaches certain forms of the evolution theory (see EVOLUTION).

The doctrine of emanation is correctly described as of oriental origin. It appears in various forms in Indian philosophy, and is the characteristically oriental element in syncretic systems like Neoplatonism and Gnosticism. None the less it is easy to find it in embryo in the speculations of the essentially European philosophers of Greece. Plato, whose philosophy was strongly opposed to the evolution theory, distinctly inclines to the emanation idea in his doctrine that each particular thing is what it is in virtue of a pre-existent idea, and that the particulars are the lowest in the scale of existence, at the head of, or above, which is the idea of the good. The view of Xenocrates is based on the same ideas. Or again, we may compare the Stoic doctrine of ἀπόρροιαι (literally "emanations") from the divine essence. It is, however, only in the last eclectic period of Greek philosophy that the emanation doctrine was definitely established in the doctrines, *e.g.* Plotinus.

See especially articles EVOLUTION, NEOPLATONISM, GNOSTICISM.

EMANUEL I. [Portuguese *Manoel*] (1469–1521), fourteenth king of Portugal, surnamed the Happy, knight of the Garter and of the Golden Fleece, was the son of Duke Ferdinand of Vizeu and of Beatrice of Beja, grandchildren of John I. of Portugal. He was born at Alcochete on the 3rd of May 1469, or, according to Barbosa Machado, on the 1st of June. His early education was directed by a Sicilian named Cataldo. In 1495 he became king in succession to his cousin John II. In 1497 he married Isabella, daughter of Ferdinand and Isabella of Castile, who had previously been married to Alphonso, the heir of John II. She died in the next year in giving birth to a son named Miguel, who until his death two years later was considered heir to the entire Iberian Peninsula. Emanuel's next wife was Maria, another daughter of Ferdinand and Isabella, whom he married in 1500. Two of their children, John and Henry, later became kings of Portugal. Maria died in 1516, and in 1518 her niece Leonora, a sister of the emperor Charles V., became Emanuel's third wife. Emanuel's reign is noteworthy for the continuance of the Portuguese discoveries and the extension of their chain of trading-posts, Vasco da Gama's opening an all-sea route to India, Cabral's landing in Brazil, Corte-Real's voyage to Labrador, the exploration of the Indian seas and the opening of commercial relations with Persia and China, bringing Portugal international prominence, colonial pre-eminence and a hitherto unparalleled degree of national prosperity. His intense religious zeal variously manifested itself in his persecutions of the Jews, whom at the beginning of his reign he had been disposed to tolerate, his strenuous endeavours to promote an international crusade against the Turks, his eager missionary enterprise throughout his new possessions, and his erection of twenty-six monasteries and two cathedrals, including the stately monastic church of the Jeronymos at Belem (see LISBON). His jealously despotic character was accentuated by the enormous increase the Indies furnished to his personal wealth, and exemplified in his assumption of new titles and in a magnificent embassy to Pope Leo X. He died at Lisbon on the 13th of December 1521.

The best authorities for the history of Emanuel's reign are the contemporary 16th-century *Chronica d'el Rei D. Manoel*, by Damião de Goes, and *De rebus Emanuelis*, by J. Osorio. *El Rei D. Manoel*, by M. B. Branco (Lisbon, 1888), is a valuable but ill-arranged biography. See also the *Ordenações do S. R. D. Manoel* (Coimbra University Press, 1797). For further bibliography see Barbosa Machado, *Bibliographica Lusitana*, vol. iii. pp. 161-166.

EMBALMING (Gr. βάλσαμον, balsam; Ger. *Einbalsamiren*; Fr. *embaumement*), the art of preparing dead bodies, chiefly by the use of medicaments, in order to preserve them from putrefaction and the attacks of insects. The ancient Egyptians carried the art to great perfection, and embalmed not only human beings, but cats, crocodiles, ichneumons, and other sacred animals. It was at one time suggested that the origin of embalming in Egypt was to be traced to a want of fuel for the purpose of cremation, to the inadvisability or at some times impossibility of burial in a soil annually disturbed by the inundation of the Nile, and to the necessity, for sanitary reasons, of preventing the decomposition of the bodies of the dead when placed in open sepulchres. As, however, the corpses of the embalmed must have constituted but a small proportion of the aggregate mass of animal matter daily to be disposed of, the above explanation would in any case be far from satisfactory; and there is no doubt (see MUMMY) that embalming originated in the idea of preserving the body for a future life. According to W. H. Prescott, it was a belief in a resurrection of the body that led the ancient Peruvians to preserve the air-dried corpses of their dead with so much solicitude (see *Conquest of Peru*, bk. i. chap. iii.). And J. C. Prichard (*Egyptian Mythology*, p. 200) properly compared the Egyptian practice with the views which rendered "the Greeks and Romans so anxious to perform the usual rites of sepulture to their departed warriors, namely, . . . that these solemnities expedited the journey of the soul to the appointed region, where it was to receive judgment for its former deeds, and to have its future doom fixed accordingly." It has been supposed by some that the discovery of the preservation of bodies interred in saline soils may have been the immediate origin of embalming in Egypt. In that country certain classes of the community were specially appointed for the practice of the art. Joseph, we are told in Gen. l. 2, "commanded his servants the physicians to embalm his father."

Herodotus (ii. 86) gives an account of three of the methods of embalming followed by the Egyptians. The most expensive of these, which cost a talent of silver (£243: 15s.), was as follows. The brains were in part removed through the nostrils by means of a bent iron implement, and in part by the injection of drugs. The intestines having been drawn out through an incision in the left side, the abdomen was cleansed with palm-wine, and filled with myrrh, cassia and other materials, and the opening was sewed up. This done, the body was steeped seventy days in a solution of litron or natron.[1] Diodorus (i. 91) relates that the cutter (παρασχίστης) appointed to make the incision in the flank for the removal of the intestines, as soon as he had performed his office, was pursued with stones and curses by those about him, it being held by the Egyptians a destestable thing to commit any violence or inflict a wound on the body. After the steeping, the body was washed, and handed over to the swathers, a peculiar class of the lowest order of priests, called by Plutarch *cholchytae*, by whom it was bandaged in gummed cloth; it was then ready for the coffin. Mummies thus prepared were considered to represent Osiris. In another method of embalming, costing twenty-two minae (about £90), the abdomen was injected with "cedar-tree pitch" (κεδρία), which, as it would seem from Pliny (*Nat. Hist.* xvi. 21), was the liquid distillate of the pitch-pine. This is stated by Herodotus to have had a corrosive and solvent action on the viscera. After injection the body was steeped a certain number of days in natron; the contents of the abdomen were allowed to escape; and the process was then complete. The preparation of the bodies of the poorest consisted simply in placing them in natron for seventy days, after a previous rinsing of the abdomen with "syrmaea." The material principally used in the costlier modes of embalming appears to have been asphalt; wax was more rarely employed. In some cases embalming seems to have been effected by immersing the body in a bath of molten bitumen. Tanning also was resorted to. Occasionally the viscera, after treatment, were in part or wholly replaced in the body, together with wax figures of the four genii of Amenti. More commonly they were embalmed in a mixture of sand and asphalt, and buried in vases, or *canopi*, placed near the mummy, the abdomen being filled with chips and sawdust of cedar and a small quantity of natron. In one jar were placed the stomach and large intestine; in another, the small intestines; in a third, the lungs and heart; in a fourth, the gall-bladder and liver. Porphyry (*De abstinentia*, iv. 10) mentions a custom of enclosing the intestines in a box and consigning them to the Nile, after a prayer uttered by one of the embalmers, but his statement is regarded by Sir J. G. Wilkinson as unworthy of belief. The body of Nero's wife Poppaea, contrary to the usage of the Romans, was not burnt, but as customary among other nations with the bodies of potentates, was honoured with embalmment (see Tacitus, *Ann.* xvi. 6). The body of Alexander the Great is said to have been embalmed with honey (Statius, *Silv.* iii. 2. 117), and the same material was used to preserve the corpse of Agesipolis I. during its conveyance to Sparta for burial. Herodotus states (iii. 24) that the Ethiopians, in embalming, dried the body, rubbed it with gypsum (or chalk), and, having painted it, placed it in a block of some transparent substance. The Guanches, the aborigines of the Canaries, employed a mode of embalming similar to that of the Egyptians, filling the hollow caused by the removal of the viscera with salt and an absorbent vegetable powder (see Bory de Saint Vincent, *Essais sur les Îles Fortunées*, 1803, p. 495). Embalming was still in vogue among the Egyptians in the time of St Augustine, who says that they termed mummies *gabbarae* (*Serm.* 120, cap. 12).

In modern times numerous methods of embalming have been practised. Dr Frederick Ruysch of Amsterdam (1665–1717) is said to have utilized alcohol for this purpose. By William Hunter essential oils, alcohol, cinnabar, camphor, saltpetre and pitch or rosin were employed, and the final desiccation of the body was effected by means of roasted gypsum placed in its coffin. J. P. Boudet (1778–1849) embalmed with tan, salt, asphalt and Peruvian bark, camphor, cinnamon and other aromatics and corrosive sublimate. The last-mentioned drug, chloride and sulphate of zinc, acetate and sulphate of alumina, and creasote and carbolic acid have all been recommended by various modern embalmers.

See MUMMY; Louis Penicher, *Traité des embaumements* (Paris, 1669); S. Blancard, *Anatomia reformata, et de balsamatione nova methodus* (Lugd. Bat., 1695); Thomas Greenhill, *The Art of Embalming* (London, 1705); J. N. Marjolin, *Manuel d'anatomie* (Paris, 1810); Pettigrew, *History of Mummies* (London, 1834); Gannal, *Traité d'embaumements* (Paris, 1838; 2nd ed., 1841); Magnus, *Das Einbalsamiren der Leichen* (Brunsw., 1839); Sucquet, *Embaumement* (Paris, 1872); Lessley, *Embalming* (Toledo, Ohio, 1884); Myers, *Textbook of Embalming* (Springfield, Ohio, 1900); Rawlinson, *Herodotus*, vol. ii. p. 141; G. Elliot Smith, *A Contribution to the Study of Mummification in Egypt* (Cairo, 1906).

EMBANKMENT, in engineering, a mound of earth or stone, usually narrow in comparison with its length, artificially raised above the prevailing level of the ground. Embankments serve for two main classes of purpose. On the one hand, they are used to preserve the level of railways, canals and roads, in cases where a valley or piece of low-lying ground has to be crossed. On the other, they are employed to stop or limit the flow of water, either constituting the retaining wells of reservoirs constructed in connexion with water-supply schemes, or protecting low-lying tracts of land from river floods or the encroachments of the sea. The word embankment has thus come to be used for the mass of material, faced and supported by a stone wall and protected by a parapet, placed along the banks of a river where it passes through a city, whether to guard against floods or to gain additional space. Such is the Thames Embankment in London, which carries a broad roadway, while under it runs the Underground railway. In this sense an embankment is distinguished from a quay, though the mechanical construction may be the same, the latter word being confined to places where ships are loaded and unloaded, thus differing from the French *quai*, which is used both of embankments and quays, *e.g.* the *Quais* along the Seine at Paris.

EMBARGO (a Spanish word meaning "stoppage"), in international law, the detention by a state of vessels within its ports as a measure of public, as distinguished from private, utility. In practice it serves as a mode of coercing a weaker state. In the middle ages war, being regarded as a complete rupture between belligerent states, operated as a suspension of all respect for the person and property of private citizens; an article of Magna Carta (1215) provided that ". . . if there shall be found any such merchants in our land in the beginning of a war, they shall be attached, without damage to their bodies or goods, until it may be known unto us, or our Chief Justiciary, how our merchants are treated who happen to be in the country which is at war with us; and if ours be safe there, theirs shall be safe in our lands" (art. 48).

Embargoes in anticipation of war have long since fallen into disuse, and it is now customary on the outbreak of war for the belligerents even to grant a respite to the enemy's trading vessels to leave their ports at the outbreak of war, so that neither ship nor cargo is any longer exposed to embargo. This has been confirmed in one of the Hague Conventions of 1907 (convention relative to the status of enemy merchant ships at the outbreak of hostilities, Oct. 18, 1907), which provides that "when a merchant ship belonging to one of the belligerent powers is at the commencement of hostilities in an enemy port, *it is desirable* that it should be allowed to depart freely, either immediately, or after a reasonable number of days of grace, and to proceed, after being furnished with a pass, direct to its port of destination, or any other port indicated" (art. 1). The next article of the same convention limits the option apparently granted by the use of the word "desirable," providing that "a merchant ship unable, owing to circumstances of *force majeure*, to leave the enemy port within the period contemplated (in the previous article), or which was not allowed to leave, *cannot* be confiscated. The belligerent may only detain it, without compensation, but subject to the obligation of restoring it after the war, or requisition it on payment of compensation" (art. 2). (T. BA.)

EMBASSY, the office of an ambassador, or, more generally, the mission on which an ambassador of one power is sent to another, or the body of official personages attached to such a mission, whether temporary or permanent. Hence "embassy" is often quite loosely used of any mission, diplomatic or otherwise. The word is also used of the official residence of an ambassador. "Embassy" was originally "ambassy," the form used in the 17th century, but by the time of Johnson considered quite obsolete. "Ambassy" is from the O. Fr. *ambassée*, derived through such forms as the Port. *ambassada*, Ital. *ambasciata* from a lost Med. Lat. *ambactiata*, *ambactiare*, to go on a mission. (See further AMBASSADOR, EXTERRITORIALITY and DIPLOMACY.)

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[1] Neutral carbonate of sodium, Na_2CO_3, found at the natron lakes in the Libyan desert, and at El Hegs, in Upper Egypt.

EMBER DAYS and **EMBER WEEKS**, the four seasons set apart by the Western Church for special prayer and fasting, and the ordination of clergy, known in the medieval Church as *quatuor tempora*, or *jejunia quatuor temporum*. The Ember weeks are the complete weeks next following Holy Cross day (September 14), St Lucy's day (December 13), the first Sunday in Lent and Whitsun day. The Wednesdays, Fridays and Saturdays of these weeks are the Ember days distinctively, the following Sundays being the days of ordination. These dates are given in the following memorial distich with a frank indifference to quantity and metre—

"Vult Crux, Lucia, Cinis, Charismata dia
Quod det vota pia quarta sequens feria."

The word has been derived from the A.S. *ymb-ren*, a circuit or revolution (from *ymb*, around, and *rennen*, to run); or by process of agglutination and phonetic decay, exemplified by the Ger. *quatember*, Dutch *quatertemper* and Dan. *kvatember*, from the Lat. *quatuor tempora*. The occurrence of the Anglo-Saxon compounds *ymbren-tid*, *ymbren-wucan*, *ymbren-fæstan*, *ymbren-dagas* for Ember tide, weeks, fasts, days, favours the former derivation, which is also confirmed by the use of the word *imbren* in the acts of the council of Ænham, A.D. 1009 ("jejunia quatuor tempora quae *imbren* vocant"). It corresponds also with Pope Leo the Great's definition, "jejunia ecclesiastica per totius anni circulum distributa."

The observance of the Ember days is confined to the Western Church, and had its origin as an ecclesiastical ordinance in Rome. They were probably at first merely the fasts preparatory to the three great festivals of Christmas, Easter and Pentecost. A fourth was subsequently added, for the sake of symmetry, to make them correspond with the four seasons, and they became known as the *jejunium vernum*, *aestivum*, *autumnale* and *hiemale*, so that, to quote Pope Leo's words, "the law of abstinence might apply to every season of the year." An earlier mention of these fasts, as four in number—the first known—is in the writings of Philastrius, bishop of Brescia, in the middle of the 4th century. He also connects them with the great Christian festivals (*De haeres.* 119). In Leo's time, A.D. 440–461, Wednesday, Friday and Saturday were already the days of special observance. From Rome the Ember days gradually spread through the whole of Western Christendom. Uniformity of practice, however, was of somewhat slow growth. Neither in Gaul nor Spain do they seem to have been generally recognized much before the 8th century. Their introduction into Britain appears to have been earlier, dating from Augustine, A.D. 597, acting under the authority of Gregory the Great. The general period of the four fasts being roughly fixed, the precise date appears to have varied considerably, and in some cases to have lost its connexion with the festivals altogether. The *Ordo Romanus* fixes the spring fast in the first week of March (then the first month); the summer fast in the second week of June; the autumnal fast in the third week of September; and the winter fast in the complete week next before Christmas eve. Other regulations prevailed in different countries, until the inconveniences arising from the want of uniformity led to the rule now observed being laid down under Pope Urban II. as the law of the church, in the councils of Piacenza and Clermont, A.D. 1095.

The present rule which fixes the ordination of clergy in the Ember weeks cannot be traced farther back than the time of Pope Gelasius, A.D. 492–496. In the early ages of the church ordinations took place at any season of the year whenever necessity required. Gelasius is stated by ritual writers to have been the first who limited them to these particular times, the special solemnity of the season being in all probability the cause of the selection. The rule once introduced commended itself to the mind of the church, and its observance spread. We find it laid down in the pontificate of Archbishop Egbert of York, A.D. 732–766, and referred to as a canonical rule in a capitulary of Charlemagne, and it was finally established as a law of the church in the pontificate of Gregory VII., *c.* 1085.

AUTHORITIES.—Muratori, *Dissert. de jejun. quat. temp.*, c. vii., anecdot. tom. ii. p. 262; Bingham, *Antiq. of the Christ. Church*, bk. iv. ch. vi. § 6, bk. xxi. ch. ii. §§ 1-7; Binterin, *Denkwürdigkeiten*, vol. v. part 2, pp. 133 ff.; Augusti, *Handbuch der christlich. Archäol.* vol. i. p. 465, iii. p. 486. (E. V.)

EMBEZZLEMENT (A.-Fr. *embesilement*, from *beseler* or *besillier*, to destroy), in English law, a peculiar form of theft, which is distinguished from the ordinary crime in two points:— (1) It is committed by a person who is in the position of clerk or servant to the owner of the property stolen; and (2) the property when stolen is in the possession of such clerk or servant. The definition of embezzlement as a special form of theft arose out of the difficulties caused by the legal doctrine that to constitute larceny the property must be taken out of the possession of the owner. Servants and others were thus able to steal with impunity goods entrusted to them by their masters. A statute of Henry VIII. (1529) was passed to meet this case; and it enacted that it should be felony in servants to convert to their own use caskets, jewels, money, goods or chattels delivered to them by their masters. "This act," says Sir J. F. Stephen (*General View of the Criminal Law of England*), "assisted by certain subtleties according to which the possession of the servant was taken under particular circumstances to be the possession of the master, so that the servant by converting the goods to his own use took them out of his own possession *qua* servant (which was his master's possession) and put them into his own possession *qua* thief (which was a felony), was considered sufficient for practical purposes for more than 200 years." In 1799 a clerk who had converted to his own use a cheque paid across the counter to him by a customer of his master was held to be not guilty of felony; and in the same year an act was passed, which, meeting the difficulty in such cases, enacted that if any clerk or servant, or any person employed as clerk or servant, should, by virtue of such employment, receive or take into his possession any money, bonds, bills, &c., for or in the name or on account of his employers, and should fraudulently embezzle the same, every such offender should be deemed to have stolen the same. The same definition is substantially repeated in a Consolidation Act passed in 1827. Numberless difficulties of interpretation arose under these acts, *e.g.* as to the meaning of "clerk or servant," as to the difference between theft and embezzlement, &c.

The law now in force, or the Larceny Act 1861, defines the offence thus (section 68):—"Whosoever, being a clerk or servant, or being employed for the purpose or in the capacity of a clerk or servant, shall fraudulently embezzle any chattel, money or valuable security which shall be delivered to or received or taken into possession by him for or in the name or on the account of his master or employer, or any part thereof, shall be deemed to have feloniously stolen the same from his master or employer, although such chattel, money or security was not received into the possession of such master or employer otherwise than by the actual possession of his clerk, servant or other person so employed, and being convicted thereof shall be liable, at the discretion of the court, to be kept in penal servitude for any time not exceeding fourteen years, and not less than three years," or imprisonment with or without hard labour for not more than two years. To constitute the offence thus described three things must concur:—(1) The offender must be a clerk or servant; (2) he must receive into his possession some chattel on behalf of his master; and (3) he must fraudulently embezzle the same. A clerk or servant has been defined to be a person bound either by an express contract of service or by conduct implying such a contract to obey the orders and submit to the control of his master in the transaction of the business which it is his duty as such clerk or servant to transact. (Stephen's *Digest of the Criminal Law*, Art. 309.)

The Larceny Act 1901, amending sections 75 and 76 of the Larceny Act 1861, also describes similar offences on the part of persons, not being clerks or servants, to which the name embezzlement is not uncommonly applied. The act makes the offence of fraudulently misappropriating property entrusted to a person by another, or received by him on behalf of another a misdemeanour punishable by penal servitude for a term not exceeding seven years, or to imprisonment, with or without hard labour, for a term not exceeding two years. So also trustees fraudulently disposing of trust property, and directors of companies fraudulently appropriating the company's property or keeping fraudulent accounts, or wilfully destroying books or publishing fraudulent statements, are misdemeanants punishable in the same way.

In the United States the law of embezzlement is founded mainly on the English statute passed in 1799, but the statutes of most states are so framed that larceny includes embezzlement. The latter is sometimes denominated statutory larceny. The punishment varies in the different states, otherwise there is little substantive difference in the laws of the two countries.

Statutes have been passed in some states providing that one indicted for larceny may be convicted of embezzlement. But it is doubtful whether such statutes are valid where the constitution of the state provides that the accused must be informed of the nature and cause of the accusation against him. (See also LARCENY.)

EMBLEM (Gr. *ἔμβλημα*, something put in or inserted, from *ἐμβάλλειν*, to throw in), a word originally applied in Greek and Latin (*emblema*) to a raised or inlaid ornament on vases and other vessels, &c., and also to mosaic or tessellated work. It is in English confined to a symbolical representation of some object, particularly when used as a badge or heraldic device.

EMBLEMENTS (from O. Fr. *emblavence de bled*, *i.e.* corn sprung up above ground), a term applied in English law to the corn and other crops of the earth which are produced annually, not spontaneously, but by labour and industry. Emblements belong therefore to the class of *fructus industriales*, or "industrial growing crops" (Sale of Goods Act 1893, § 62). They include not only corn and grain of all kinds, but everything of an artificial and annual profit that is produced by labour and manuring, *e.g.* hemp, flax, hops, potatoes, artificial grasses like clover, but not fruit growing on trees, which come under the general rule *quicquid plantatur solo, solo cedit*. Emblements are included within the definition of goods in s. 62 of the Sale of Goods Act 1893. Where an estate of uncertain duration terminates unexpectedly by the death of the tenant, or some other event due to no fault of his own, the law gives to the personal representative the profits of crops of this nature as compensation for the tilling, manuring and sowing of the land. If the estate, although of uncertain duration, is determined by the tenant's own acts, the right to emblements does not arise. The right to emblements has become of no importance in England since 1851, when it was provided by the Landlord and Tenant Act 1851 (s. 1) that any tenant at rack-rent, whose lease was determined by the death or cesser of the estate, of a landlord entitled only for his life, or for any other uncertain interest, shall, instead of emblements, be entitled to hold the lands until the expiration of the current year of his tenancy. The right to emblements still exists, however, in favour of (*a*) a tenant not within the Landlord and Tenant Act 1851, whose estate determines by an event which could not be foreseen, (*b*) the executor, as against the heir of the owner in fee of land in his own occupation, (*c*) an execution creditor under a writ directing seizure of goods and chattels. A person entitled to emblements may enter upon the lands after the determination of the tenancy for the purpose of cutting and carrying away the crops. Emblements are liable to distress by the landlord for arrears of rent, or rent during the period of holding on under the act of 1851 (the Distress for Rent Act 1737; see Bullen on *Distress*, 4th ed., 1893).

The term "emblements" is unknown in *Scots law*, but the heir or representative of a life-rent tenant, a liferenter of lands, has an analogous right to reap the crop (on paying a proportion of the rent) and a right to recompense for labour in tilling the ground. The Landlord and Tenant Act 1851 (s. 1) was in force in *Ireland* till 1860, when it was replaced by the Land Act 1860, which gave to the tenant an almost identical right to emblements (s. 34).

In the *United States* the English common law of emblements has been generally preserved. In North Carolina there has been legislation on the lines of the English Landlord and Tenant Act 1851. In some states the tenant is entitled to compensation also from the person succeeding to the possession.

Under the French Code Civil, the outgoing tenant is entitled to convenient housing for the consumption of his fodder and for the harvests remaining to be got in (art. 1777). The same rule is in force in Belgium (Code Civil, art. 1777); and in Holland (Civil Code, art. 1635) and Spain (art. 1578). Similar rights are secured to the tenant under the German Civil Code (arts 592 et seq.). French law is in force in Mauritius. The common law of England and the Landlord and Tenant Act 1851 (14 & 15 Vict., c. 25, s. 1) are in force in many of the British colonies acquired by settlement. In other colonies they have been recognized by statute (*e.g.* Victoria, Landlord and Tenant Act 1890, No. 1108, ss. 45-48: Tasmania, Landlord and Tenant Act 1874, 38 Vict. No. 12).

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EMBOSSING, the art of producing raised portions or patterns on the surface of metal, leather, textile fabrics, cardboard, paper and similar substances. Strictly speaking, the term is applicable only to raised impressions produced by means of engraved dies or plates brought forcibly to bear on the material to be embossed, by various means, according to the nature of the substance acted on. Thus raised patterns produced by carving, chiselling, casting and chasing or hammering are excluded from the range of embossed work. Embossing supplies a convenient and expeditious medium for producing elegant ornamental effects in many distinct industries; and especially in its relations to paper and cardboard its applications are varied and important. Crests, monograms, addresses, &c., are embossed on paper and envelopes from dies set in small handscrew presses, a force or counter-die being prepared in leather faced with a coating of gutta-percha. The dies to be used for plain embossing are generally cut deeper than those intended to be used with colours. Colour embossing is done in two ways—the first and ordinary kind that in which the ink is applied to the raised portion of the design. The colour in this case is spread on the die with a brush and the whole surface is carefully cleaned, leaving only ink in the depressed parts of the engraving. In the second variety—called cameo embossing—the colour is applied to the flat parts of the design by means of a small printing roller, and the letters or design in relief is left uncoloured. In embossing large ornamental designs, engraved plates or electrotypes therefrom are employed, the force or counterpart being composed of mill-board faced with gutta-percha. In working these, powerful screw-presses, in principle like coining or medal-striking presses, are employed. Embossing is also most extensively practised for ornamental purposes in the art of bookbinding. The blocked ornaments on cloth covers for books, and the blocking or imitation tooling on the cheaper kinds of leather work, are effected by means of powerful embossing or arming presses. (See BOOK-BINDING.) For impressing embossed patterns on wall-papers, textiles of various kinds, and felt, cylinders of copper, engraved with the patterns to be raised, are employed, and these are mounted in calender frames, in which they press against rollers having a yielding surface, or so constructed that depressions in the engraved cylinders fit into corresponding elevations in those against which they press. The operations of embossing and colour printing are also sometimes effected together in a modification of the ordinary cylinder printing machine used in calico-printing, in which it is only necessary to introduce suitably engraved cylinders. For many purposes the embossing rollers must be maintained at a high temperature while in operation; and they are heated either by steam, by gas jets, or by the introduction of red-hot irons within them. The stamped or struck ornaments in sheet metal, used especially in connexion with the brass and Britannia-metal trades, are obtained by a process of embossing—hard steel dies with forces or counterparts of soft metal being used in their production. A kind of embossed ornament is formed on the surface of soft wood by first compressing and consequently sinking the parts intended to be embossed, then planing the whole surface level, after which, when the wood is placed in water, the previously depressed portion swells up and rises to its original level. Thus an embossed pattern is produced which may be subsequently sharpened and finished by the ordinary process of carving (see CHASING and REPOUSSÉ).

EMBRACERY (from the O. Fr. *embraseour*, an embracer, *i.e.* one who excites or instigates, literally one who sets on fire, from *embraser*, to kindle a fire; "embrace," *i.e.* to hold or clasp in the arms, is from O. Fr. *embracer*, Lat. *in* and *bracchia*, arms), in law, the attempting to influence a juryman corruptly to give his verdict in favour of one side or the other in a trial, by promise, persuasions, entreaties, money, entertainments and the like. It is an offence both at common law and by statute, and punishable by fine and imprisonment. As a statutory offence it dates back to 1360. The offence is complete, whether any verdict has been given or not, and whether the verdict is in accordance with the weight of evidence or otherwise. The person making the attempt, and any juryman who consents, are equally punishable. The false verdict of a jury, whether occasioned by embracery or otherwise, was formerly considered criminal, and jurors were severely punished, being proceeded against by writ of attaint (*q.v.*). The Juries Act of 1825, in abolishing writs of attaint, made a special exemption as regards jurors guilty of embracery (§ 61). Prosecution for the offence has been so extremely rare that when a case occurred in 1891 (*R.* v. *Baker*, 113, Cent. Crim. Ct. Sess. Pap. 374) it was stated that no precedent could be found for the indictment. The defendant was fined £200, afterwards reduced to £100.

EMBRASURE, in architecture, the opening in a battlement between the two raised solid portions or merlons, sometimes called a crenelle (see BATTLEMENT, CRENELLE); also the splay of a window.

EMBROIDERY (M.E. *embrouderie*, from O. Fr. *embroder*, Mod. Fr. *broder*), the ornamentation of textile fabrics and other materials with needlework. The beginnings of the art of embroidery probably date back to a very primitive stage in the history of all peoples, since plain stitching must have been one of the earliest attainments of mankind, and from that it is but a short step to decorative needlework of some kind. The discovery of needles among the relics of Swiss lake-dwellings shows that their primitive inhabitants were at least acquainted with the art of stitching.

In concerning ourselves solely with those periods of which examples survive, we must pass over a wide gap and begin with the anciently-civilized land of Egypt. The sandy soil and dry climate of that country have led to the preservation of woven stuffs and embroideries of unique historic interest. The principal, and by far the earliest, known pieces which have a bearing on the present subject, found in 1903 in the tomb of Tethmosis (Thoutmôsis, or Thothmes) IV. at Thebes, are now in the Cairo Museum. There are three fragments, entirely of linen, inwrought with patterns in blue, red, green and black (fig. 1). A kind of tapestry method is used, the patterns being wrought upon the warp threads of the ground, instead of upon the finished web or woven material. Such a process, generally supplemented, as in this case, by a few stitches of fine needlework, was still in common use at a far later time. The largest of the three fragments at Cairo bears, in addition to rows of lotus flowers and papyrus inflorescences, a cartouche containing the name of Amenophis (Amenhotep) II. (*c.* 15th century B.C.); another is inwrought with the name of Tethmosis III. (*c.* 16th century B.C.).[1]

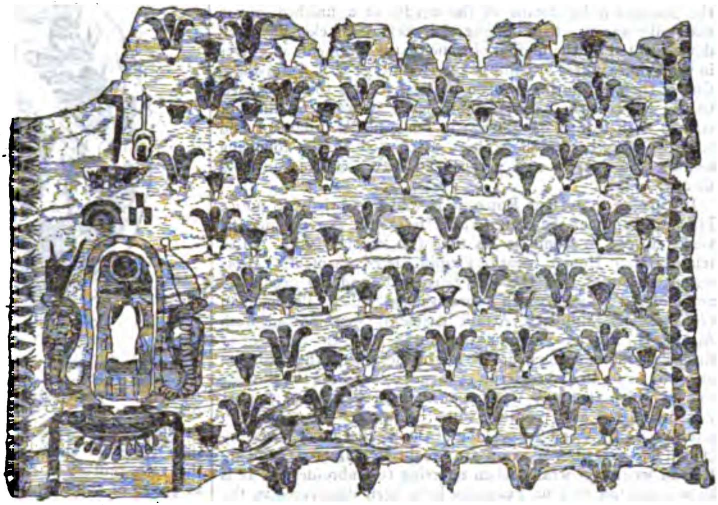

FIG. 1.—Fragment of a linen robe, found in the tomb of Tethmosis (Thothmes) IV. at Thebes, and now in the Cairo Museum. The cartouche has the name of Amenophis (Amenhotep) II. (*c.* 15th century B.C.)

No other embroidered stuffs which can be assigned to so early a date have hitherto come to light in the Nile valley (nor indeed elsewhere), and the student who wishes to gain a fuller knowledge of the textile patterns of the ancient Egyptians must be referred to the wall-paintings and sculptured reliefs which have been preserved in considerable numbers.

From the ancient civilizations of Babylon and Assyria no fragments of embroidery, nor even of woven stuffs, have come down to us. The fine series of wall-reliefs from Nineveh in the British Museum give some idea of the geometrical and floral patterns and diapers which adorned the robes of the ancient Assyrians. The discovery of the ruins of the palace of Darius I. (521–485 B.C.) at Susa in 1885 has thrown some light upon the textile art of the ancient Persians. They evidently owed much to the nations whom they had supplanted. The famous relief from this palace (now in the Louvre) represents a procession of archers, wearing long robes covered with small diaper patterns, perhaps of embroidery.

The exact significance of the words used in the book of Exodus in describing the robes of Aaron (ch. xxviii.) and the hangings and ornaments of the Tabernacle (ch. xxvi.) cannot be determined, and the "broidered work" of the prophecy of Ezekiel (ch. xxvii.) at a later time is also of uncertain meaning. It seems likely that much of this ancient work was of the tapestry class, such as we have found in the early fragments from Thebes.

The methods of the ancient Greek embroiderer, or "variegator" (*ποικιλτής*) to whom woven garments were submitted for enrichment, can only be conjectured. The *peplos* or woven cloth made every fifth year to cover or shade the statue of Athena in the Parthenon at Athens, and carried at the Panathenaic festival,[1] was ornamented with the battles of the gods and giants. The late Dr J. H. Middleton thought that very possibly most of the elaborate work upon these *peploi* was done by the needle. That true embroidery, in the modern sense—the decoration by means of the needle of a finished woven material—was practised among the ancient Greeks, has been demonstrated by the finding of some textile fragments in graves in the Crimea; these are now in the Hermitage at St Petersburg. One of them, of purple woollen material, from a tomb assigned to the 4th century B.C., is embroidered in wools of different colours with a man on horseback, honeysuckle ornament and tendrils. Another woollen piece, attributed to the following century, has a stem and arrow-head leaves worked in gold thread.[2]

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[1] See H. Carter and P. E. Newberry, *Cat. gén. des ant. égypt. du musée du Caire* (1904), pl. i. and xxviii. A remarkable piece of Egyptian needlework, the funeral tent of Queen Isi em Kheb (XXIst Dynasty), was discovered at Deir el Bahri some years ago. It is described as a mosaic of leatherwork—pieces of gazelle hide of several colours, stitched together (see Villiers Stuart, *The Funeral Tent of an Egyptian Queen*, 1882).

In turning to ancient Rome, it is well first briefly to notice Pliny's account of the craft (*Nat. Hist.* viii.), as recording the views current in Rome at his time (1st century A.D.). After relating that Homer mentions embroidered garments (*pictas vestes*), he states that the Phrygians first used the needle for embroidered robes, which were thence called Phrygionian (*Phrygioniae*), and that Attalic garments were named from Attalus II., king of Pergamum (159–138 B.C.), the inventor of the art of embroidering in gold. He further relates that Babylon gave the name to embroideries of divers colours, for the production of which that city was famous. By the Romans the art was designated as "painting with the needle" (*acu pingere*), a term used by Virgil in speaking of the decoration of robes, by Ovid (who describes it as an art taught by Minerva), and by Roman writers generally when referring to embroidery.[3] It is to be regretted that no examples have been discovered in the neighbourhood of the Roman capital. For embroideries made under Roman influence we must again look to Egypt. They formed the decoration of garments[4] and mummy-wrappings from the cemeteries in Upper and Middle Egypt, which have been so extensively rifled of late years. Those of Roman type date approximately from the first five centuries of the Christian era. The earliest represent human figures, animals, birds, geometrical and interlacing ornaments, vases, fruit, flowers and foliage (especially the vine). They are generally done in purple wool and undyed linen thread by the tapestry process employed in Egypt at least fifteen centuries earlier, as we have seen; most of the patterns have had the lines more clearly marked out by the ordinary method of needlework. Towards the end of this period a greater choice of colours is seen, and Christian symbols appear. At this time examples worked entirely upon the finished web are found (fig. 2). The transition is easy from such work to the veritable "needle-paintings," representing scenes from the gospels, produced in Egypt shortly after (fig. 3). Such embroideries are evidently akin to those mentioned by Bishop Asterius (330–410), who describes the garments worn by effeminate Christians as painted like the walls of their houses.[5]

From the time of Justinian (527–565) onwards for some centuries, the art of Europe, embroidery with the rest, was dominated by that of the Byzantine empire. To trace the progress of the highly conventionalized Byzantine style, becoming more rigid and stereotyped as time passes, belongs to the general history of art, and such a task cannot be attempted here. Perhaps the most remarkable example of all which have survived to illustrate the work of the Byzantine embroiderers is the blue silk robe known as the dalmatic of Charlemagne or of Leo III., in the sacristy of St Peter's at Rome (fig. 4). According to the present consensus of opinion it belongs to a later time than either of those dignitaries, dating most probably from the 12th century.[6] In front is represented Christ enthroned as Judge of the world, a youthful but majestic figure; on the back is the Transfiguration. These, as well as the minor subjects, are explained by Greek inscriptions. The wide influence of Byzantine art gradually died out after the Latin sack of Constantinople in the year 1204, although the style lingered, and lingers still, in certain localities, notably at Mount Athos.

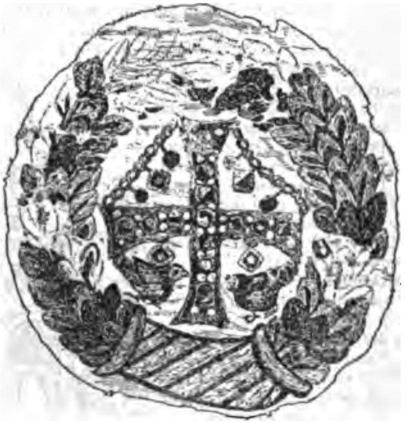

FIG. 2.—Embroidered panel from a linen garment, with a jewelled cross and two birds within a wreath. Found in a cemetery at Akhmim, Upper Egypt. Egypto-Roman work of the 4th or 5th century A.D.

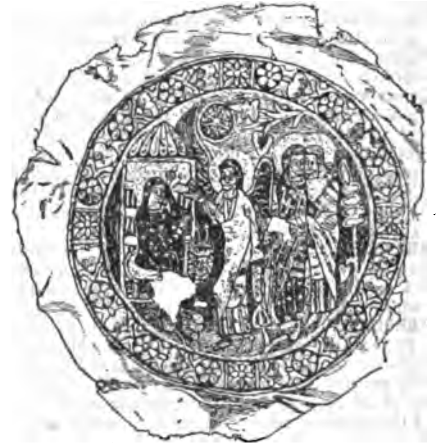

FIG. 3.—Embroidered panel from a linen garment, with a representation of the Annunciation and the Salutation. Found in a cemetery in Egypt. Coptic work of the 6th or 7th century A.D.

Palermo in Sicily succeeded Byzantium as the capital of the arts in Europe, although its ascendancy was of brief duration. Under the Norman kings of Sicily the style was strongly oriental, consequent upon the earlier occupation of the island by the Saracens, and upon the employment of Saracenic craftsmen by the Normans. The magnificent red silk mantle at Vienna, embroidered in gold thread with a date-palm and two lions springing upon camels, and enriched with pearls and enamel plaques, bears round the edge an Arabic inscription, recording that it was made in the royal factory of the capital of Sicily (Palermo) in the year 528 (=A.D. 1134). At that time Roger, the first Norman king, was on the throne. Another of the imperial coronation-robes—a linen alb with gold embroidery—is also at Vienna.[1] An inscription in Latin and Arabic states that it was made in the year 1181, under the reign of William II. (Norman king of Sicily, 1166–1189).

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[1] The procession at this festival is represented upon the frieze of the Parthenon.

[2] See *Compte rendu de la Comm. Imp. Arch.*, 1878–1879 (St Petersburg), pl. iii. and v.

[3] For an account of the conditions under which Greek and Roman embroiderers worked, see Alan S. Cole, "Some Aspects of Ancient and Modern Embroidery," *Journal of the Society of Arts*, vol. liii., 1905, pp. 958, 959.

[4] Chiefly tunics with vertical bands (*clavi*) and medallions (*orbiculae*), and an ample outer robe or cloak.

[5] The Adoration of the Magi is represented upon the lower border of the long robe worn by the empress Theodora (wife of Justinian) in the mosaic in the church of S. Vitale at Ravenna.

[6] Writers have assigned different dates to this vestment: Lady Alford, *Needlework as Art* (earlier than the 13th century); F. Bock, *Die Kleinodien* (12th century); S. Boisserée, *Über die Kaiser-Dalmatica in der St Peterskirche zu Rom* (12th or first half of 13th century); A. S. Cole, *Cantor Lectures at Society of Arts, 1905* (possibly of 9th century); Lord Lindsay, *Christian Art* (12th or early 13th century); A. Venturi, *Storia dell' arte* (10th or 11th century); T. Braun, *Liturg. Gewandung*, p. 305 and note (late 14th or early 15th century).

From about that time distinct national styles began to develop in different places. In tracing the progress of the embroiderer's art during the middle ages we must rely mainly upon the many fine examples of ecclesiastical work which have been preserved. The costumes of men and women, as well as curtains and hangings and such articles of domestic use, were often richly adorned with embroidery. These have mostly perished; while the careful preservation and comparatively infrequent use of the vestments and other objects devoted to the service of the church have given us tangible evidence of the attainments of the medieval embroiderer. Much of this work was produced in convents, but old documents show that in monasteries also were to be found men known for their skill in needlework. Other names, both of men and women, are recorded, showing that the craft was by no means exclusively confined to monastic foundations. Gilds of embroiderers existed far back in medieval times.

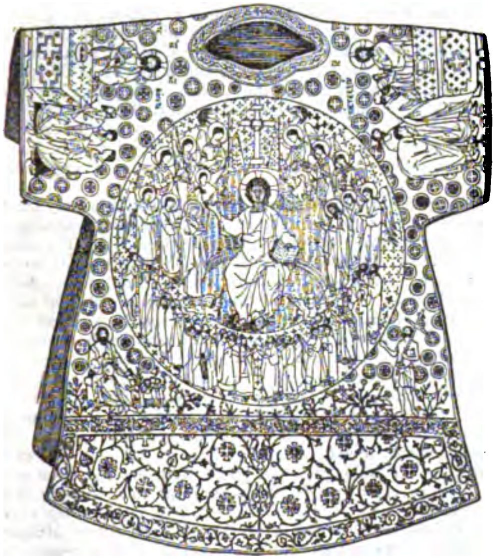

FIG. 4.—Embroidered robe known as the "Dalmatic of Charlemagne," or of Leo III., preserved in the sacristy of St Peter's at Rome. Byzantine work, probably of the 12th century.

In England the craft has been a favourite employment for many centuries, and persons of all ranks have occupied their spare hours at needlework. Some embroidered fragments, found in 1826–1827 in the tomb of St Cuthbert at Durham, and now kept in the cathedral library, were worked, chiefly in gold thread, by order of Ælflæda, queen of Edward the Elder, for Fridestan, bishop of Winchester, early in the 10th century. In the later part of the following century the "Bayeux tapestry" was produced—a work of unique importance (Plate I. fig. 7). It is a band of linen, more than 230 ft. long, embroidered in coloured wools with the story of the Norman conquest of England. (See BAYEUX TAPESTRY.)

Some fragments of metallic embroidery on silk, of the 12th and 13th centuries, may be seen in the library of Worcester cathedral. They were removed from the coffins of two bishops, William de Blois (1218–1236) and Walter de Cantelupe (1236–1266). A fragment of gold embroidery from the tomb of the latter bishop is preserved in the Victoria and Albert Museum at South Kensington, and others are in the British Museum. In the 13th century English embroidery was famous throughout western Europe, and many embroidered objects are described in inventories of that time as being *de opere anglicano.* During that century, and the early part of the next, English work was at its best. The most famous example is the "Syon cope" at South Kensington, belonging to the latter half of the 13th century (see COPE, Plate I. fig. 2). It represents the coronation of the Virgin, the Crucifixion, the archangel Michael transfixing the dragon, the death and burial of the Virgin, our Lord meeting Mary Magdalene in the garden, the Apostles and the hierarchies of angels. The broad orphrey is embroidered with a series of heraldic shields (Plate II. fig. 9). Other embroideries of the period are at Steeple Aston, Chesterfield (Col. Butler-Bowden), Victoria and Albert and British museums, Rome (St John Lateran), Bologna, Pienza, Anagni, Ascoli, St Bertrand de Comminges, Lyons museum, Madrid (archaeological museum), Toledo and Vich.

During the course of the 14th and 15th centuries embroideries produced in England were not equal to the earlier work. Towards the end of the latter century, and until the dissolution of the monasteries in the next, much ecclesiastical embroidery of effective design was done, and many examples are still to be seen in churches throughout the country. In the Tudor period the costumes of the wealthy were often richly adorned with needlework. The portraits of King Henry VIII., Queen Elizabeth and their courtiers show how magnificent was the embroidery used for such purposes. Many examples, especially of the latter reign, worked with very effective and beautiful floral patterns, have come down to these times. A kind of embroidery known as "black work," done in black silk on linen, was popular during the same reign. A tunic embroidered for Queen Elizabeth, with devices copied from contemporary woodcuts, is an excellent example of this work. It now belongs to the Viscount Falkland. Another class of work, popular at the same time, was closely worked in wools and silks on open-mesh material like canvas, which was entirely covered by the embroidery. Figures in rich costume were often introduced (Plate I. fig. 6). This method was much practised in France, and the term applied to it in that country, "*au petit point,*" has become generally used. Throughout the 17th and 18th centuries embroidery in England, though sometimes lacking in good taste, maintained generally a high standard, and that done to-day, based on the study of old examples, need not fear comparison with any modern work. During these three centuries bold floral patterns for hangings, curtains and coverlets have been usual (Plate III. fig. 13), but smaller works, such as samplers, covers of work-boxes, and pictorial and landscape subjects (fig. 5), have been produced in large numbers. In the 18th century gentlemen's coats and waistcoats and ladies' dresses were extensively embroidered.

In France, embroidery, like all the arts practised by that nation, has been characterized by much grace and beauty, and many good specimens belonging to different periods are known. The vestments associated with the name of St Thomas of Canterbury at Sens may be either of French or English work (12th century). To the later part of the following century belongs a band of embroidery, representing the coronation of the Virgin, the Adoration of the Magi, the presentation in the Temple, and other subjects beneath Gothic arches, preserved in the Hôtel-Dieu at Château Thierry. The mitre of Jean de Marigny, archbishop of Rouen (1347–1351), in the museum at Evreux, embroidered with figures of St Peter and St Eloy, may be regarded as representative of 14th-century work. An altar-frontal with the Annunciation embroidered in silks and gold and silver upon a blue silk damask ground, now in the museum at Lille, is a very beautiful example of Franco-Flemish art in the second half of the 15th century. It was originally in the church at Noyelles-lez-Seclin. An embroidery more characteristically French, and belonging to the same century, is in the museum at Chartres. It is a triptych, having in the middle a *pietà*, on the left wing St John the Evangelist, and on the right St Catherine of Alexandria. Each leaf has a canopy of architecture represented in perspective. In the 16th century an effective style of embroidery was practised in France; the pattern is generally a graceful combination of floral and scroll forms, cut out of velvet, satin or silk, and applied to a thick woollen cloth. Later work, chiefly of a floral character, has served for the decoration of costumes, ecclesiastical vestments, curtains and hangings, and the seats and backs of chairs.

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[1] Both are illustrated in F. Bock, *Die Kleinodien.*

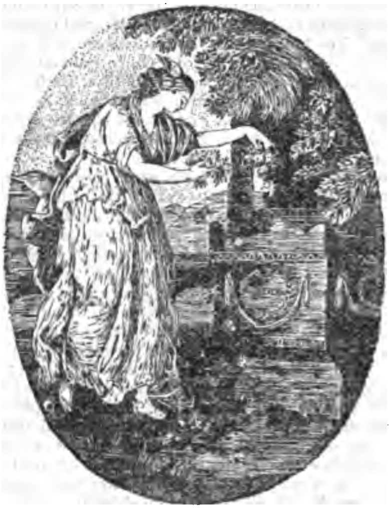

FIG. 5.—Oval picture in silk embroidery: Fame scattering Flowers over Shakespeare's Tomb. English work of the 18th century.

Under the rule of the dukes of Burgundy in the 15th century art in the southern provinces of the Netherlands prospered greatly, and able artists were found to meet the wishes of those munificent rulers. The local schools of painting, which flourished under their patronage, appear to have very considerably influenced the embroiderers' art. Great care and pains were given to reproduce as accurately as possible the painted cartoon or picture which served as the model. The heads are individualized, and the folds of the draperies are laboriously worked out in detail. The masonry of buildings, the veinings of marble, and the architectural enrichments are often represented with careful fidelity, and landscape backgrounds are shown in every detail. As in the case of the tapestries of the Netherlands—the finest which the world has seen—there can be no doubt that patrons of art and donors, when requiring embroideries to be made, secured the services of eminent painters for the designs. There are many examples of such careful work. A set of vestments known as the *ornement de la Toison d'Or*, now in the Hof-museum at Vienna, is embroidered in the most minute manner with sacred subjects and figures of saints and angels. The stiff disposal of many of these figures, within flattened hexagons arranged in zones, is not pleasing, but the needlework is most remarkable for skill and carefulness. They are of 15th-century work. A cope belonging to the second half of that century was given to the cathedral of Tournay by Guillaume Fillatre, abbot of St Bertin at St Omer, and bishop of Tournay (d. 1473). It is now in the museum there. Upon the orphreys and hood are represented the seven Works of Mercy. The body of the cope, of plain red velvet, is powdered with stags' heads and martlets (the heraldic bearings of the bishop); between the antlers of the stags is worked in each case the initial letter of the bishop's name, and the morse is embroidered with his arms. Some panels of embroidery, once decorating an altar in the abbey of Grimbergen, and now at Brussels, illustrate the best class of Flemish needlework in the 16th century. The scenes are taken from the Gospel: the marriage at Cana, Christ in the house of the Pharisee, Christ in the house of Zacchaeus, the Last Supper, and the supper at Emmaus. In the museum at Bern there are some embroideries of great historic and artistic interest, found in the tent of Charles the Bold, duke of Burgundy, after his defeat at Granson in 1476. They include some armorial panels and two tabards or heralds' coats. A tabard of the following century, with the royal arms of Spain in applied work, and most probably of Flemish origin, is preserved in the archaeological museum at Ghent.

The later art of Holland was largely influenced by the Dutch conquests in the East Indies at the end of the 16th century, and the subsequent founding of the Dutch East India Company. Embroideries were among the articles produced in the East under Dutch influence for exportation to Holland.

Much embroidery for ecclesiastical purposes has been executed in Belgium of late years. It follows medieval models, but is lacking in the qualities which make those of so much importance in the history of the art.

There is perhaps little worthy of special notice in Italy before the beginning of the 14th century, but the embroideries produced at that time show great skill and are very beautiful. The names of two Florentine embroiderers of the 14th century—both men—have come down to us, inscribed upon their handiwork. A fine frontal for an altar, very delicately worked in gold and silver and silks of many colours, is preserved in the archaeological museum at Florence. The subject in the middle is the coronation of the Virgin; on either side is an arcade with figures of apostles and saints. The embroiderer's name is worked under the central subject: *Jacobus Cambi de Florētia me fecit MCCCXXXVIII.* The other example is in the basilica at Manresa in Spain. It also is an altar-frontal, worked in silk and gold upon an embroidered gold ground. There is a large central panel representing the Crucifixion, with nine scenes from the Gospel on each side. The embroidered inscription is as follows: *Geri Lapi rachamatore me fecit in Florentia.* It is of 14th-century work. An embroidered orphrey in the Victoria and Albert Museum belongs to the early part of the same century. It represents the Annunciation, the coronation of the Virgin and figures of apostles and saints beneath arches. In the spandrels are the orders of angels with their names in Italian. In the best period of Italian art successful painters did not disdain to design for embroidery. Francesco Squarcione (1394–1474), the founder of the Paduan school of painting, and master of Mantegna, is called in a document of the year 1423 a tailor and embroiderer (*sartor et recamator*). It is recorded that Antonio del Pollaiuolo painted cartoons which were carried out in embroidery,[1] and Pierino del Vaga, according to Vasari, did likewise. In the 16th and 17th centuries large numbers of towels and linen covers were embroidered in red, green or brown silk with borders of floral patterns, sometimes (especially in the southern provinces) combined with figure subjects and bird and animal forms (Plate IV. fig. 15). Another type of embroidery popular at the same time, both in Italy and Spain, is known as appliqué (or applied) work. The pattern is cut out and applied to a bright-coloured ground, frequently of velvet, as in the example illustrated (Plate III. fig. 14). The later embroidery of Sicily follows that of the mainland. A remarkable coverlet, quilted and padded with wool so as to throw the design into relief, is shown to be of Sicilian origin by the inscriptions which it bears

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[1] Some embroideries from vestments, designed by Pollaiuolo, are still preserved in the Museo dell' Opera del Duomo, Florence.

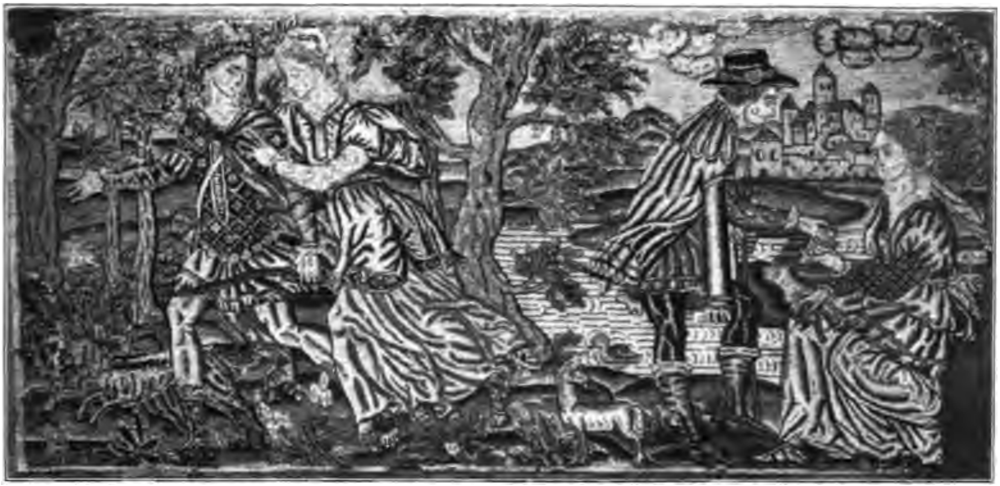

Fig. 6.—Panel of Petit-point Embroidery, with a representation of courtly figures in a landscape. English work of the end of the reign of Queen Elizabeth.

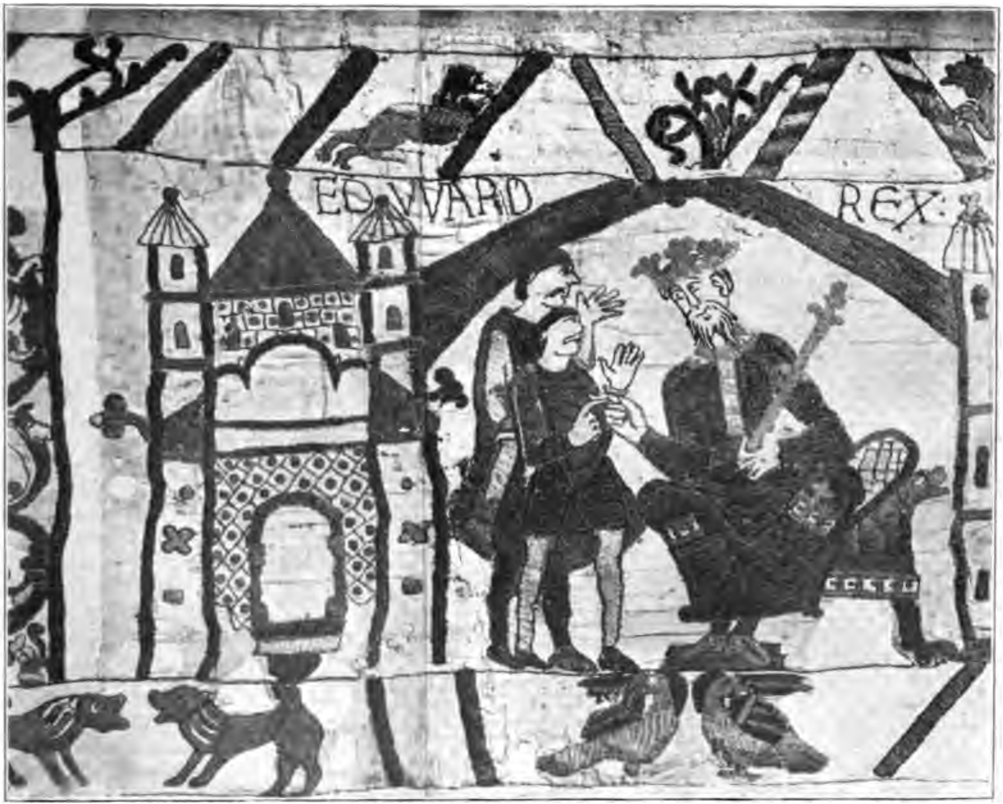

Fig. 7.—Portion of the "Bayeux Tapestry," a band of embroidery with the story of the Norman Conquest of England. In the museum at Bayeux, 11th century work.

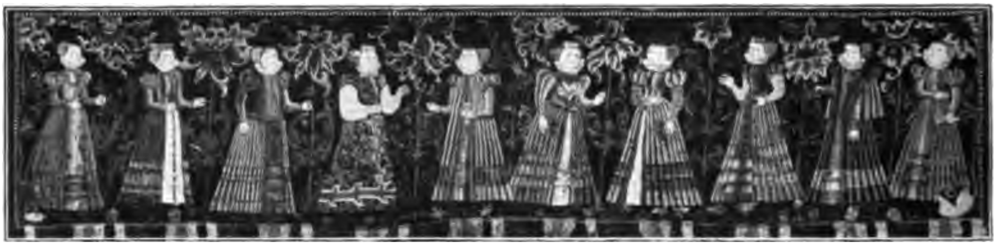

Fig. 8.—Hanging of Woollen Cloth, Embroidered with the Five Wise and the Five Foolish Virgins. German work, dated 1598.

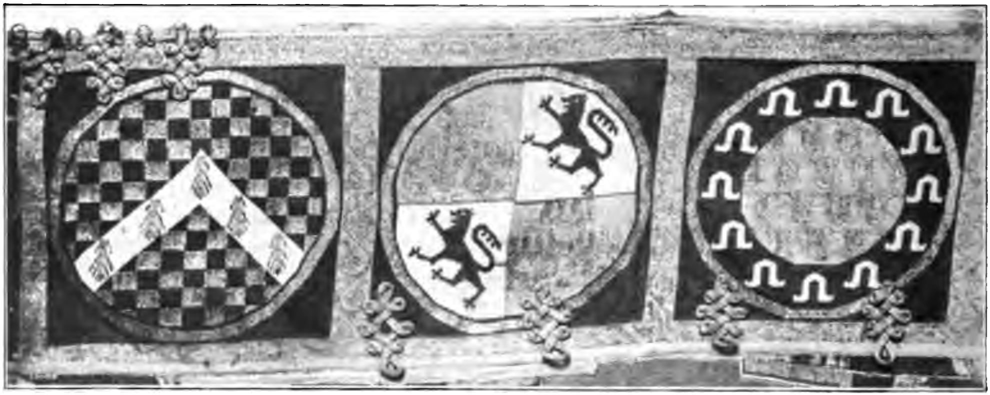

Fig. 9.—Portion of the Orphrey of the "Syon Cope," Embroidered with Shields of Arms. The cope, formerly in the monastery of Syon near Isleworth, is now in the Victoria and Albert Museum. English work of the 13th century.

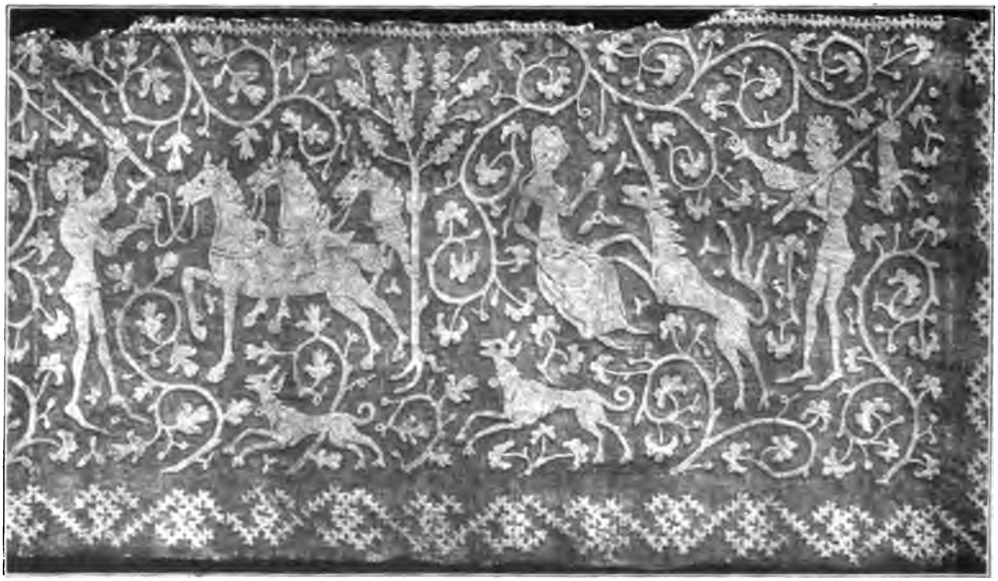

Fig. 10.—Portion of a Band of Loose Linen, Embroidered in White Thread with Figures and Animals. German work of the later part of the 14th century.

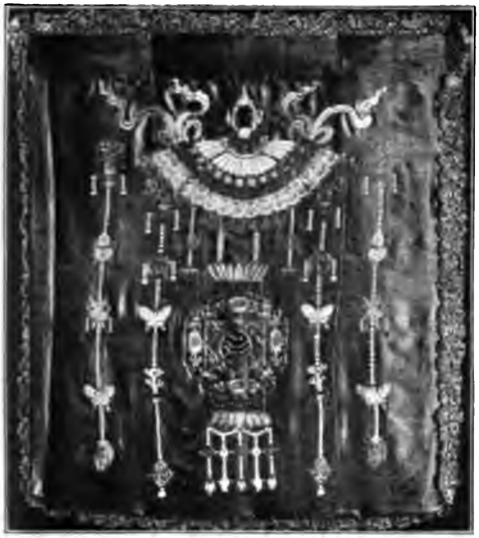

Fig. 11.—Silk Panel, embroidered with a hanging lantern. Chinese work of the 17th or 18th century.

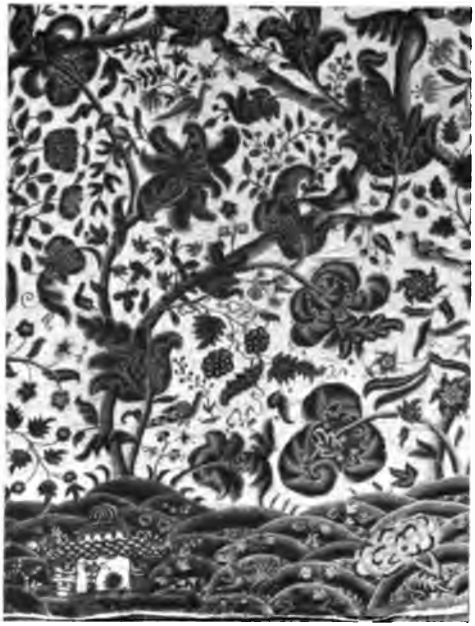

Fig. 13.—Portion of a Bed-Hanging, embroidered with flowering trees growing from mounds.
English work of the later part of the 17th century.

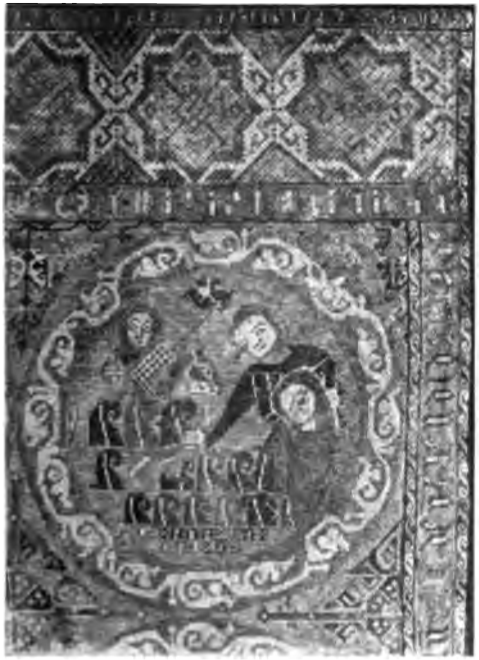

Fig. 12.—Portion of a large Hanging, embroidered with figures within medallions, and inscriptions.
From a church in Iceland, probably 17th century.

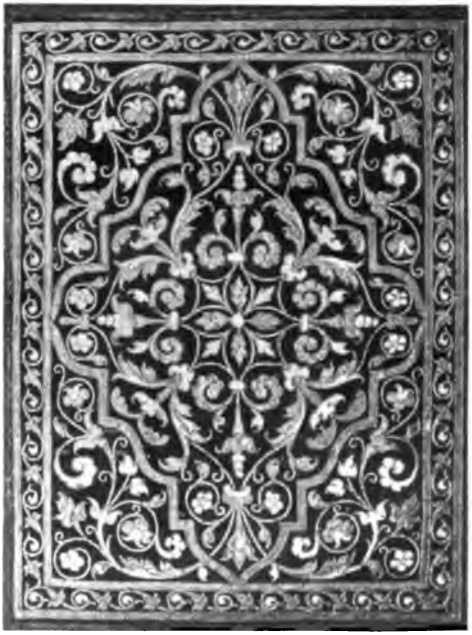

Fig. 14.—Apparel for a Dalmatic of green velvet, embroidered with an appliqué pattern.
Italian work of the 16th century.

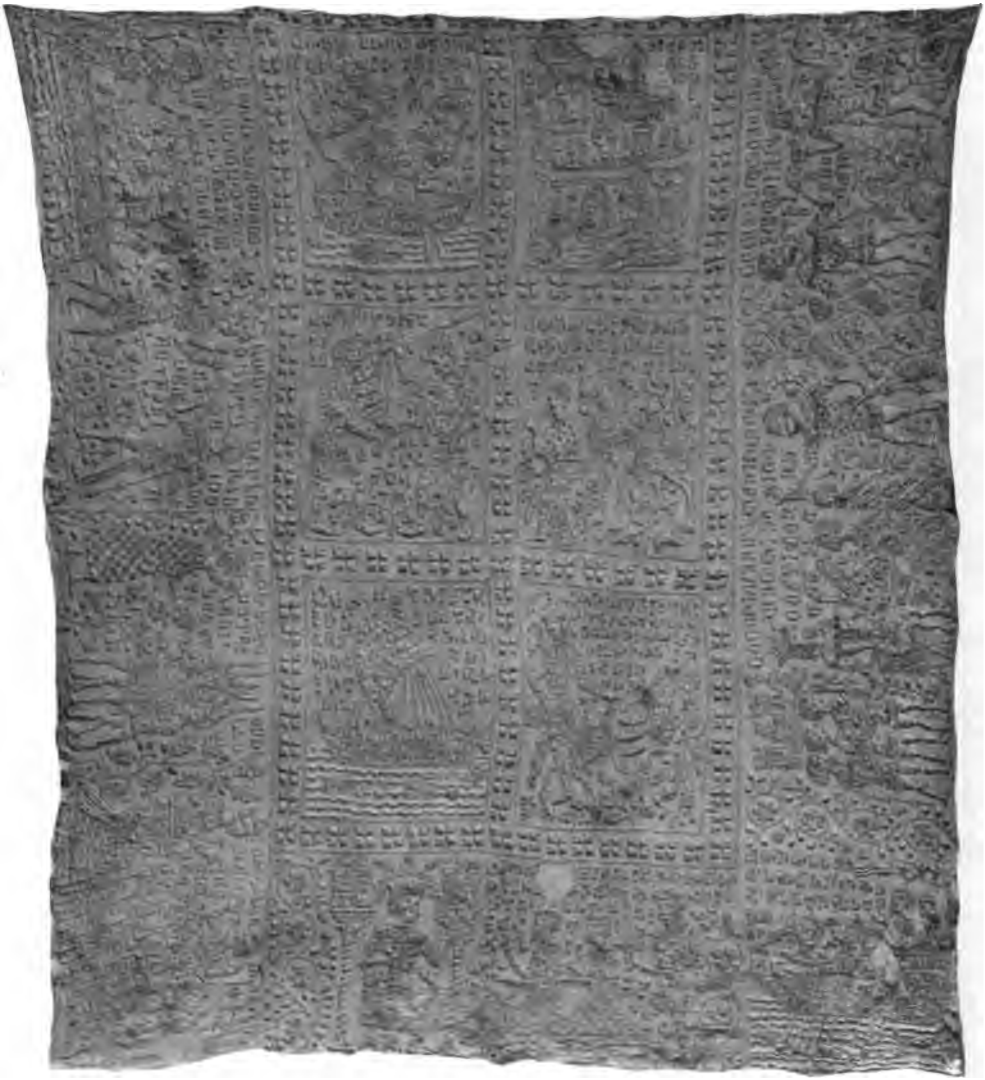

Fig. 18.—Part of a Sicilian Coverlet, of the end of the 14th century.

It is of white linen, quilted and padded in wool so as to throw the design into relief. The scenes represented, taken from the Story of Tristan, with inscriptions in the Sicilian dialect, are as follows:—(1) Comu: Lu Amoroldu Fa Bandiri: Lu Osti: In Cornuualgia (How the Morold made the host to go to Cornwall); (2) Comu: Lu Rre: Languis: Cumanda: Chi Uaia: Lo Osti: Cornuaglia (How King Languis ordered that the host should go to Cornwall); (3) Comu: Lu Rre: Languis: Manda: Per Lu Trabutu in Cornualia (How King Languis sent to Cornwall for the tribute); (4) Comu: (li m) Issagieri: so Uinnti: Al Rre: Marcu: Per Lu Tributu Di Secti Anni (How the ambassadors are come to King Mark for the tribute of seven years); (5) Comu: Lu Amoroldu Uai: in Cornuualgia (How the Morold comes to Cornwall); (6) Comu: Lu Amoroldu: Fa Suldari: La Genti (How the Morold made the people pay); (7) Comu: T(ristainu): Dai: Lu Guantu Allu Amoroldu Dela Bactaglia (How Tristan gives the glove of battle to the Morold); (8) Comu: Lu Amoroldu: E Uinutu: in Cornuualgia: Cum XXXX Galei: (How the Morold is come to Cornwall with forty galleys); (9) Comu Tristainu Bucta: La Uarca: Arretu: Intu: Allu Maru (How Tristan struck his boat behind him into the sea); (10) Comu: Tristainu: Aspecta: Lu Amoroldu: Alla Isola Di Lu Maru: Sansa Uintura (How Tristan awaits the Morold on the isle Sanza Ventura in the sea); (11) Comu: Tristainu Feriu Lu Amorolldu in Testa (How Tristan wounded the Morold in the head); (12) Comu: Lu Inna (?) Delu Amoroldu: Aspecttaua Lu Patrunu (How the Morold's page (?) awaited his master); (13) Comu Lu Amorodu Feriu: Tristainu A Tradimantu (How the Morold wounded Tristan by treachery); (14) . . . Sita: In Airlandia (. . . in Ireland).

(Plate VI. fig. 18). It represents scenes from the story of Tristan, agreeing in the main part with the *novella* entitled "La Tavola Rotonda o l'istoria di Tristano." The quilt dates from the end of the 14th century. Many pattern-books for embroidery and lace were published in Italy in the 16th and 17th centuries.[1]

In the greater part of the Spanish peninsula art was for many centuries dominated by the Arabs, who overran the country in the 8th century, and were not finally subdued until the end of the 15th. Hispano-Moorish embroideries of the medieval period usually have interlacing patterns combined with Arabic inscriptions. In the 15th and 16th centuries Italian influence becomes evident. Later the effects of the Spanish conquests in Asia are seen. Eastern influence is, however, stronger in the case of the Portuguese, who seized Goa, on the west coast of the Indian peninsula, early in the 16th century, and during the whole of that century held the monopoly of the eastern trade. Many large embroideries were produced in the Indies, showing eastern floral patterns mingled with representations of Europeans, ships and coats of arms. Embroideries done in Portugal in the 16th and 17th centuries strongly reflect the influence of oriental patterns.

German embroidery of the 12th and 13th centuries adheres closely to the traditions of Byzantine art. A peculiarity of much medieval German work is a tendency to treat the draperies of the figures as flat surfaces to be covered with diaper patterns, showing no folds. A cope from Hildesheim cathedral, now in the Victoria and Albert Museum, is a typical illustration of such work, dating from the end of the 13th century. It is embroidered in silk upon linen with the martyrdom of apostles and saints. Other specimens of embroidery in this manner may be seen at Halberstadt. An altar-frontal from Rupertsburg (Bingen), belonging to the earlier years of the 13th century, is now in the Brussels museum. It is of purple silk, embroidered with Christ in majesty and figures of saints. It was no doubt made in the time of Siegfried, archbishop of Mainz (1201–1230), who is represented upon it. A type of medieval German embroidery is done in white linen thread on a loose linen ground—a sort of darning-work (Plate II. fig. 10). Earlier specimens of this work are often diversified by using a variety of stitches tending to form diaper patterns. The use of long scrolling bands with inscriptions explaining the subjects represented is more usual in German work than in that of any other country. In the 15th century much fine embroidery was produced in the neighbourhood of Cologne. Later German work shows a preference for bold floral patterns, sometimes mingled with heraldry; the larger examples are often worked in wool on a woollen cloth ground (Plate II. fig. 8). The embroidery of the northern nations (Denmark, Scandinavia, Iceland) was later in development than that of the southern peoples. Figure subjects evidently belonging to as late a period as the 17th century are still disposed in formal rows of circles, and accompanied by primitive ornamental forms (Plate III. fig. 12). A remarkable early embroidered fabric covers the relics of St Knud (Canute, king of Denmark, 1080–1086) in his shrine in the church dedicated to him at Odense. It is apparently contemporary work. The pattern consists of displayed eagles within oval compartments, in blue on a red ground.

In Greece and the islands of the eastern Mediterranean embroidery has been much employed for the decoration of costumes, portières and bed-curtains. Large numbers have been acquired in Crete (Plate IV. fig. 16), and patterns of a distinctive character are also found in Rhodes, Cos, Patmos and other islands. Some examples show traces of the influence of the Venetian trading settlements in the archipelago in the 16th and 17th centuries. Among the Turks a great development of the arts followed upon the conquest of Asia Minor and the Byzantine territory in Europe. Their embroideries show a preference for floral forms—chiefly roses, tulips, carnations and hyacinths—which are treated with great decorative skill.

The use of embroidery in Asia—especially in India, China Turkestan and Persia—dates back to very early times. The conservatism of all these peoples renders the date of surviving examples often difficult to establish, but the greater number of such embroideries now to be seen in Europe are certainly of no great age.

India has produced vast quantities of embroideries of varying excellence. The fine woollen shawls of Kashmir are widely famed; their first production is supposed to date back to a remote period. The somewhat gaudy effect of many Indian embroideries is at times intensified by the addition of beetles' wings, tinsel or fragments of looking-glass. China is the original home of the silkworm, and the textile arts there reached an advanced stage at a date long before that of any equally skilful work in Europe. Embroideries worked there are generally in silk threads on a ground of the same material. Such work is largely used for various articles of costume, and for coverlets, screens, banners, chair-covers and table-hangings. The ornaments upon the robes especially are prescribed according to the rank of the wearer. The designs include elaborate landscapes with buildings and figures, dragons, birds, animals, symbolic devices, and especially flowers (Plate III. fig. 11). Dr Bushell states that the stuff to be embroidered is first stretched upon a frame, on pivots, and that pattern-books with woodcuts have been published for the workers' guidance. A kind of embroidery exported in large quantities from Canton to Europe rivals painting in the variety and gradation of its colours, and in the smoothness and regularity of its surface.

Embroidery in Japan resembles in many ways that of China, the country which probably supplied its first models. As a general rule, Japanese work is more pictorial and fanciful than that of China, and the stitching is looser. It frequently happens that the brush has been used to add to the variety of the embroidered work, and in other cases the needle has been an accessory upon a fabric already ornamented with printing or painting. Japanese work is characterized generally by bold and broad treatment, and especial skill is shown in the representation of landscapes—figures, rocks, waterfalls, animals, birds, trees, flowers and clouds being each rendered by a few lines. More elaborate are the large temple hangings, the pattern being frequently thrown into relief, and completely covering the ground material.

Embroidery in Persia has been used to a great extent for the decoration of carpets, for prayer or for use at the bath (Plate V. fig. 17). Robes, hangings, curtains, tablecovers and portières are also embroidered. A preference is shown for floral patterns, but the Mahommedans of Persia had no scruples about introducing the forms of men and animals—the former engaged in hawking or hunting, or feasting in gardens. Panels embroidered with close diagonal bands of flowers were made into loose trousers for women, now obsolete. The embroidered shawls of Kerman are widely celebrated. Hangings and covers of cloth patchwork have been embroidered in many parts of Persia, more particularly at Resht and Ispahan.

In Turkestan, and especially at Bokhara, excellent embroideries have been, and are, produced, some patterns being of a bold floral type, and others conventionalized into hooked and serrated outlines. The work is most usually in bright-coloured silks, red predominating, on a linen material.

In North Africa the embroidery of Morocco and Algeria deserves notice; the former inclines more to geometrical forms and the latter to patterns of a floral character.

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[1] Others, sometimes with the same illustrations, appeared in France and Germany, and no doubt forwarded the general tendency towards Italian models at the time. A few pattern-books were also published in England.

(*ib.*, 1867), and *Church Vestments* (*ib.*, 1868); M. Dreger, *Künstlerische Entwicklung der Weberei und Stickerei* (Vienna, 1904); Madame I. Errera, *Collection de broderies anciennes* (Brussels, 1905); L. de Farcy, *La Broderie* (Paris, 1890); R. Forrer, *Die Gräber und Textilfunde von Achmim-Panopolis* (Strassburg, 1891); F. R. Fowke, *The Bayeux Tapestry* (London, 1898); Rev. C. H. Hartshorne, *On English Medieval Embroidery* (*ib.*, 1848); M. B. Huish, *Samplers and Tapestry Embroideries* (*ib.*, 1900); A. F. Kendrick, *English Embroidery* (*ib.*, 1905); *English Embroidery executed prior to the Middle of the 16th Century* (Burlington Fine Arts Club Exhibition, 1905, introduction by A. F. Kendrick); E. Lefebure, *Embroideries and Lace*, translated by A. S. Cole, C.B. (London, 1888); F. Marshall, *Old English Embroidery* (*ib.*, 1894); E. M. Rogge, *Moderne Kunst-Nadelarbeiten* (Amsterdam, 1905); South Kensington Museum, *Catalogue of Special Loan Exhibition of Decorative Art Needlework* (1874); W. G. P. Townshend, *Embroidery* (London, 1899). For further examples of ecclesiastical embroidery see the articles CHASUBLE, COPE, DALMATIC and MITRE. (A. F. K.; A. S. C.)

EMBRUN, a town in the department of the Hautes Alpes in S.E. France. It is built at a height of 2854 ft. on a plateau that rises above the right bank of the Durance. It is 27½ m. by rail from Briançon and 24 m. from Gap. Its ramparts were demolished in 1884. In 1906 the communal pop. (including the garrison) was 3752. Besides the Tour Brune (11th century) and the old archiepiscopal palace, now occupied by government offices, barracks, &c., the chief object of interest in Embrun is its splendid cathedral church, which dates from the second half of the 12th century. Above its side door, called the *Réal*, there existed till 1585 (when it was destroyed by the Huguenots) a fresco, probably painted in the 13th century, representing the Madonna: this was the object of a celebrated pilgrimage for many centuries. Louis XI. habitually wore on his hat a leaden image of this Madonna, for which he had a very great veneration, since between 1440 and 1461, during the lifetime of his father, he had been the dauphin, and as such ruler of this province.

Embrun was the *Eburodunum* or *Ebredunum* of the Romans, and the chief town of the province of the Maritime Alps. The episcopal see was founded in the 4th century, and became an archbishopric about 800. In 1147 the archbishops obtained from the emperor Conrad III. very extensive temporal rights, and the rank of princes of the Holy Roman Empire. In 1232 the county of the Embrunais passed by marriage to the dauphins of Viennois. In 1791 the archiepiscopal see was suppressed, the region being then transferred to the diocese of Gap, so that the once metropolitan cathedral church is now simply a parish church. The town was sacked in 1585 by the Huguenots and in 1692 by the duke of Savoy. Henri Arnaud (1641–1721), the Waldensian pastor and general, was born at Embrun.

See A. Albert, *Histoire du diocèse d'Embrun* (2 vols., Embrun, 1783); M. Fornier, *Histoire générale des Alpes Maritimes ou Cottiennes et particulière de leur métropolitaine Embrun* (written 1626–1643), published by the Abbé Paul Guillaume (3 vols., Paris and Gap, 1890–1891); A. Fabre, *Recherches historiques sur le pèlerinage des rois de France à N. D. d'Embrun* (Grenoble, 1859); A. Sauret, *Essai historique sur la ville d'Embrun* (Gap, 1860). (W. A. B. C.)

EMBRYOLOGY. The word embryo is derived from the Gr. ἔμβρυον, which signified the fruit of the womb before birth. In its strict sense, therefore, embryology is the study of the intrauterine young or embryo, and can only be pursued in those animals in which the offspring are retained in the uterus of the mother until they have acquired, or nearly acquired, the form of the parent. As a matter of fact, however, the word has a much wider application than would be gathered from its derivation. All animals above the Protozoa undergo at the beginning of their existence rapid growth and considerable changes of form and structure. During these changes, which constitute the development of the animal, the young organism may be incapable of leading a free life and obtaining its own food. In such cases it is either contained in the body of the parent or it is protruded and lies quiescent within the egg membranes; or it may be capable of leading an independent life, possessing in a functional condition all the organs necessary for the maintenance of its existence. In the former case the young organism is called an *embryo*,[1] in the latter a *larva*. It might thus be concluded that embryology would exclude the study of larvae, in which the whole or the greater part of the development takes place outside the parent and outside the egg. But this is not the case; embryology includes not only a study of embryos as just defined, but also a study of larvae. In this way the scope of the subject is still further widened. As long as embryology confines its attention to embryos, it is easy to fix its limits, at any rate in the higher animals. The domain of embryology ceases in the case of viviparous animals at birth, in the case of oviparous animals at hatching; it ceases as soon as the young form acquires the power of existing when separated from the parent, or when removed from the protection of the egg membranes. But as soon as post-embryonic developmental changes are admitted within the scope of the subject, it becomes on close consideration difficult to limit its range. It must include all the developmental processes which take place as a result of sexual reproduction. A man at birth, when he ceases to be an embryo, has still many changes besides those of simple growth to pass through. The same remark applies to a young frog at the metamorphosis. A chick even, which can run about and feed almost immediately after hatching, possesses a plumage very different from that of the full-grown bird; a starfish at the metamorphosis is in many of its features quite different from the form with which we are familiar. It might be attempted to meet this difficulty by limiting embryology to a study of all those changes which occur in the organism before the attainment of the adult state. But this merely shifts the difficulty to another quarter, and makes it necessary to define what is meant by the adult state. At first sight this may seem easy, and no doubt it is not difficult when man and the higher animals alone are in question, for in these the adult state may be defined comparatively sharply as the stage of sexual maturity. After that period, though changes in the organism still continue, they are retrogressive changes, and as such might fairly be excluded from any account of development, which clearly implies progression, not retrogression. But, as so often happens in the study of organisms, formulae which apply quite satisfactorily to one group require modifications when others are considered. Does sexual maturity always mark the attainment of the adult state? Is the Axolotl adult when it acquires its reproductive organs? Can a larval Ctenophore, which acquires functional reproductive glands and still possesses the power of passing into the form ordinarily described as adult in that group, be considered to have reached the end of its development? Or—to take the case of those animals, such as *Amphioxus*, *Balanoglossus*, and many segmented worms in which important developmental processes occur, *e.g.* formation of new gill slits, of gonadial sacs, or even of whole segments of the body, long after the power of reproduction has been acquired—how is the attainment of the adult state to be defined, for it is clear that in them the attainment of sexual maturity does not correspond with the end of growth and development? If, then, embryology is to be regarded as including not only the study of embryos, but also that of larvae, *i.e.* if it includes the study of the whole developmental history of the individual—and it is impossible to treat the subject rationally unless it is so regarded—it becomes exceeding difficult to fix any definite limit to the period of life with which embryology concerns itself. The beginning of this period can be fixed, but not the end, unless it be the end of life itself, *i.e.* death. The science of embryology, then, is the science of individual development, and includes within its purview all those changes of form and structure, whether embryonic, larval or post-larval, which characterize the life of the individual. The beginning of this period is precise and definite—it is the completion of the fertilization of the ovum, in which the life of the individual has its start. The end, on the other hand, is vague and cannot be precisely defined, unless it be death, in which case the period of life with which embryology concerns itself is coincident with the life of the individual. To use the words of Huxley ("Cell Theory," *Collected Works*, vol. i. p. 267): "Development, therefore, and life are, strictly speaking, one thing, though we are accustomed to limit the former to the progressive half of life merely, and to speak of the retrogressive half as decay, considering an imaginary resting-point between the two as the adult or perfect state."

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[1] In the mammalia the word *foetus* is often employed in the same signification as embryo; it is especially applied to the embryo in the later stages of uterine development.

Reproduction.

There are two kinds of reproduction, the sexual and the asexual. The sexual method has for its results an increase of the number of kinds of individual or organism, whereas the asexual affords an increase in the number of individuals of the same kind. If the asexual method of reproduction alone existed, there would, so far as our knowledge at present extends, be no increase in the number of kinds of organism: no new individuality could arise. The first establishment of a new kind of individual by the sexual process is effected in a very similar manner in all Metazoa. The parent produces by a process of unequal fission, which takes place at a part of the body called the reproductive gland, a small living organism called the reproductive cell. There are always two kinds of reproductive cells, and these are generally produced by different animals called the male and female respectively (when they are produced by the same animal it is said to be hermaphrodite). The reproductive cell produced by the male is called the spermatozoon, and that produced by the female, the ovum. These two organisms agree in being small uninucleated masses of protoplasm, but differ considerably in form. They are without the organs of nutrition, &c., which characterize their parents, but the ovum nearly always possesses, stored up within its protoplasm, a greater or less quantity of vitelline matter or food-yolk, while the spermatozoon possesses in almost all cases the power of locomotion. The object with which these two minute and simple organisms are produced is to fuse with one another and give rise to one resultant uninucleated (for the nuclei fuse) organism or cell, which is called the *zygote*. This process of fusion between the two kinds of reproductive cells, which are termed *gametes*, is called conjugation: it is the process which is sometimes spoken of as the fertilization of the ovum, and its result is the establishment of a new individual. This new individual at first is simply a uninucleated mass of living matter, which always contains a certain amount of food-yolk, and is generally bounded by a delicate cuticular membrane called the vitelline membrane. In form the newly established zygote resembles the female gamete or ovum—so much so, indeed, that it is frequently called the ovum; but it must be clearly understood that although the bulk of its matter has been derived from the ovum, it consists of ovum and spermatozoon, and, as shown by its subsequent behaviour, the spermatozoon has quite as much to do with determining its vital properties as the ovum.

To the unaided eye the main difference between the newly formed zygotes of different species of animals is that of bulk, and this is due to the amount of food-yolk held in suspension in the protoplasm. The ovum of the fowl is 30 mm. in diameter, that of the frog 1·75 mm., while the ova of the rabbit and *Amphioxus* have a diameter of ·1 mm. The food-yolk is deposited in the ovum as a result of the vital activity of its protoplasm, while the ovum is still a part of the ovary of the parent. It is an inert substance which is used as food later on by the developing embryo, and it acts as a dilutant of the living matter of the ovum. It has a profound influence on the subsequent developmental process. The newly formed zygotes of different species of animals have undoubtedly, as stated above, a certain family resemblance to one another; but however great this superficial resemblance may be, the differences must be most profound, and this fact becomes at once obvious when the properties of these remarkable masses of matter are closely investigated.

Causes of development.

As in the case of so many other forms of matter, the more important properties of the zygote do not become apparent until it is submitted to the action of external forces. These forces constitute the external conditions of existence, and the properties which are called forth by their action are called the acquired characters of the organism. The investigation of these properties, particularly of those which are called forth in the early stages of the process, constitutes the science of Embryology. With regard to the manifestation of these properties, certain points must be clearly understood at the outset:—(1) If the zygote is withheld from the appropriate external influences, *e.g.* if a plant-seed be kept in a box free from moisture or at a low temperature, no properties are evolved, and the zygote remains apparently unchanged; (2) the acquisition of the properties which constitutes the growth and development of the organism proceeds in a perfectly definite sequence, which, so far as is known, cannot be altered; (3) just as the features of the growing organism change under the continued action of the external conditions, so the external conditions themselves must change as the organism is progressively evolved. With regard to this last change, it may be said generally that it is usually, if not always, effected by the organism itself, making use of the properties which it has acquired at earlier stages of its growth, and acting in response to the external conditions. There is, to use a phrase of Mr Herbert Spencer, a continuous adjustment between the external and internal relations. For every organism a certain succession of conditions is necessary if the complete and normal evolution of properties is to take place. Within certain limits, these conditions may vary without interfering with the normal evolution of the properties, though such variations are generally responded to by slight but unimportant variation of the properties (variation of acquired characters). But if the variation of the conditions is too great, the evolved properties become abnormal, and are of such a nature as to preclude the normal evolution of the organism; in other words, the action of the conditions upon the organism is injurious, causing abortions and, ultimately, death. For many organisms the conditions of existence are well known for all stages of life, and can be easily imitated, so that they can be reared artificially and kept alive and made to breed in confinement—*e.g.* the common fowl. But in a large number of cases it is not possible, through ignorance of the proper conditions, or on account of the difficulty of imitating them, to make the organism evolve all its properties. For instance, there are many marine larvae which have never been reared beyond a certain point, and there are some organisms which, even when nearly full-grown—a stage of life at which it is generally most easy to ascertain and imitate the natural conditions—will not live, or at any rate will not breed, in captivity. Of late years some naturalists have largely occupied themselves with experimental observation of the effects on certain organisms of marked and definite changes of the conditions, and the name of Developmental Mechanics (or *Physiology of Development*) has been applied to this branch of study (see below).

Gametogeny.

In normal fertilization, as a rule, only one spermatozoon fuses with the ovum. It has been observed in some eggs that a membrane, formed round the ovum immediately after the entrance of the spermatozoon, prevents the entrance of others. If more than one spermatozoon enters, a corresponding number of male pronuclei are formed, and the subsequent development, if it takes place at all, is abnormal and soon ceases. An egg by ill-treatment (influence of chloroform, carbonic acid, &c.) can be made to take more than one spermatozoon. In some animals it appears that several spermatozoa may normally enter the ovum (some Arthropoda, Selachians, Amphibians and Mammals), but of these only one forms a male pronucleus (see below), the rest being absorbed. Gametogeny is the name applied to the formation of the gametes, *i.e.* of the ova and spermatozoa. The cells of the reproductive glands are the germ cells (*oögonia, spermatogonia*). They undergo division and give rise to the progametes, which in the case of the female are sometimes called *oöcytes*, in the case of the male *spermatocytes*. The oöcytes are more familiarly called the ovarian ova. The nucleus of the oöcyte is called the germinal vesicle. The oöcyte (progamete) gives rise by division to the ovum or true gamete, the nucleus of which is called the *female pronucleus*. As a general rule the oöcyte divides unequally twice, giving rise to two small cells called polar bodies, and to the ovum. The first formed polar body frequently divides when the oöcyte undergoes its second and final division, so that there are three polar bodies as well as the ovum resulting from the division of the oöcyte or progamete. Sometimes the ovum arises from the oöcyte by one division only, and there is only one polar body (*e.g.* mouse, Sobotta, *Arch. f. mikr. Anat.*, 1895, p. 15). The polar bodies are oval, but as a rule they are so small as to be incapable of fertilization. They may therefore be regarded as abortive ova. In one case, however (see Francotte, *Bull. Acad. Belg.* (3), xxxiii., 1897, p. 278), the first formed polar body is nearly as large as the ovum, and is sometimes fertilized and develops. The spermatogonia are the cells of the testis; these produce by division the spermatocytes (progametes), which divide and give rise to the spermatids. In most cases which have been investigated the divisions by which the spermatids arise from the spermatocytes are two in number, so that each spermatocyte gives origin to four spermatids. Each spermatid becomes a functional spermatozoon or male gamete. The gametogeny of the male therefore closely resembles that of the female, differing from it only in the fact that all the four products of the progamete become functional gametes, whereas in the female only one, the ovum, becomes functional, the other three (polar bodies) being abortive. In the spermatogenesis of the bee, however, the spermatocyte only divides once, giving rise to a small polar-body-like structure and one spermatid (Meves, *Anat. Anzeiger*, 24, 1904, pp. 29-32). The nucleus of the male gamete is not called the male pronucleus, as would be expected, that term being reserved for the second nucleus which appears in the ovum after fertilization. As this is in all probability derived entirely from the nucleus of the spermatozoon, we should be almost justified in calling the nucleus of the spermatozoon the male pronucleus. In most forms in which the formation of the gametes from the progamete has been accurately followed, and in which the progamete of both sexes divides twice in forming the gametes, the division of the nucleus presents certain peculiarities. In the first place, between the first division and the second it does not enter into the resting state, but immediately proceeds to the second division. In the second place, the number of chromosomes which appear in the final divisions of the progametes and assist in constituting the nuclei of the gametes is half the number which go to constitute the new nuclei in the ordinary nuclear divisions of the animal. The number of chromosomes of the nucleus of the gamete is therefore reduced, and the divisions by which the gametes arise from the progametes are called reducing (*maiotic*) divisions. It is not certain, however, that this phenomenon is of universal occurrence, or has the significance which is ordinarily attributed to it. In the parthenogenetic ova of certain insects, *e.g. Rhodites rosae* (Henking), *Nematus lacteus* (Doncaster, *Quart. Journal Mic. Science*, 49, 1906, pp. 561-589), reduction does not occur, though two polar bodies are formed.

Fertilization.

As soon as the spermatozoon has conjugated with the ovum, a second nucleus appears in the ovum. This is undoubtedly derived from the spermatozoon, possibly from its nucleus only, and is called the male pronucleus. It possesses in the adjacent protoplasm a well-marked centrosome. The general rule appears to be that the female pronucleus is without a centrosome, and that no centrosome appears in the female in the divisions by which the gamete arises from the progamete. If this is true, the centrosome of the zygote nucleus must be entirely derived from that of the male pronucleus. This accounts for the fact, which has been often observed, that the female pronucleus is not surrounded by protoplasmic radiations, whereas such radiations are present round the male pronucleus in its approach to the female. In the mouse the subsequent events are as follow:—Both pronuclei assume the resting form, the chromatin being distributed over the nuclear network, and the nuclei come to lie side by side in the centre of the egg A long loop of chromatin then appears in each nucleus and divides up into twelve pieces, the chromosomes. The centrosome now divides, the membranes of both nuclei disappear, and a spindle is formed. The twenty-four chromosomes arrange themselves at the centre of this spindle and split longitudinally, so that forty-eight chromosomes are formed. Twenty-four of these, twelve male and twelve female, as it is supposed, travel to each pole of the spindle and assist in giving rise to the two nuclei. At the next nuclear division twenty-four chromosomes appear in each nucleus, each of which divides longitudinally; and so in all subsequent divisions. The fusion of the two pronuclei is sometimes effected in a manner slightly different from that described for the mouse. In *Echinus*, for instance, the two pronuclei fuse, and the spindle and chromosomes are formed from the zygote nucleus, whereas in the mouse the two pronuclei retain their distinctness during the formation of the chromosomes. There appears, however, to be some variation in this respect: cases have been observed in the mouse in which fusion of the pronuclei occurs before the separation of the chromosomes.

Parthenogenesis.

Parthenogenesis, or development of the female gamete without fertilization, is known to occur in many groups of the animal kingdom. Attempts have been made to connect this phenomenon with peculiarities in the gametogeny. For instance, it has been said that parthenogenetic ova form only one polar body. But, as we have seen, this is sometimes the case in eggs which are fertilized, and parthenogenetic ova are known which form two polar bodies, *e.g.* ova of the honey-bee which produce drones (*Morph. Jahrb.* xv., 1889, p. 85) ova of *Rotifera* which produce males (*Zool. Anzeiger*, xx., 1897, p. 455), ova of some saw-flies and gall flies which produce females (L. Doncaster, *Quart. Journ. Mic. Sc.*, 49, 1906, pp. 561-589). Again it has been asserted that in parthenogenetic eggs the polar bodies are not extruded from the ovum; in such cases, though the nucleus divides, those of its products which would in other cases be extruded in polar bodies remain in the protoplasm of the ovum. But this is not a universal rule, for in some cases of parthenogenesis polar bodies are extruded in the usual way (*Aphis*, some Lepidoptera), and in some fertilized eggs the polar bodies are retained in the ovum.

It is quite probable that parthenogenesis is more common than has been supposed, and it appears that there is some evidence to show that ova, which in normal conditions are incapable of developing without fertilization, may yet develop if subjected to an altered environment. For instance, it has been asserted that the addition of a certain quantity of chloride of magnesium and other substances to sea-water will cause the unfertilized ova of certain marine animals (*Arbacia*, *Chaetopterus*) to develop (J. Loeb, *American Journal of Physiology*, ix., 1901, p. 423); and according to M. Y. Delage (*Comptes rendus*, 135, 1902. Nos 15 and 16) such development may occur after the formation of polar bodies, the chromosomes undergoing reduction and the full number being regained in the segmenting stage. These experiments, if authenticated, suggest that ova have the power of development, but are not able to exercise it in their normal surroundings. There is reason to believe that the same assertion may be made of spermatozoa. Phenomena of the nature of parthenogenesis have never been observed in the male gamete, but it has been suggested by A. Giard (*Cinquantenaire de la Soc. de Biol.*, 1900) that the phenomenon of the so-called fertilization of an enucleated ovum which has been described by T. Boveri and Delage in various eggs, and which results in development up to the larval form (*merogony*), is in reality a case in which the male gamete, unable to undergo development in ordinary circumstances on account of its small size and specialization of structure has obtained a nutritive environment which enables it to display its latent power of development. Moreover, A. M. Giard suggests that in some cases of apparently normal fertilization one of the pronuclei may degenerate, the resultant embryo being the product of one pronucleus only. In this way he explains certain cases of hybridization in which the paternal (rarely the maternal) type is exclusively reproduced. For instance, in the batrachiate Amphibia, Héron Royer succeeded in 1883 in rearing, out of a vast number of attempts, a few hybrids between a female *Pelobates fuscus* and a male *Rana fusca*; the product was a *Rana fusca*. He also crossed a female *Bufo vulgaris* with a male *Bufo calamita*; in the few cases which reached maturity the product was obviously a *Bufo calamita*. Finally, H. E. Ziegler (*Arch. f. Ent.-Mech.*, 1898, p. 249) divided the just-fertilized ovum of a sea-urchin in such a way that each half had one pronucleus; the half with the male pronucleus segmented and formed a blastula, the other degenerated. It is said that in a few species of animals males do not occur, and that parthenogenesis is the sole means of reproduction (a species of Ostracoda among Crustacea; species of Tenthredinidae, Cynipidae and Coccidae among Insecta); this is the thelytoky of K. T. E. von Siebold. The number of species in which males are unknown is constantly decreasing, and it is quite possible that the phenomenon does not exist. Parthenogenesis, however, is undoubtedly of frequent occurrence, and is of four kinds, namely, (1) that in which males alone are produced, *e.g.* honey-bees (*arrhenotoky*); (2) that in which females only are produced (*thelytoky*), as in some saw-flies; (3) that in which both sexes are produced (*deuterotoky*), as in some saw-flies; (4) that in which there is an alternation of sexual and parthenogenetic generations, as in Aphidae, many Cynipidae, &c. It would appear that "parthenogenesis does not favour the production of one sex more than another, but it is clear that it decidedly favours the production of a brood that is entirely of one sex, but which sex that is differs according to circumstances" (D. Sharp, *Cambridge Natural History*, "Insects," pt. i. p. 498). In some Insecta and Crustacea exceptional parthenogenesis occurs: a certain proportion of the eggs laid are capable of undergoing either the whole or a part of development parthenogenetically, *e.g. Bombyx mori*, &c. (A. Brauer, *Arch. f. mikr. Anat.*, 1893; consult also E. Maupas on parthenogenesis of Rotifera, *Comp. rend.*, 1889–1891, and R. Lauterborn, *Biol. Centralblatt*, xviii., 1898, p. 173).

Determination of sex.

The question of the determination of sex may be alluded to here. Is sex determined at the act of conjugation of the two gametes? Is it, in other words, an unalterable property of the zygote, a genetic character? Or does it depend upon the conditions to which the zygote is subjected in its development? In other words, is it an acquired character? It is impossible in the present state of knowledge to answer these questions satisfactorily, but the balance of evidence appears to favour the view that sex is an unalterable, inborn character. Thus those twins which are believed to come from a split zygote are always of the same sex, members of the same litter which have been submitted to exactly similar conditions are of different sexes, and all attempts to determine the sex of offspring in the higher animals by treatment have failed. On the other hand, the male bee is a portion of a female zygote—the queen-bee. The same remark applies to the male Rotifer, in which the zygote always gives rise to a female, from which the male arises parthenogenetically, but in these cases it does not appear that the production of males is in any way affected by external conditions (see R. C. Punnett, *Proc. Royal Soc.*, 78 B, 1906, p. 223). It is said that in human societies the number of males born increases after wars and famines, but this, if true, is probably due to an affection of the gametes and not of the young zygote. For a review of the whole subject see L. Cuénot, *Bull. sci. France et Belgique*, xxxii., 1899, pp. 462-535.

The first change the zygote undergoes in all animals is what is generally called the segmentation or cleavage of the ovum. This consists essentially of the division of the nucleus into a number of nuclei around which the protoplasm sooner or later

Cleavage.

becomes arranged in the manner ordinarily spoken of as cellular. This division of the nucleus is effected by the process called binary fission; that is to say, it first divides into two, then each of these divides simultaneously again into two, giving four nuclei; each of these after a pause again simultaneously divides into two. So the process continues for some time until the ovum becomes possessed of a large number of nuclei, all of which have proceeded from the original nucleus by a series of binary fissions. This division of the nucleus, which constitutes the essential part of the cleavage of the ovum, continues through the whole of life, but it is only in the earliest period that it is distinguished by a distinct name and used to characterise a stage of development. The nuclear division of cleavage is usually at first a rhythmical process; all the nuclei divide simultaneously, and periods of nuclear activity alternate with periods of rest. Nuclear divisions may be said to be of three kinds, according to the accompanying changes in the surrounding protoplasm: (1) accompanied by no visible change, *e.g.* the multinucleated Protozoon *Actinosphaerium*; (2) accompanied by a rearrangement of the protoplasm around each nucleus, but not by its division into two separate masses, *e.g.* the division which results in the formation of a colony of Protozoa, (3) accompanied by the division of the protoplasm into two parts, so that two distinct cells result, *e.g.* the divisions by which the free wandering leucocytes are produced, the reproduction of uninuclear Protozoa, &c. In the cleavage of the ovum the first two of these methods of division are found, but probably not the third. At one time it was thought that the nuclear divisions of cleavage were always of the third kind, and the result of cleavage was supposed to be a mass of isolated cells, which became reunited in the subsequent development to give rise to the later connexion between the tissues which were known to exist. But in 1885 it was noticed that in the ovum of *Peripatus capensis* (A. Sedgwick, *Quart. Journ. Mic. Science*, xxv., 1885, p. 449) the extranuclear protoplasm did not divide in the cleavage of the ovum, but merely became rearranged round the increasing nuclei; the continuity of the protoplasm was not broken, but persisted into the later stages of growth, and gave rise to the tissue-connexions which undoubtedly exist in the adult. This discovery was of some importance, because it rendered intelligible the unity of the embryo so far as its developmental processes are concerned, the maintenance of this unity being somewhat surprising on the previous view. On further inquiry and examination it was found that the ova of many other animals presented a cleavage essentially similar to that of *Peripatus*. Indeed, it was found that the nuclear divisions of cleavage were of the first two kinds just described. In some eggs, *e.g.* the Alcyonaria, the first nuclear divisions are effected on the first plan, *i.e.* they take place without at first producing any visible effect upon the protoplasm of the egg. But in the later stages of cleavage the protoplasm becomes arranged around each nucleus and related to it as to a centre. In the majority of eggs, however, the protoplasm, though not undergoing complete cleavage, becomes rearranged round each nucleus as these are formed. The best and clearest instance of this is afforded by many Arthropodan eggs, in which the nucleus of the just-formed zygote takes up a central position, where it undergoes its first division, subsequent divisions taking place entirely within the egg and not in any way affecting its exterior. The result is to give rise to a nucleated network or foam-work of protoplasm, ramifying through the yolk-particles and containing these in its meshes.

In other Arthropodan eggs the cleavage is on the so-called centrolecithal type, in which the dividing nuclei pass to the cortex of the ovum, and the surface of the ovum becomes indented with grooves corresponding to each nucleus. In this kind of cleavage all the so-called segments are continuous with the central undivided yolk-mass. It sometimes happens that in Arthropods the egg breaks up into masses, which cannot be said to have the value of cells, as they are frequently without nuclei. In other eggs, characterized by a considerable amount of yolk, *e.g.* the ova of Cephalopoda, and of the Vertebrata with much yolk, the first nucleus takes up an eccentric position in a small patch of protoplasm which is comparatively free from yolk-particles. This patch is the germinal disc, and the nuclear divisions are confined to it and to the transitional region, where it merges into the denser yolk which makes up the bulk of the egg. At the close of segmentation the germinal disc consists of a number of nuclei, each surrounded by its own mass of protoplasm, which is, however, not separated from the protoplasm round the neighbouring nuclei, as was formerly supposed, but is continuous at the points of contact. In this manner the germinal disc has beecome converted into the blastoderm, which consists of a small watch-glass-shaped mass of so-called cells resting on, but continuous with, the large yolk-mass. It is characteristic of this kind of ovum that there is always a row of nuclei, called the yolk-nuclei, placed in the denser yolk immediately adjacent to the blastoderm. These nuclei are continually undergoing division, one of the products of division, together with a little of the sparse yolk protoplasm, passing into the blastoderm to reinforce it (so-called formative cells). The other product of the dividing yolk-nuclei remains in the yolk, in readiness for the next division. In this manner nucleated masses of protoplasm are continually being added to the periphery of the blastoderm and assisting in its growth. But it must be borne in mind that all the nucleated masses of which the blastoderm consists are in continuity with each other and with the sparse protoplasmic reticulum of the subjacent yolk.

In the great majority of eggs, then, the nuclear division of cleavage is not accompanied by a complete division of the ovum into separate cells, but only by a rearrangement of the protoplasm, which produces, indeed, the so-called cellular arrangement, and an appearance only of separate cells. But there still remain to be mentioned those small eggs in which the amount of yolk is inconsiderable, and in which division of the nuclei does appear to be accompanied by a complete division of the surrounding protoplasm into separate unconnected cells—ova of many Annelida, Mollusca, Echinoderma, &c., and of Mammalia amongst Vertebrata. In the case of these also (G. F. Andrews, *Zool Bulletin*, ii., 1898) it has been shown that the apparently separate spheres are connected by a number of fine anastomosing threads of a hyaline protoplasm, which are not easy to detect and are readily destroyed by the action of reagents. It is therefore probable that the divisions of the nuclei in cleavage are in no case accompanied by complete division of the surrounding protoplasm, and the organism in the cleavage stage is a continuous whole, as it is in all the other stages of its existence.

Division of embryo.

Of late years a great number of experiments have been made to discover the effects of dividing the embryo during its cleavage, and of destroying certain portions of it. These experiments have been made with the object of testing the view, held by some authorities, that certain segments are already set apart in cleavage to give rise to certain adult organs, so that if they were destroyed the organs in question could not be developed. The results obtained have not borne out this view. Speaking generally, it may be said that they have been different according to the stage at which the separation was effected and the conditions under which the experiment was carried out. If the experiment be made at a sufficiently early stage, each part, if not too small, will develop into a normal, though small, embryo. In some cases the embryo remained imperfect for a certain time after the experiment, but the loss is eventually made good by regeneration. (For a summary of the work done on this subject see R. S. Bergh, *Zool. Centralblatt*, vii., 1900, p. 1.)

The layer theory.

The end of cleavage is marked by the commencement of the differentiation of the organs. The first differentiation is the formation of the layers. These are three in number, being called respectively the ectoderm, endoderm and mesoderm, or, in embryos in which at their first appearance they lie like sheets one above the other, the epiblast, hypoblast and mesoblast. The layers are sometimes spoken of as the primary organs, and their importance lies in the fact that they are supposed to be generally homologous throughout the series of the Metazoa. This view, which is based partly on their origin and partly on their fate, had great influence on the science of comparative anatomy during the last thirty years of the 19th century, for the homology of the layers being admitted, they afforded a kind of final court of appeal in determining questions of doubtful homologies between adult organs. Great importance was therefore attached to them by embryologists, and both their mode of development and the part which they play in forming the adult organs were examined with the greatest care. It is very unusual for all the layers to be established at the same time. As a general rule the ectoderm and endoderm, which may be called the primary layers, come first, and later the mesoderm is developed from one or other of them. There are two main methods in which the first two are differentiated—invagination and delamination. The former is generally found in small eggs, in which the embryo at the close of cleavage assumes the form of a sphere, having a fluid or gelatinous material in its centre, and bounded externally by a thin layer of protoplasm, in which all the nuclei are contained. Such a sphere is called a blastosphere, and may be regarded as a spherical mass of protoplasm, of which the central portion is so much vacuolated that it seems to consist entirely of fluid. The central part of the blastosphere is called the segmentation cavity or blastocoel. The blastosphere soon gives rise, by the invagination of one part of its wall upon the other, and a consequent obliteration of the segmentation cavity, to a double-walled cup with a wide opening, which, however, soon becomes narrowed to a small pore. This cup-stage is called the gastrula stage; the outer wall of the gastrula is the ectoderm, and its inner the endoderm; while its cavity is the enteron, and the opening to the exterior the blastopore. Origin of the primary layers by delamination occurs universally in eggs with large yolks (Cephalopoda and many Vertebrata), and occasionally in others. In it cleavage gives rise to a solid mass, which divides by delamination into two layers, the ectoderm and endoderm. The main difference between the two methods of development lies in the fact that in the first of them the endoderm at its first origin shows the relations which it possesses in the adult, namely, of forming the epithelial wall of the enteric space, whereas in the second method the endoderm is at first a solid mass, in which the enteric space makes its appearance later by excavation. In the delaminate method the enteric space is at first without a blastopore, and sometimes it never acquires this opening, but a blastopore is frequently formed, and the two-layered gastrula stage is reached, though by a very different route from that taken in the formation of the invaginate gastrula. According to the layer-theory, these two layers are homologous throughout the series of Metazoa; their limits can always be accurately defined, they give rise to the same organs in all cases, and the adult organs (excluding the mesodermal organs) can be traced back to one or other of them with absolute precision. Thus the ectoderm gives rise to the epidermis, to the nervous system, and to the lining of the stomodaeum and proctodaeum, if such parts of the alimentary canal are present. The endoderm, on the other hand, gives rise to the lining of the enteron, and of the glands which open into it.

So far as these two layers are concerned, and excluding the mesoderm, it would appear that the layer-theory does apply in a very remarkable manner to the whole of the Metazoa. But even here, when the actual facts are closely scanned, there are found to be difficulties, which appear to indicate that the theory may not perhaps be such an infallible guide as it seems at first sight. Leaving out of consideration the case of the Mammalia, in which the differentiation of the segmented ovum is not into ectoderm and endoderm, and the case of the sponges, the most important of these difficulties concern the stomodaeum and proctodaeum. The best case to examine is that of *Peripatus capensis*, in which the blastopore is at first a long slit, and gives rise to both the mouth and the anus of the adult. Here there is always found at the lips of the blastopore, and extending for a short distance inwards as enteric lining, a certain amount of tissue, which by its characters must be regarded as ectoderm. Now, in the closure of the blastopore between the mouth and anus, this tissue, which at the mouth and anus develops into the lining of the stomodaeum and proctodaeum, is left inside, and actually gives rise to the median ventral epithelium of the alimentary canal. Hence the development of *Peripatus capensis* suggests the conclusion, if we strictly apply the layer-theory, that a considerable portion of the true mesenteron is lined by ectoderm, and is not homologous with the corresponding portion of the mesenteron of other animals—a conclusion which will on all hands be admitted to be absurd. The difficulties in the application of the layer-theory become vastly greater when the origin and fate of the mesoderm is considered. The mesoderm is, if we may judge from the number of organs which are derived from it, much the most important of the three layers. It generally arises later than the others, and in its very origin presents difficulties to the theory, which are much increased when we consider its history. It is generally, though not always, developed from the endoderm, either as hollow outgrowths containing prolongations of the enteric cavity, which become the coelom, or as solid proliferations. But in some groups the mesoderm is actually laid down in cleavage, and is present at the end of that process. In others it is entirely derived from the ectoderm (*Peripatus capensis*). In yet others it is partly derived from endoderm and partly from ectoderm (primitive streak of amniotic Vertebrates). Finally, in whatever manner the first rudiments are developed, it frequently receives considerable reinforcements from one of the primary layers. For instance, the structure known as the nerve crest of the vertebrate embryo is not, as was formerly supposed, exclusively concerned with the formation of the spinal nerves and ganglia, but contributes largely to the mesoderm of the axial region of the body. This is particularly clearly seen in the case of the anterior part of the head of Elasmobranch and probably of other vertebrate embryos, where all the mesoderm present is derived from the anterior part of the neural crest (*Quart. Journ. Mic. Science*, xxxvii. p. 92).

Mesoderm.

The layer-theory, then, will not bear critical examination. It is clear, both from their origin and history, that the layers or masses of cells called ectoderm, endoderm and mesoderm have not the same value in different animals; indeed, it is misleading to speak of three layers. At the most we can only speak of two, for the mesoderm is formed after the others, has a composite origin, and has no more claim to be considered an embryonic layer than has the rudiment of the central nervous system, which in some animals, indeed, appears as soon as the mesoderm. Arguments as to homology, based on derivation or non-derivation from the same embryonic layer, have therefore in themselves but little value.

It has frequently been asserted that the reproductive cells are marked off at a very early stage of the development (*Sagitta*, certain Crustacea, *Scorpio*). Recently it has been asserted that in *Ascaris* (T. Boveri, *Kuppfer's Festschrift*, 1899, p. 383) the reproductive cells are set apart after the first cleavage, and that they can be traced by certain peculiarities of their nuclei into the adult reproductive glands.

Mesenchyme.

It has been already stated that the mesoderm is a composite tissue. This fact is frequently conspicuous at its first establishment. In many Coelomata it is present under two forms from the beginning. One of these is epithelial in character, while the other has the form of a network of protoplasm, with nuclei at the nodes. The former is called simply epithelial mesoderm, the latter mesenchyme. Sometimes the epithelial mesoderm is the first formed, and what little mesenchyme there is is developed from it (*Amphioxus*, *Balanoglossus*, &c.). Sometimes the mesenchyme is the first to arise, the epithelial mesoderm developing from it (most, if not all, Vertebrates). Finally, it sometimes happens that these two kinds of tissue arise separately from one or other of the primary layers (Echinodermata). As already hinted, in *Balanoglossus* and *Amphioxus* the whole of the mesoderm of the body is at first in an epithelial condition, being developed as an outgrowth of the gut-wall. In *Peripatus capensis* also, and possibly in other Arthropods, it has at first an intermediate form, being derived from a primitive streak and not from the gut-wall, but it rapidly assumes an epithelial structure, from which all the mesodermal tissues are developed. In Annelids the bulk of the mesoderm has at first a modified epithelial form similar to that of Arthropods, but it is formed, not from a primitive streak, but from some peculiar cells produced in cleavage, called pole-cells. In Annelids with trochosphere larvae a certain amount of mesenchyme is formed at an earlier stage and gives rise to the muscular bands of the young larva. In Echinodermata a certain amount of mesenchyme appears before the epithelial mesoderm, which is formed later as gut-diverticula. In these forms the mesenchyme is said to arise as wandering amoeboid cells, which are budded into the blastocoel by the endoderm just before and during its invagination, but the writer has reason to believe that this account of it does not quite describe what happens. It would seem to be more probable that the mesenchyme arises in these forms, as it certainly does in the case of the later-formed mesenchyme of the Vertebrate embryo, as a protoplasmic outflow from its tissue of origin, passing at first along the line of pre-existent protoplasmic strands which traverse the blastocoel, and sending out at the same time processes which branch and anastomose with neighbouring processes (see E. W. MacBride, *Proc. Camb. Phil. Soc.*, 1896, p. 153). In the Vertebrata the whole of the mesoderm has at first the mesenchyme form. Afterwards, when the body-cavity split appears, the bulk of it assumes a kind of modified epithelial condition, which later on yields, by a process of outflow very similar in its character to what has been supposed to occur in the Echinoderm blastula, a considerable mesenchyme of the reticulate character. Mesenchyme is the tissue which in Vertebrate embryology has frequently been called embryonic connective tissue. This name is no doubt due to the fact that it was supposed to consist of isolated stellate cells. It is, however, in no sense of the word connective tissue, because it gives rise to many organs having nothing whatever to do with connective tissue. For instance, in Vertebrata this tissue gives rise to nervous tissue, blood-vessels, renal tubules, smooth muscular fibres, and other structures, as well as to connective and skeletal tissues. The Vertebrata, indeed, are remarkable for the fact that the epithelial tissues of the so-called mesoderm, *e.g.* the epithelial lining of the body-cavity, and of the renal tubules and urogenital tracts, all pass through the mesenchymatous condition, whereas in *Amphioxus*, *Balanoglossus* and presumably *Sagitta* and the Brachiopoda, all the mesodermal tissues pass through the epithelial condition, most of the mesodermal tissues of the adult retaining this condition permanently. As has been implied in the above account, mesenchyme is usually formed from epithelial mesoderm or from endoderm, or from tissue destined to form endoderm. It is also sometimes formed from ectoderm, as in the Vertebrata at the nerve crest and other places. In some Coelenterata also it appears certain that the ectoderm does furnish tissue of a mesenchymatous nature which passes into the jelly, but this phenomenon takes place comparatively late in life, at any rate after the embryonic period. In this connexion it may be interesting to point out that in many Coelenterates all the tissues of the body retain throughout life the epithelial condition, nothing comparable to mesenchyme ever being formed.

Continuity of the layers.

Finally, before leaving this branch of the subject, the fact that the three germinal layers are continuous with one another, and not isolated masses of tissue, may be emphasized. Indeed, an embryo may be defined as a multinucleated protoplasmic mass, in which the protoplasm at any surface—whether internal or external—is in the form of a relatively dense layer, while that in the interior is much vacuolated and reduced to a more or less sparse reticulum, the nuclei either being exclusively found in the surface protoplasm, or if the embryo has any bulk and the internal reticulum is at all well developed, at the nodes of the internal reticulum as well.

Mouth and anus.

The origin of some of the more important organs may now be considered. It is a remarkable fact that the mouth and anus develop in the most diverse ways in different groups, but as a rule either one or both of them can be traced into relation with the blastopore, the history of which must therefore be examined. In most, if not all, the great groups of the animal kingdom, *e.g.* in Coelenterata, Annelida, Mollusca, Vertebrata, and in Arthropoda, the blastopore or its representative is placed on the neural surface of the body, and, as will be shown later on, within the limits of the central nerve rudiment. Here it undergoes the most diverse fate, even in members of the same group. For instance, in *Peripatus capensis* it extends as a slit along the ventral surface, which closes up in the middle, but remains open at the two ends as the permanent mouth and anus. In other Arthropods, though full details have not yet in all cases been worked out, the following general statement may be made:—A blastopore (certain Crustacea) or its representative is formed on the neural surface of the embryo and always becomes closed, the mouth and anus arising as independent perforations later. Here no one would doubt the homology of the mouth and anus throughout the group; yet within the limits of a single genus—*Peripatus*—they show the most diverse modes of development. In Annelids the blastopore sometimes becomes the mouth (most Chaetopoda); sometimes it becomes the anus (*Serpula*); sometimes it closes up, giving rise to neither, though in this case it may assume the form of a long slit along the ventral surface before disappearing. In Mollusca its fate presents the same variations as in Annelida. Now in these groups no zoologist would deny the homology of the mouth and anus in the different forms, and yet how very different is their history even in closely allied animals. How are these apparently diverse facts to be reconciled? The only satisfactory explanation which has been offered (Sedgwick, *Quart. J. Mic. Science*, xxiv., 1884, p. 43) is that the blastopore is homologous in all the groups mentioned, and is the representative of the original single opening into the enteric cavity, such as at present characterizes the Coelenterata. From it the mouth and anus have been derived, as is indicated by its history in *Peripatus capensis*, and by the variability in its behaviour in closely allied forms; such variability in its subsequent history is due to its specialization as a larval organ, as a result of which it has lost its capacity to give rise to both mouth and anus, and sometimes to either.

That the blastopore does become specialized as a larval organ is obvious in those cases in which it becomes transformed into the single opening with which some larvae are, for a time at least, alone provided, *e.g.* *Pilidium*, Echinoderm larvae, &c., and that larval characters have been the principal causes of the form of embryonic characters, strong reason to believe will be adduced later on. In the Vertebrata the behaviour of the blastopore (anus of Rusconi) is also variable in a very remarkable manner. As a rule it is slit-like in form and closes completely, but in most cases one portion of it remains open longer than the rest, as the neurenteric canal. In a few forms (*e.g.* Newt, *Lepidosiren*, &c.) the very hindermost portion of the slit-like blastopore remains permanently open as the anus, and from such cases it can be shown that the neurenteric aperture (when present) is derived from a portion of the blastopore just anterior to its hindermost end. The words "hindermost" and "anterior" are used on the assumption that the whole blastopore has retained its dorsal position; as a matter of fact the hindermost part of it—the part which persists or reopens as the anus—loses this position in the course of development and becomes shifted on to the ventral surface. This is clearly seen in *Lepidosiren* (Kerr, *Phil. Trans.* cxcii., 1900), in Elasmobranchii, and in Amniota (primitive streak). Moreover, in *Lepidosiren*, and possibly in some other forms, the anus, *i.e.* the hind end of the blastopore, is at first contained within the medullary plate and bounded behind by the medullary folds. Later the portions of the medullary plate in the neighbourhood of the anus completely atrophy, and this relation is lost. This extension of the hind end of the blastopore on to the ventral surface, and atrophy of the portion of the medullary plate in relation with it, is a highly important phenomenon, and one to which attention will be again called when the relation of the mouth to the blastopore is being considered. The remarkable fact about the Vertebrata, a feature which that group shares in common with all other Chordata (*Amphioxus*, Tunicata, Enteropneusta) and with the Echinodermata, is that the mouth has never been traced into relation with the blastopore. For this reason, among others, it has been held by some zoologists that the mouth of the Vertebrata is not homologous with the mouth of such groups as the Annelida, Arthropoda and Mollusca. But, as has been explained above, in face of the extraordinary variability in the history of the mouth and anus in these groups, this view cannot be regarded as in any way established. On the contrary, there are distinct reasons for thinking that the Vertebrate mouth is a derivate of the blastopore. In the first place, in Elasmobranchii (Sedgwick, *Quart. Journ. Mic. Sci.* xxxiii., 1892, p. 559), and in a less conspicuous form in other vertebrate groups, the mouth has at first a slit-like form, extending from the anterior end of the central nerve-tube backwards along the ventral surface of the anterior part of the embryo. This slit-like rudiment, recalling as it does the form which the blastopore assumes in so many groups and in many Vertebrata, does suggest the view that possibly the mouth of the Vertebrata may in reality be derived from a portion of an originally long slit-like neural blastopore, which has become extended anteriorly on to the ventral surface and has lost its original relation to the nerve rudiment, as has undoubtedly happened with the posterior part, which persists as the anus.

Central nervous system.

Of the other organs which develop from the two primary layers it is only possible to notice here the central nervous system. This in almost all animals develops from the ectoderm. In Cephalopods among Mollusca—the development of which is remarkable from the almost complete absence of features which are supposed to have an ancestral significance—and in one or two other forms, it has been said to develop from the mesoderm; but apart from these exceptional and perhaps doubtful cases, the central nervous system of all embryos arises as thickenings of the ectoderm, and in the groups above mentioned, namely, Annelida, Mollusca, Arthropoda and Vertebrata, and probably others, from the ectoderm of the blastoporal surface of the body. This surface generally becomes the ventral surface, but in Vertebrata it becomes the dorsal. These thickened tracts of ectoderm in *Peripatus* and a few other forms can be clearly seen to surround the blastopore. This relation is retained in the adult in *Peripatus*, some Mollusca and some Nemertines, in which the main lateral nerve cords are united behind the anus as well as in front of the mouth; in other forms it cannot always be demonstrated, but it can, as in the case of the Vertebrata just referred to, always be inferred; only, in the Invertebrate groups the part of the nerve rudiment which has to be inferred is the posterior part behind the blastopore, whereas in Vertebrata it is the anterior part, namely, that in front of the blastopore, assuming that the mouth is a blastoporal derivate.

In the Echinodermata, Enteropneusta and one or two other groups, it is not possible, in the present state of knowledge, to bring the mouth into relation with the blastopore, nor can the blastopore be shown to be a perforation of the neural surface. For the Echinoderms, at any rate, this fact loses some of the importance which might at first sight be attributed to it when the remarkable organization of the adult and the sharp contrast which exists between it and the larva is remembered. In some Annelids the central nervous system remains throughout life as part of the outer epidermis, but as a general rule it becomes separated from the epidermis and embedded in the mesodermal tissues. The mode in which this separation is effected varies according to the form and structure of the central nervous system. In the Vertebrata, in which this organ has the form of a tube extending along the dorsal surface of the body, it arises as a groove of the medullary plate, which becomes constricted into a canal. The wall of this canal consists of ectoderm, which at an earlier stage formed part of the outer surface of the body, but which after invagination thickens, to give rise to the epithelial lining of the canal and to the nervous tissue which forms the bulk of the canal wall. The fact that the blastopore remains open at the hind end of the medullary plate explains to a certain extent the peculiar relation which always exists in the embryo between the hind end of the neural and alimentary canals. This communication between the hind end of the neural tube and the gut is one of the most remarkable and constant features of the Vertebrate embryo. As has been pointed out, it is not altogether unintelligible when we remember the relation of the blastopore to the medullary plate of the earlier stage, but to give a complete explanation of it is, and probably always will be, impossible. It is no doubt the impress of some remarkable larval condition of the blastopore of a stage of evolution now long past.

In *Ceratodus* the open part of the blastopore is enclosed by the medullary folds, as in *Lepidosiren*, and probably persists as the anus, the portion of the folds around the anus undergoing atrophy (Semon, *Zool. Forschungsreisen in Australien*, 1893, Bd. i. p. 39). In Urodeles the blastopore persists as anus, so far as is known, but the relation to the medullary folds has not been noticed. The same may be said of *Petromyzon* (A. E. Shipley, *Quart. Journ. Mic. Sci.* xxviii., 1887).

Cranial flexure.

The nerve tube of the Vertebrata at a certain early stage of the embryo becomes bent ventralwards in its anterior portion, in such a manner that the anterior end, which is represented in the adult by the infundibulum, comes to project backwards beneath the mid-brain. This bend, which is called the cranial flexure, takes place through the mid-brain, so that the hind-brain is unaffected by it. The cranial flexure is not, however, confined to the brain: the anterior end of the notochord, which at first extends almost to the front end of the nerve tube (this extension, which is quite obvious in the young embryo of Elasmobranchs, becomes masked in the later stages by the extraordinary modifications which the parts undergo), is also affected by it. Moreover, it affects even other parts, as may be seen by the oblique, almost antero-posterior, direction of the anterior gill slits as compared with the transverse direction of those behind. No satisfactory explanation has ever been offered of the cranial flexure. It is found in all Vertebrates, and is effected at an early stage of the development. In the later stages and in the adult it ceases to be noticeable, on account of an alteration of the relative sizes of parts of the brain. This is due almost entirely to the enormous growth of the cerebral vesicle, which is an outgrowth of the dorsal wall of the fore-brain just short of its anterior end. The anterior end of the fore-brain remains relatively small throughout life as the infundibulum, and the junction of this part of the fore-brain with the part which is so largely developed, as the rudiment of the cerebrum, is marked by the attachment of the optic chiasma. The optic nerve, indeed, is morphologically the first cranial nerve, the olfactory being the second; both are attached to what is morphologically the dorsal side of the nerve tube. The morphological anterior end of the central nerve tube is the point of the infundibulum which is in contact with the pituitary body. While on the subject of the cranial flexure, it may be pointed out that there is a similar downward curve of the hind end of the nervous axis, which leads into the hind end of the enteron. If it be supposed that originally there was a communication between the infundibulum and pituitary body, then the ventral flexure found at both ends of the nerve axis would originally have had the same result, namely, of placing the neural and alimentary canals in communication. Moreover, the mouth would have had much the same relation to this imaginary anterior neurenteric canal that the anus has to the actual posterior one.

In *Amphioxus* and the Tunicata the early development of the central nervous system is very much like that of the Vertebrata, but the later stages are simpler, being without the cranial flexure. The Tunicata are remarkable for the fact that the nervous system, though at first hollow, becomes quite solid in the adult. In *Balanoglossus* the central nervous system is in part tubular, the canal being open at each end. It arises, however, by delamination from the ectoderm, the tube being a secondary acquisition. This is probably due to a shortening of development, for the same feature is found in some Vertebrata (Teleostei, *Lepidosteus*, &c.), where the central canal is secondarily hollowed out in the solid keel-like mass which is separated from the ectoderm. Parts of the central nervous system arise by invagination in other groups; for instance, the cerebral ganglia of *Dentalium* are formed from the walls of two invaginations of ectoderm, which eventually disappear at the anterior end of the body (A. Kowalevsky, *Ann. Mus. Hist. Nat. Marseilles*, "Zoology," vol. i.). In *Peripatus* the cerebral ganglia arise in a similar way, but in this case the cavities of the invagination become separated from the skin and persist as two hollow appendages on the lower side of the cerebral ganglia. In other Arthropods the cerebral ganglia arise in a similar way, but the invaginations disappear in the adult. In Nemertines the cerebral ganglia contain a cavity which communicates with the exterior by a narrow canal. Finally, in certain Echinodermata the ventral part of the central nervous system arises by the invagination of a linear streak of ectoderm, the cavity of the invagination persisting as the epineural canal.

Peripheral nervous system.

Although the central nervous system is almost always developed from the ectoderm of the embryo, the same cannot be said of the peripheral nerve trunks. These structures arise from the mesoblastic reticulum already described (Sedgwick, *Quart. Journ. Mic. Sci.* xxxvii. 92). Inasmuch as this reticulum is perfectly continuous with the precisely similar though denser tissue in the ectoderm and endoderm, it may well be that a portion of the nerve trunks should be described as being ectodermal and endodermal in origin, though the bulk of them are undoubtedly formed from that portion of the reticulum commonly described as mesoblastic. But, however that may be, the tissue from which the great nerve trunks are developed is continuous on all sides with a similar tissue which pervades all the organs of the body, and in which the nuclei of these organs are contained.

In the early stages of development this tissue is very sparse and not easily seen. It would appear, indeed, that it is of a very delicate texture and readily destroyed by reagents. It is for this reason that the layers of the Vertebrate embryo are commonly represented as being quite isolated from one another, and that the medullary canal is nearly always represented as being completely isolated at certain stages from the surrounding tissues. In reality the layers are all connected together by this delicate tissue—in a sparse form, it is true—which not only extends between them, but also in a denser and more distinct form pervades them. In the germinal layers themselves, and in the organs developing from them, this tissue is in the young stages almost entirely obscured by the densely packed nuclei which it contains. For instance, in the wall of the medullary canal in the Vertebrate embryo, in the splanchnic and somatic layers of mesoderm of the same embryo, and in the developing nerve cords of the *Peripatus* embryo, the nuclei are at first so densely crowded together that it is almost impossible to see the protoplasmic framework in which they rest, but as development proceeds this extranuclear tissue becomes more largely developed, and the nuclei are forced apart, so that it becomes visible and receives various names according to its position. In the wall of the medullary canal of the Vertebrate embryo, on the outside of which it becomes especially conspicuous in certain places, and on the dorsal side of the developing nerve cords of the *Peripatus* embryo, it constitutes the white matter of the developing nerve cord; in the mesoblastic tissue outside, where it at the same time becomes more conspicuous (Sedgwick, "Monograph of the Development of *Peripatus capensis*," *Studies from the Morph. Lab. of the University of Cambridge*, iv., 1889, p. 131), it forms the looser network of the mesoblastic reticulum; and connecting the two, in place of the few and delicate strands of this tissue of the former stage, there are at certain places well-marked cords of a relatively dense texture, with the meshes of the reticulum elongated in the direction of the cord. This latter structure is an incipient nerve trunk. It can be traced outwards into the mesoblastic reticulum, from the strands of which it is indeed developed, and with which it is continuous not only at its free end, but also along its whole course. In this way the nerve trunks are developed—by a gathering up, so to speak, of the fibres of the reticulum into bundles. These bundles are generally marked by the possession of nuclei, especially in their cortical parts, which become no doubt the nuclei of the nerve sheath, and, in the neighbourhood of the ganglia, of nerve cells. From this account of the early development of the nerves, it is apparent that they are in their origin continuous with all the other tissues of the body, with that of the central nervous system and with that which becomes transformed into muscular tissue and connective and epithelial tissues. All these tissues are developed from the general reticulum, which in the young embryo can be seen to pervade the whole body, not being confined to the mesoderm, but extending between the nuclei of the ectoderm and endoderm, and forming the extra-nuclear, so-called cellular, protoplasm of those layers. Moreover, it must be remarked that in the stages of the embryo with which we are here concerned the so-called cellular constitution of the tissues, which is such a marked feature of the older embryo and adult, has not been arrived at. It is true, indications of it may be seen in some of the earlier-formed epithelia, but of nerve cells, muscular cells, and many kinds of gland cells no distinct signs are yet visible. This remark particularly applies to nerve cells, which do not make their appearance until a much later stage—not, indeed, until some time after the principal nerve trunks and ganglia are indicated as tracts of pale fibrous substance and aggregations of nuclei respectively.

The embryos of Elasmobranchs—particularly of *Scyllium*—are the best objects in which to study the development of nerves. In many embryos it is difficult to make out what happens, because the various parts of the body remain so close together that the process is obscured, and the loosening of the mesoblastic nuclei is deferred until after the nerves have begun to be differentiated. The process may also be traced in the embryos of *Peripatus*, where the main features are essentially similar to those above described (*op. cit.* p. 131). The development of the motor nerves has been worked out in *Lepidosiren* by J. Graham Kerr (*Trans. Roy. Soc. of Edinburgh*, 41, 1904. p. 119).

To sum up, the development of nerves is not, as has been recently urged, an outgrowth of cell processes from certain cells, but is a differentiation of a substance which was already in position, and from which all other organs of the body have been and are developed. It frequently happens that the young nerve tracts can be seen sooner near the central organ than elsewhere, but it is doubtful if any importance can be attached to this fact, since it is not constantly observed. For instance, in the case of the third nerve of *Scyllium* the differentiation appears to take place earliest near the ciliary ganglion, and to proceed from that point to the base of the mid-brain.

Coelom.

There are two main methods in which new organs are developed. In the one, which indicates the possibility of physiological continuity, the organ arises by the direct modification of a portion of a pre-existing organ; the development of the central nervous system of the Vertebrata from a groove in the embryonic ectoderm may be taken as an example of this method. In the other method there is no continuity which can be in any way interpreted as physiological; a centre of growth appears in one of the parts of the embryo, and gives rise to a mass of tissue which gradually shapes itself into the required organ. The development of the central nervous system in Teleosteans and in other similar exceptional cases may be mentioned as an example of the second plan. Such a centre of growth is frequently called a blastema, and consists of a mass of closely packed nuclei which have arisen by the growth-activity of the nuclei in the neighbourhood. The coelom, an organ which is found in the so-called coelomate animals, and which in the adult is usually divided up more or less completely into three parts, namely, body-cavity, renal organs, generative glands, presents in different animals both these methods of development. In certain animals it develops by the direct modification of a part of the primitive enteron, while in others it arises by the gradual shaping of a mass of tissue which consists of a compact mass of nuclei derived by nuclear proliferation from one or more of the pre-existing tissues of the body. Inasmuch as the first rudiment of the coelom nearly always makes its appearance at an early stage, when the ectoderm and endoderm are almost the only tissues present, and as it then bulks relatively very large and frequently contains within itself the potential centres of growth of other organs, *e.g.* mesenchymal organs (see above), it has come to be regarded by embryologists as being the forerunner of all the so-called mesodermal organs of the body, and has been dignified with the somewhat mysterious rank which attaches to the conception of a germinal layer. Its prominence and importance at an early stage led embryologists, as has already been explained, to overlook the fact that although some of the centres of growth for the formation of other non-coelomic mesodermal organs and tissues may be contained within it, all are not so contained, and that there are centres of mesodermal growth still left in the ectoderm and endoderm after its establishment. If these considerations, and others like them, are correct, it would seem to follow that the conception implied by the word mesoderm has no objective existence, that the tissue of the embryo called mesoderm, though sometimes mainly the rudiment of the coelom, is often much more than this, and contains within itself the rudiment of many, sometimes of all, of the organs appertaining to the mesenchyme. In thus containing within itself the potential centres of growth of other organs and tissues which are commonly ranked as mesodermal, it is not different from the rudiments of the two other organs already formed, namely, the ectoderm and endoderm; for these contain within themselves centres of growth for the production of so-called mesodermal tissues, as witness the nerve-crest of Vertebrata, the growing-point of the pronephric duct, and the formation of blood-vessels from the hypoblast described for some members of the same group.

In Echinodermata, *Amphioxus*, Enteropneusta, and a few other groups, the coelom develops from a portion or portions of the primitive enteron, which eventually becomes separated from the rest and forms a variable number of closed sacs lying between the gut and the ectoderm. The number of these sacs varies in different animals, but the evidence at present available seems to show that the maximum number is five—an unpaired one in front and two pairs behind—and, further, that if a less number of sacs is actually separated from the enteron, the rule is for these sacs so to divide up that they give rise to five sacs arranged in the manner indicated. The Enteropneusta present us with the clearest case of the separation of five sacs from the primitive enteron (W. Bateson, *Quart. Journ. Mic. Sci.* xxiv., 1884). In *Amphioxus*, according to the important researches of E. W. MacBride (*Quart. Journ. Mic. Sci.* xl. 589), it appears that a similar process occurs, though it is complicated by the fact that the sacs of the posterior pair become divided up at an early stage into many pairs. In *Phoronis* there are indications of the same phenomenon (A. T. Masterman, *Quart. Journ. Mic. Sci.* xliii. 375). In the Chaetognatha a single sac only is separated from the enteron, but soon becomes divided up. In the Brachiopoda one pair of sacs is separated from the enteron, but our knowledge of their later history is not sufficient to enable us to say whether they divide up into the typically arranged five sacs. In Echinodermata the number of sacs separated from the enteron varies from one to three; but though the history of these shows considerable differences, there are reasons to believe that the typical final arrangement is one unpaired and two paired sacs. But however many sacs may arise from the primitive enteron, and however these sacs may ultimately divide up and arrange themselves, the important point of development common to all these animals, about which there can be no dispute, is that the coelom is a direct differentiation of a portion of the enteron.

In the majority of the Coelomata the coelomic rudiment does not arise by the simple differentiation of a pre-existing organ, and there is considerable variation in its method of formation. Speaking generally, it may be said to arise by the differentiation of a blastema (see above), which develops at an early stage as a nuclear proliferation from one or more growth-centres in one or both of the primary layers. It appears in this tissue as a sac or as a series of sacs, which become transformed into the body-cavity (except in the Arthropoda), into the renal organs (with the possible exception, again, of some Arthropoda), and into the reproductive glands. In metamerically segmented animals the appearance of the cavities of these sacs is synchronous with, and indeed determines, the appearance of metameric segmentation. In all segmented animals in which the mesoderm (coelomic rudiment) appears as a continuous sheet or band of tissue on each side of the body, the coelomic cavity makes its first appearance not as a continuous space on each side, which later becomes divided up into the structures called mesoblastic somites, but as a series of paired spaces round which the coelomic tissue arranges itself in an epithelial manner. In the Vertebrata, it is true, the ventral portion of the coelom appears at first as a continuous space, at any rate behind the region of the two anterior pairs of somites, but in the dorsal portion the coelomic cavity is developed in the usual way, the coelomic tissue becoming transformed into the muscle plates and rudimentary renal tubules of the later stages. With regard to this ventral portion of the coelom in Vertebrata, it is to be noticed that the cavity in it never becomes divided up, but always remains continuous, forming the perivisceral portion of the coelom. The probable explanation of this peculiarity in the development of the Vertebrate coelom, as compared with that of *Amphioxus* and other segmented animals, is that the segmented stage of the ventral portion of the coelom is omitted. This explanation derives some support from the fact that even in animals in which the coelom is at its first appearance wholly segmented, it frequently happens that in the adult the perivisceral portion of it is unsegmented, *i.e.* it loses during development the segmentation which it at first possesses. This happens in many Annelida and in *Amphioxus*. The lesson, then, which the early history of the coelom in segmented animals teaches is, that however the coelomic cavity first makes its appearance, whether by evaginations from the primitive enteron, or by the hollowing out of a solid blastema-like tissue which has developed from one or both of the primary layers, it is in its first origin segmented, and forms the basis on which the segments of the adult are moulded. In Arthropoda the origin of the coelom is similar to that of Annelids, but its history is not completely known in any group, with the exception of *Peripatus*. In this genus it develops no perivisceral portion, as in other groups, but gives rise solely to the nephridia and to the reproductive organs. It is probable, though not certainly proved, that the history of the coelom in other Arthropods is essentially similar to that of *Peripatus*, allowance being made for the fact that the nephridial portion does not attain full development in those forms which are without nephridia in the adult.

With regard to the development of the vascular system, little can be said here, except that it appears to arise from the spaces of the mesoblastic reticulum. When this reticulum is sparse or so delicate as to give way in manipulation, these spaces appear to be represented by a continuous space which in the earliest stages of development is frequently spoken of as the blastocoel or segmentation cavity. They acquire special epithelial walls, and form the main trunks and network of smaller vessels found in animals with a canalicular vascular system, or the large sinus-like spaces characteristic of animals with a haemocoelic body-cavity.

Transient embryonic organs.

The existence of a phase at the beginning of life during which a young animal acquires its equipment by a process of growth of the germ is of course intelligible enough; such a phase is seen in the formation of buds, and in the sexual reproduction of both animals and plants. The remarkable point is that while in most cases this embryonic growth is a direct and simple process—*e.g.* animal and plant buds, embryonic development of plant seeds—in many cases of sexual reproduction of animals it is not direct, and the embryonic phase shows stages of structure which seem to possess a meaning other than that of being merely phases of growth. The fact that these stages of structure through which the embryo passes sometimes present for a short time features which are permanent in other members of the same group, adds very largely to the interest of the phenomenon and necessitates its careful examination. This may be divided into two heads: (1) in relation to embryos, (2) in relation to larvae. So far as embryos are concerned, we shall limit ourselves mainly to a consideration of the Vertebrata, because in them are found most instances of that remarkable phenomenon, the temporary assumption by certain organs of the embryo of stages of structure which are permanent in other members of the same group. As is well known, the embryos of the higher Vertebrata possess in the structure of the pharynx and of the heart and vascular system certain features—namely, paired pharyngeal apertures, a simple tubular heart, and a single ventral aorta giving off right and left a number of branches which pass between the pharyngeal apertures—which permanently characterize those organs in fishes. The skeleton, largely bony in the adult, passes through a stage in which it is entirely without bone, and consists mainly of cartilage—the form which it permanently possesses in certain fishes. Further, the Vertebrate embryo possesses for a time a notochord, a segmented muscular system, a continuity between the pericardium and the posterior part of the perivisceral cavity—all features which characterize certain groups of Pisces in the adult state. Instances of this kind might be multiplied, for the work of anatomists and embryologists has of late years been largely devoted to adding to them. Examples of embryonic characters which are not found in the adults of other Vertebrates are the following:—At a certain stage of development the central nervous system has the form of a groove in the skin, there is a communication at the hind end of the body between the neural and alimentary canals, the mouth aperture has at first the form of an elongated slit, the growing end of the Wolffian duct is in some groups continuous with the ectoderm, and the retina is at one stage a portion of the wall of the medullary canal. In the embryos of the lower Vertebrates many other instances of the same interesting character might be mentioned; for instance, the presence of a coelomic sac close to the eye, of another in the jaw, and of a third near the ear (Elasmobranchs), the opening of the Müllerian duct into the front end of the Wolffian duct, and the presence of an aperture of communication between the muscle-plate coelom and the nephridial coelom.

Recapitulation theory.

The interest attaching to these remarkable facts is much increased by the explanation which has been given of them. That explanation, which is a deduction from the theory of evolution, is to the effect that the peculiar embryonic structures and relations just mentioned are due to the retention by the embryo of features which, once possessed by the adult ancestor, have been lost in the course of evolution. This explanation, which at once suggests itself when we are dealing with structures actually present in adult members of other groups, does not so obviously apply to those features which are found in no adult animal whatsoever. Nevertheless it has been extended to them, because they are of a nature which it is not impossible to suppose might have existed in a working animal. Now this explanation, which, it will be observed, can only be entertained on the assumption that the evolution theory is true, has been still further extended by embryologists in a remarkable and frequently unjustifiable manner, and has been applied to all embryonic processes, finally leading to the so-called recapitulation theory, which asserts that embryonic history is a shortened recapitulation of ancestral history, or, to use the language of modern zoology, that the *ontogeny* or development of the individual contains an abbreviated record of the *phylogeny* or development of the race. A theory so important and far-reaching as this requires very careful examination. When we come to look for the facts upon which it is based, we find that they are non-existent, for the ancestors of all living animals are dead, and we have no means of knowing what they were like. It is true there are fossil remains of animals which have lived, but these are so imperfect as to be practically useless for the present requirements. Moreover, if they were perfectly preserved, there would be no evidence to show that they were ancestors of the animals now living. They might have been animals which have become extinct and left no descendants. Thus the explanation ordinarily given of the embryonic structures referred to is purely a deduction from the evolution theory. Indeed, it is even less than this, for all that can be said is something of this kind: if the evolution theory is true, then it is conceivable that the reason why the embryo of a bird passes through a stage in which its pharynx presents some resemblance to that of a fish is that a remote ancestor of the bird possessed a pharynx with lateral apertures such as are at present found in fishes.

But the explanation is sometimes pushed even further, and it is said that these pharyngeal apertures of the ancestral bird had the same respiratory function as the corresponding structures in modern fishes. That this is going too far a little reflection will show. For if it be admitted that all so-called vestigial structures had once the same function as the homologous structures when fully developed in other animals, it becomes necessary to admit that male mammals must once have had fully developed mammary glands and suckled the young, that female mammals formerly were provided with a functional penis, and that in species in which the females have a trace of the secondary sexual characters of the male the latter were once common to both sexes. The second and more extended form of the explanation plainly introduces a considerable amount of contentious matter, and it will be advisable, in the first instance, at any rate, to confine ourselves to a critical examination of the less ambitious conception. This explanation obviously implies the view that in the course of evolution the tendency has been for structures to persist in the embryo after they have been lost in the adult. Is there any justification for this view? It is clearly impossible to get any direct evidence, because, as explained above, we have no knowledge of the ancestors of living animals; but if we assume the evolution theory to be true, there is a certain amount of indirect evidence which is distinctly opposed to the view. As is well known, living birds are without teeth, but it is generally assumed that their edentulous condition has been comparatively recently acquired, and that they are descended from animals which, at a time not very remote from the present, possessed teeth. Considering the resemblance of birds to other terrestrial vertebrates, and the fact that extinct birds, not greatly differing from birds now living, are known to have had teeth, it must be allowed that there is some warrant for the assumption. Yet in no single case has it been certainly shown that any trace of teeth has been developed in the embryo. The same remark applies to a large number of similar cases; for instance, the reduced digits of the bird's hand and foot and the limbs of snakes. Moreover, organs which are supposed to have become recently reduced and functionless in the adult are also reduced in the embryo; for instance, digits 3 and 4 of the horse's foot, the hind limbs of whales (G. A. Guldberg and F. Nansen, "On the Development and Structure of Whales," *Bergen Museum*, 1894), the spiracle of Elasmobranchii. In fact, considerations of this kind distinctly point to the view that any tendency to the reduction or enlargement of an organ in the adult is shared approximately to the same extent by the embryo. But there are undoubtedly some, though not many, cases in which organs which were presumably present in an ancestral adult have persisted in the embryo of the modern form. As an instance may be mentioned the presence in whale-bone whales of imperfectly formed teeth, which are absorbed comparatively early in foetal life (Julin, *Arch. biologie*, i., 1880, p. 75).

It therefore becomes necessary to inquire why in some cases an organ is retained by the embryo after its loss by the adult, whereas in other cases it dwindles and presumably disappears simultaneously in the embryo and the adult. The whole question is examined and discussed by the present writer in the *Quarterly Journal of Microscopical Science*, xxxvi., 1894, p. 35, and the conclusions there reached are as follows:—A disappearing adult organ is not retained in a relatively greater development by an organism in the earlier stages of its individual growth unless it is of functional importance to the young form. In cases in which the whole development is embryonic this rarely happens, because the conditions of embryonic life are so different from free life that functional embryonic organs are usually organs *sui generis*, *e.g.* the placenta, amnion, &c., which cannot be traced to a modification of organs previously present in the adult. It does, however, appear to have happened sometimes, and as an instance of it may be mentioned the *ductus arteriosus* of the Sauropsidan and Mammalian embryo. On the other hand, when there is a considerable period of larval life, it does appear that there is a strong case for thinking that organs which have been lost by the adult may be retained and made use of by the larva. The best-known example that can be given of this is the tadpole of the frog. Here we find organs, viz. gills and gill-slits, which are universally regarded as having been attributes of all terrestrial Vertebrata in an earlier and aquatic condition, and we also notice that their retention is due to their being useful on account of the supposed ancient conditions of life having been retained. Many other instances, more or less plausible, of a like retention of ancestral features by larvae might be mentioned, and it must be conceded that there are strong reasons for supposing that larvae often retain traces, more or less complete, of ancestral stages of structure. But this admission does not carry with it any obligation to accept the widely prevalent view that larval history can in any way be regarded as a recapitulation of ancestral history. Far from it, for larvae in retaining some ancestral features are in no way different from adults; they only differ from adults in the features which they have retained. Both larvae and adults retain ancestral features, and both have been modified by an adaptation to their respective conditions of life which has ever been becoming more perfect.

The conclusion, then, has been reached, that whereas larvae frequently retain traces of ancestral stages of adult structure, embryos will rarely do so; and we are confronted again with the question, How are we to account for the presence in the embryo of numerous functionless organs which cannot be explained otherwise than as having been inherited from a previous condition in which they were functional? The answer is that the only organs of this kind which have been retained are organs which have been retained by the larvae of the ancestors after they have been lost by the adult, and have become in this way impressed upon the development. As an illustration taken from current natural history of the manner in which larval characters are in actual process of becoming embryonic may be mentioned the case of the viviparous salamander (*Salamandra atra*), in which the gills, &c., are all developed but never used, the animal being born without them. In other and closely allied species of salamander there is a considerable period of larval life in which the gills and gill-slits are functional, but in this species the larval stage, for the existence of which there was a distinct reason, viz. the entirely aquatic habits of life in the young state, has become at one stroke embryonic by its simple absorption into the embryonic period. The view, then, that embryonic development is essentially a recapitulation of ancestral history must be given up; it contains only a few references to ancestral history, namely, those which have been preserved probably in a much modified form by previous larvae.

Law of v. Baer.

We must now pass to the consideration of another supposed law of embryology—the so-called law of v. Baer. This generalization is usually stated as follows:—Embryos of different species of the same group are more alike than adults, and the resemblances are greater the younger the embryo examined. Great importance has been attached to this generalization by embryologists and naturalists, and it is very widely accepted. Nevertheless, it is open to serious criticism. If it were true, we should expect to find that embryos of closely similar species would be indistinguishable, but this is notoriously not the case. On the contrary, they often differ more than do the adults, in support of which statement the embryos of the different species of *Peripatus* may be referred to. The generalization undoubtedly had its origin in the fact that there is what may be called a family resemblance between embryos, but this resemblance, which is by no means exact, is purely superficial, and does not extend to anatomical detail. On the contrary, it may be fairly argued that in some cases embryos of widely dissimilar members of the same group present anatomical differences of a higher morphological value than do the adults (see Sedgwick, *loc. cit.*), and, as stated above the embryos of closely allied animals are distinguishable at all stages of development, though the distinguishing features are not the same as those which distinguish the adults. To say that the development of the organism and of its component parts is a progress from the simple to the complex is to state a truism, but to state that it is also a progress from the general to the special is to go altogether beyond the facts. The bipinnaria larva of an echinoderm, the trochosphere larva of an annelid, the blastodermic vesicle of a mammal are all as highly specialized as their respective adults, but the specialization is for a different purpose, and of a different kind to that which characterizes the adult.

History of embryology.

In its scientific and systematic form embryology may be considered as having only taken birth within the last century, although the germ from which it sprung was already formed nearly half a century earlier. The ancients, it is true, as we see by the writings of Aristotle and Galen, pursued the subject with interest, and the indefatigable Greek naturalist and philosopher had even made continued series of observations on the progressive stages of development in the incubated egg, and on the reproduction of various animals; but although, after the revival of learning, various anatomists and physiologists from time to time made contributions to the knowledge of the foetal structure in its larger organs, yet from the minuteness of the observations required for embryological research, it was not till the microscope came into use for the investigation of organic structure that any intimate knowledge was attained of the nature of organogenesis. It is not to be wondered at, therefore, that during a long period, in this as in other branches of physical inquiry, vague speculations took the place of direct observation and more solid information. This is apparent in most of the works treating of generation during the 16th and part of the 17th centuries.[1]

Harvey was the first to give, in the middle of the latter century, a new life and direction to investigation of this subject, by his discovery of the connexion between the cicatricula of the yolk and the rudiments of the chick, and by his faithful description of the successive stages of development as observed in the incubated egg, as well as of the progress of gestation in some Mammalia. He had also the merit of fixing the attention of physiologists upon general laws of development as deduced from actual observation of the phenomena, by the enunciation of two important propositions, viz.—(1) that all animals are produced out of ova, and (2) that the organs of the embryo arise by new formation, or *epigenesis*, and not by mere enlargement out of a pre-existing invisible condition (*Exercitationes de generatione animalium*, Amstelodami, 1651). Harvey's observations, however, were aided only by the use of magnifying glasses (perspecillae), probably of no great power, and he saw nothing of the earliest appearances of the embryo in the first thirty-six hours, and believed the blood and the heart to be the parts first formed.

The influence of the work of Harvey, and of the successful application of the microscope to embryological investigation, was soon afterwards apparent in the admirable researches of Malpighi of Bologna, as evinced by his communications to the Royal Society of London in 1672, "De ovo incubato," and "De formatione pulli," and more especially in his delineations of some of the earlier phenomena of development, in which, as in many other parts of minute anatomy, he partially or wholly anticipated discoveries, the full development of which has only been accomplished in the present century. Malpighi traced the origin of the embryo almost to its very commencement in the formation of the cerebro-spinal groove within the cicatricula, which he removed from the opaque mass of the yolk; and he only erred in supposing the embryonal rudiments to have pre-existed as such in the egg, in consequence, apparently, of his having employed for observation, in very warm weather, eggs which, though he believed them to be unincubated, had in reality undergone some of the earlier developmental changes.

The works of Walter Needham (1667), Regnier de Graaf (1673), Swammerdam (1685), Vallisneri (1689)—following upon those of Harvey—all contain important contributions to the knowledge of our subject, as tending to show the similarity in the mode of production from ova in a variety of animals with that previously best known in birds. The observations more especially of de Graaf, Nicolas Steno and J. van Horne gave much greater precision to the knowledge of the connexion between the origin of the ovum of quadrupeds and the vesicles of the ovary now termed Graafian, which de Graaf showed always burst and discharged their contents on the occurrence of pregnancy.

These observations bring us to the period of Boerhaave and Albinus in the earlier part of the 18th century, and in the succeeding years to that of Haller, whose vast erudition and varied and accurate original observations threw light upon the entire process of reproduction in animals, and brought its history into a more systematic and intelligible form. A considerable part of the seventh and the whole of the eighth volumes of Haller's great work, the *Elementa physiologiae*, published at successive times from 1757 to 1766, are occupied with the general view of the function of generation, while his special contributions to embryology are contained in his *Deux mémoires sur la formation du cœur dans le poulet* and *Deux mémoires sur la formation des os*, both published at Lausanne in 1758, and republished in an extended and altered form, together with his "Observations on the early condition of the Embryo in Quadrupeds," made along with Kühlemann, in the *Opera minora* (1762–1768). Though originally educated as a believer in the doctrine of "preformation" by his teacher Boerhaave, Haller was soon led to abandon that view in favour of "epigenesis" or new formation, as may be seen in various parts of his works published before the middle of the century; see especially a long note explanatory of the grounds of his change of opinion in his edition of Boerhaave's *Praelectiones academicae*, vol. v. part 2, p. 497 (1744), and his *Primae lineae physiologiae* (1747). But some years later, and after having been engaged in observing the phenomena of development in the incubated egg, he again changed his views, and during the remainder of his life was a keen opponent of the system of epigenesis, and a defender and exponent of the theory of "evolution," as it was then named—a theory very different from that now bearing the name, and which implied belief in the pre-existence of the organs of the embryo in the germ, according to the theory of encasement (*emboîtement*) or inclusion supported by Leibnitz and Bonnet. (See the interesting work of Bonnet, *Considérations sur les corps organisés*, Amsterdam, 1762, for an account of his own views and those of Haller.)

It was reserved for Caspar Frederick Wolff (1733–1794), a German by birth, but naturalized afterwards in Russia, to bring forward observations which, though almost entirely neglected for a long time after their publication, and in some measure discredited under the influence of Haller's authority, were sixty years later acknowledged to have established the theory of epigenesis upon the secure basis of ascertained facts, and to have laid the first foundation of the morphological science of embryology. Wolff's work, entitled *Theoria generationis*, first published as an inaugural Dissertation at Berlin in 1759, was republished with additions in German at Berlin in 1764, and again in Latin at Halle in 1774. Wolff also wrote a "Memoir on the Development of the Intestine" in *Nov. comment. acad. Petropol.*, 1768 and 1769. But it was not till the latter work was translated into German by J. F. Meckel, and appeared in his *Archiv* for 1812, that Wolff's peculiar merits as the founder of modern embryology came to be known or fully appreciated.

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[1] It may be proper to mention, as authors of this period who made special researches on the development of the embryo—(1) Volcher Coiter of Groningen, who, along with Aldrovandus of Bologna, made a series of observations on the formation of the chick, day by day, in the incubated egg, which were described in a work published in 1573, and (2) Hieronymus Fabricius (ab Aquapendente), who, in his work *De formato foetu*, first published at Padua in 1600, gave an interesting account, illustrated by many fine engravings, of uterogestation and the foetus of a number of quadrupeds and other animals, and in a posthumous work entitled *De formatione ovi et pulli*, edited by J. Prevost and published at Padua in 1621, described and illustrated by engravings the daily changes of the egg in incubation. It is enough, however, to say that Fabricius was entirely ignorant of the earlier phenomena of development which occur in the first two or three days, and even of the source of the embryonic rudiments, which he conceived to spring, not from the yolk or true ovum, but from the chalazae or twisted, deepest part of the white. The cicatricula he looked upon as merely the vestige of the pedicle by which the yolk had previously been attached to the ovary.

The special novelty of Wolff's discoveries consisted mainly in this, that he showed that the germinal part of the bird's egg forms a layer of united granules or organized particles (cells of the modern histologist), presenting at first no semblance of the form or structure of the future embryo, but gradually converted by various morphological changes in the formative material, which are all capable of being traced by observation, into the several rudimentary organs and systems of the embryo. The earlier form of the embryo he delineated with accuracy; the actual mode of formation he traced in more than one organ, as for example in the alimentary canal, and he was the discoverer of several new and important embryological facts, as in the instance of the primordial kidneys, which have thus been named the Wolffian bodies. Wolff further showed that the growing parts of plants owe their origin to organized particles or cells, so that he was led to the great generalization that the processes of embryonic formation and of adult growth and nutrition are all of a like nature in both plants and animals. No advance, however, was made upon the basis of Wolff's discoveries till the year 1817, when the researches of C. H. Pander on the development of the chick gave a fuller and more exact view of the phenomena less clearly indicated by Wolff, and laid down with greater precision a plan of the formation of parts in the embryo of birds, which may be regarded as the foundation of the views of all subsequent embryologists.

But although the minuter investigation of the nature and true theory of the process of embryonic development was thus held in abeyance for more than half a century, the interval was not unproductive of observations having an important bearing on the knowledge of the anatomy of the foetus and the function of reproduction. The great work of William Hunter on the human gravid uterus, containing unequalled pictorial illustrations of its subject from the pencil of Rymsdyk and other artists, was published in 1775;[1] and during a large part of the same period numerous communications to the *Memoirs* of the Royal Society testified to the activity and genius of his brother, John Hunter, in the investigation of various parts of comparative embryology. But it is mainly in his rich museum, and in the manuscripts and drawings which he left, and which have been in part described and published in the catalogue of his wonderful collection, that we obtain any adequate idea of the unexampled industry and wide scope of research of that great anatomist and physiologist.

As belonging to a somewhat later period, but still before the time when the more strict investigation of embryological phenomena was resumed by Pander, there fall to be noticed, as indicative of the rapid progress that was making, the experiments of L. Spallanzani, 1789; the researches of J. H. von Autenrieth, 1797, and of Soemmering, 1799, on the human foetus; the observations of Senff on the formation of the skeleton, 1801; those of L. Oken and D. G. Kieser on the intestine and other organs, 1806; Oken's remarkable work on the bones of the head, 1807 (with the views promulgated in which Goethe's name is also intimately connected); J. F. Meckel's numerous and valuable contributions to embryology and comparative anatomy, extending over a long series of years; and F. Tiedemann's classical work on the development of the brain, 1816.

The observations of the Russian naturalist, Christian Heinrich Pander (1794–1865), were made at the instance and under the immediate supervision of Prof. Döllinger at Würzburg, and we learn from von Baer's autobiography that he, being an early friend of Pander's, and knowing his qualifications for the task, had pointed him out to Döllinger as well fitted to carry out the investigation of development which that professor was desirous of having accomplished. Pander's inaugural dissertation was entitled *Historia metamorphoseos quam ovum incubatum prioribus quinque diebus subit* (Virceburgi, 1817); and it was also published in German under the title of *Beiträge zur Entwickelungsgeschichte des Hühnchens im Eie* (Würzburg, 1817). The beautiful plates illustrating the latter work were executed by the elder E. J. d'Alton, well known for his skill in scientific observation, delineation and engraving.

Pander observed the germinal membrane or *blastoderm*, as he for the first time called it, of the fowl's egg to acquire three layers of organized substance in the earlier period of incubation. These he named respectively the serous or outer, the vascular or middle, and the mucous or inner layers, and he traced with great skill and care the origin of the principal rudimentary organs and systems from each of these layers, pointing out shortly, but much more distinctly than Wolff had done, the actual nature of the changes occurring in the process of development.

Karl Ernest von Baer (*q.v.*), the greatest of modern embryologists, was, as already remarked, the early friend of Pander, and, at the time when the latter was engaged in his researches at Würzburg, was associated with Döllinger as prosector, and engaged with him in the study of comparative anatomy. He witnessed, therefore, though he did not actually take part in, Pander's researches; and the latter having afterwards abandoned the inquiry, von Baer took it up for himself in the year 1819, when he had obtained an appointment in the university of Königsberg, where he was the colleague of Burdach and Rathke, both of whom were able coadjutors in the investigation of the subject of his choice. (See v. Baer's interesting autobiography, published on his retirement from St Petersburg to Dorpat in 1864.)

Von Baer's observations were carried on at various times from 1819 to 1826 and 1827, when he published the first results in a description of the development of the chick in the first edition of Burdach's *Physiology*.

It was at this time that von Baer made the important discovery of the ovarian ovum of mammals and of man, totally unknown before his time, and was thus able to prove as matter of exact observation what had only been surmised previously, viz. the entire similarity in the mode of origin of these animals with others lower in the scale. (*Epistola de ovi mammalium et hominis genesi*, Lipsiae, 1827. See also the interesting commentary on or supplement to the *Epistola* in Heusinger's *Journal*, and the translation in Breschet's *Répertoire*, Paris, 1829.)

In 1829 von Baer published the first part of his great work, entitled *Beobachtungen und Reflexionen über die Entwickelungsgeschichte der Thiere*, the second part of which, still leaving the work incomplete, did not appear till 1838. In this work, distinguished by the fulness, richness and extreme accuracy of the observations and descriptions, as well as by the breadth and soundness of the general views on embryology and allied branches of biology which it presents, he gave a detailed account not only of the whole progress of development of the chick as observed day by day during the incubation of the egg, but he also described what was known, and what he himself had investigated by numerous and varied observations, of the whole course of formation of the young in other vertebrate animals. His work is in fact a system of comparative embryology, replete with new discoveries in almost every part.

Von Baer's account of the layers of the blastoderm differs somewhat from that of Pander, and appears to be more consistent with the further researches which have lately been made than was at one time supposed, in this respect, that he distinguished from a very early period two primitive or fundamental layers, viz. the animal or upper, and the vegetative or lower, from each of which, in connexion with two intermediate layers derived from them, the fundamental organs and systems of the embryo are derived:—the animal layer, with its derivative, supplying the dermal, neural, osseous and muscular; the vegetative layer, with its derivative, the vascular and mucous (intestinal) systems. He laid down the general morphological principle that the fundamental organs have essentially the shape of tubular cavities, as appears in the first form of the central organ of the nervous system, in the two muscular and osseous tubes which form the walls of the body, and in the intestinal canal; and he followed out with admirable clearness the steps by which from these fundamental systems the other organs arise secondarily, such as the organs of sense, the glands, lungs, heart, vascular glands, Wolffian bodies, kidneys and generative organs.

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[1] Along with the work of W. Hunter must be mentioned a large collection of unpublished observations by Dr James Douglas, which are preserved in the Hunterian Museum of Glasgow University.

To complete von Baer's system there was mainly wanting a more minute knowledge of the intimate structure of the elementary tissues, but this had not yet been acquired by biologists, and it remained for Theodor Schwann of Liége in 1839, along with whom should be mentioned those who, like Robert Brown and M. J. Schleiden, prepared the way for his great discovery, to point out the uniformity in histological structure of the simpler forms of plants and animals, the nature of the organized animal and vegetable cell, the cellular constitution of the primitive ovum of animals, and the derivation of the various tissues, complex as well as simple, from the transformation or, as it is now called, differentiation of simple cellular elements,—discoveries which have exercised a powerful and lasting influence on the whole progress of biological knowledge in our time, and have contributed in an eminent degree to promote the advance of embryology itself.

To K. B. Reichert of Berlin more particularly is due the first application of the newer histological views to the explanation of the phenomena of development, 1840. To him and to R. A. von Kölliker and R. Virchow is due the ascertainment of the general principle that there is no free-cell formation in embryonic development and growth, but that all organs are derived from the multiplication, combination and transformation of cells, and that all cells giving rise to organs are the descendants or progeny of previously existing cells, and that these may be traced back to the original cell or cell-substance of the ovum.

It may be that modern research has somewhat modified the views taken by biologists of the statements of Schwann as to the constitution of the organized cell, especially as regards its simplest or most elementary form, and has indicated more exactly the nature of the protoplasmic material which constitutes its living basis; but it has not caused any very wide departure from the general principles enunciated by that physiologist. Schwann's treatise, entitled *Microscopical Researches into the Accordance in the Structure and Growths of Animals and Plants*, was published in German at Berlin in 1839, and was translated into English by Henry Smith, and printed for the Sydenham Society in 1847, along with a translation of Schleiden's memoir, "Contributions to Phytogenesis," which originally appeared in 1838 in Müller's *Archiv* for that year, and which had also been published in English in Taylor and Francis's *Scientific Memoirs*, vol. ii. part vi.

Among the newer observations of the same period which contributed to a more exact knowledge of the structure of the ovum itself may be mentioned—first the discovery of the germinal vesicle, or nucleus, in the germ-disk of birds by J. E. von Purkinje (*Symbolae ad ovi avium historiam ante incubationem*, Vratislaviae, 1825, and republished at Leipzig in 1830); second, von Baer's discovery of the mammiferous ovum in 1827, already referred to; third, the discovery of the germinal vesicle of mammals by J. V. Coste in 1834, and its independent observation by Wharton Jones in 1835; and fourth, the observation in the same year by Rudolph Wagner of the germinal macula or nucleus. Coste's discovery of the germinal vesicle of Mammalia was first communicated to the public in the *Comptes rendus* of the French Academy for 1833, and was more fully described in the *Recherches sur la génération des mammifères*, by Delpech and Coste (Paris, 1834). Thomas Wharton Jones's observations, made in the autumn of 1834, without a knowledge of Coste's communication, were presented to the Royal Society in 1835. This discovery was also confirmed and extended by G. G. Valentin and Bernardt, as recorded by the latter in his work *Symb. ad ovi mammal. hist. ante praegnationem*. Rudolph Wagner's observations first appeared in his *Textbook of Comparative Anatomy*, published at Leipzig in 1834–1835, and in Müller's *Archiv* for the latter year. His more extended researches are described in his work *Prodromus hist. generationis hominis atque animalium* (Leipzig, 1836), and in a memoir inserted in the *Trans. of the Roy. Bavarian Acad. of Sciences* (Munich, 1837).

The two decades of years from 1820 to 1840 were peculiarly fertile in contributions to the anatomy of the foetus and the progress of embryological knowledge. The researches of Prévost and Dumas on the ova and primary stages of development of Batrachia, birds and mammals, made as early as 1824, deserve especial notice as important steps in advance, both in the discovery of the process of yolk segmentation in the batrachian ovum, and in their having shown almost with the force of demonstration, previous to the discovery of the mammiferous ovarian ovum by von Baer, that that body must exist as a minute spherule in the Graafian follicle of the ovary, although they did not actually succeed in bringing the ova clearly under observation.

The works of Pockels (1825), of Seiler (1831), of G. Breschet (1832), of A. A. L. M. Velpeau (1833), of T. L. W. Bischoff (1834)—all bearing upon human embryology; the researches of Coste in comparative embryology in 1834, already referred to, and those published by the same author in 1837; the publication of Johannes Müller's great work on physiology, and Rudolph Wagner's smaller text-book, in both of which the subject of embryology received a very full treatment, together with the excellent *Manual of the Development of the Foetus*, by Valentin, in 1835, the first separate and systematic work on the whole subject, now secured to embryology its permanent place among the biological sciences on the Continent; while in this country attention was drawn to the subject by the memoirs of Allen Thomson (1831), Th. Wharton Jones (1835–1838) and Martin Barry (1839–1840).

Among the more remarkable special discoveries which belong to the period now referred to, a few may be mentioned, as, for example, that of the chorda dorsalis by von Baer, a most important one, which may be regarded as the key to the whole of vertebral morphology; the phenomenon of yolk segmentation, now known to be universal among animals, but which was only first carefully observed in Batrachia by Prévost and Dumas (though previously casually noticed by Swammerdam), and was soon afterwards followed out by Rusconi and von Baer in fishes; the discovery of the branchial clefts, plates and vascular arches in the embryos of the higher abranchiate animals by H. Rathke in 1825–1827; the able investigation of the transformations of these arches by Reichert in 1837; and the researches on the origin and development of the urinary and generative organs by Johannes Müller in 1829–1830.

On entering the fifth decade of the 19th century, the number of original contributions and systematic treatises becomes so great as to render the attempt to enumerate even a selection of the more important of them quite unsuitable to the limits of the present article. We must be satisfied, therefore, with a reference to one or two which seem to stand out with greater prominence than the rest as landmarks in the progress of embryological discovery. Among these may first be mentioned the researches of Theodor L. W. von Bischoff, formerly of Giessen and later of Munich, on the development of the ovum in Mammalia, in which a series of the most laborious, minute and accurate observations furnished a greatly novel and very full history of the formative process in several animals of that class. These researches are contained in four memoirs, treating separately of the development of the rabbit, the dog, the guinea-pig and the roe-deer, and appeared in succession in the years 1842, 1845, 1852 and 1854.

Next may be mentioned the great work of Coste, entitled *Histoire gén. et particul. du développement des animaux*, of which, however, only four fasciculi appeared between the years 1847 and 1859, leaving the work incomplete. In this work, in the large folio form, beautiful representations are given of the author's valuable observations on human embryology, and on that of various mammals, birds and fishes, and of the author's discovery in 1847 of the process of partial yolk segmentation in the germinal disk of the fowl's egg during its descent through the oviduct, and his observations on the same phenomenon in fishes and mammals.

The development of reptiles received important elucidation from the researches of Rathke, in his history of the development of serpents, published at Königsberg in 1839, and in a similar work on the turtle in 1848, as well as in a later one on the crocodile in 1866, along with which may be associated the observations of H. J. Clark on the "Embryology of the Turtle," published in Agassiz's *Contributions to Natural History, &c.*, 1857.

The phenomena of yolk segmentation, to which reference has more than once been made, and to which later researches give more and more importance in connexion with the fundamental phenomena of development, received great elucidation during this period, first from the observations of C. T. E. von Siebold and those of Bagge on the complete yolk segmentation of the egg in nematoid worms in 1841, and more fully by the observations of Kölliker in the same animals in 1843. The nature of partial segmentation of the yolk was first made known by Kölliker in his work on the development of the Cephalopoda in 1844, and, as has already been mentioned, the phenomena were observed by Coste in the eggs of birds. The latter observations have since been confirmed by those of Oellacher, Götte and Kölliker. Further researches in a vast number of animals give every reason to believe that the phenomenon of segmentation is in some shape or other the invariable precursor of embryonic formation.

The first considerable work on the development of a division of the invertebrates was that of Maurice Herold of Marburg on spiders, *De generatione aranearum ex ovo*, published at Marburg in 1824, in which the whole phenomena of the formative processes in that animal are described with remarkable clearness and completeness. A few years later an important series of contributions to the history of the development of invertebrate animals appeared in the second volume of Burdach's work on *Physiology*, of which the first edition was published in 1828, and in this the history of the development of the Entozoa was the production of Ch. Theod. von Siebold, and that of most of the other invertebrates was compiled by H. Rathke from the results of his own observations and those of others. These memoirs, together with others subsequently published by Rathke, notably that *Über die Bildung und Entwickelungsgeschichte d. Flusskrebses* (Leipzig, 1829), in which an attempt is made to extend the doctrine of the derivation of the organs from the germinal layers to the invertebrata, entitle him to be regarded as the founder of invertebrate embryology.

A large body of facts having by this time been ascertained with respect to the more obvious processes of development, a further attempt to refer the phenomena of organogenesis to morphological and histological principles became desirable. More especially was the need felt to point out with greater minuteness and accuracy the relation in which the origin of the fundamental organs of the embryo stands to the layers of the blastoderm; and this we find accomplished with signal success in the researches of R. Remak on the development of the chick and frog, published between the years 1850 and 1855.

Starting from Pander's discovery of the trilaminate blastoderm, Remak worked out the development of the chick in the light of the cell-theory of Schleiden and Schwann. He observed the division of the middle layer into two by a split which subsequently gives rise to the body-cavity (pleuro-peritoneal space) of the adult; and traced the principal organs which came from these two layers (*Hautfaserblatt* and *Darmfaserblatt*) respectively. In this manner the foundations of the germ-layer theory were established in their modern form.

A great step forward was made in 1859 by T. H. Huxley, who compared the serous and mucous layers of Pander with the ectoderm and endoderm of the Coelenterata. But in spite of this comparison it was generally held that germinal layers similar to those of the vertebrata were not found in invertebrate animals, and it was not until the publication in 1871 of Kowalewsky's researches (see below) that the germinal layer theory was applied to the embryos of all the Metazoa. But the year 1859 will be for ever memorable in the history of science as the year of the publication of the *Origin of Species*. If the enunciation of the cell-theory may be said to have marked a first from a second period in the history of embryology, the publication of Darwin's great idea ushered in a third. Whereas hitherto the facts of anatomy and development were loosely held together by the theory of types which owed its origin and maintenance to Cuvier, L. Agassiz, J. Müller and R. Owen, they were now combined into one organic whole by the theory of descent and by the hypothesis of recapitulation which was deduced from that theory. First clearly enunciated by Johann Müller in his well-known work *Für Darwin* published in 1864 (rendered in England as *Facts for Darwin*, 1869), the view that a knowledge of embryonic and larval histories would lay bare the secrets of race history and enable the course of evolution to be traced and so lead to the discovery of the natural system of classification, gave a powerful stimulus to embryological research. The first fruits of this impetus were gathered by Alexander Agassiz, A. Kowalewsky and E. Metschnikoff. Agassiz, in his memoir on the *Embryology of the Starfish* published in 1864, showed that the body-cavity in Echinodermata arises as a differentiation of the enteron of the larva and so laid the foundations of our present knowledge of the coelom. This discovery was confirmed in 1869 by Metschnikoff ("Studien üb. d. Entwick. d. Echinodermen u. Nemertinen," *Mém. Ac. Pétersbourg* (7), 41, 1869), and extended by him to Tornaria, the larva of *Balanoglossus* in 1870 ("Untersuchungen üb. d. Metamorphose einiger Seethiere," *Zeit. f. wiss. Zoologie*, 20, 1870). In 1871 Kowalewsky in his classical memoir, entitled "Embryologische Studien an Würmern und Arthropoden" (*Mém. Acad. Pétersbourg* (7), 16, 1871), proved the same fact for Sagitta and added immensely to our knowledge of the early stages of development of the Invertebrata. These memoirs formed the basis on which subsequent workers took their stand. Amongst the most important of these was F. M. Balfour (1851–1882). Led to the study of embryology by his teacher, M. Foster, in association with whom he published in 1874 the *Elements of Embryology*, Balfour was one of the first to take advantage of the facilities for research offered by Dr. A. Dohrn's Zoological Station at Naples which has since become so celebrated. Here he did the work which was subsequently published in 1878 in his *Monograph of the Development of Elasmobranch Fishes*, and which constituted the most important addition to vertebrate morphology since the days of Johannes Müller. This was followed in 1879 and 1881 by the publication of his *Treatise on Comparative Embryology*, the first work in which the facts of the rapidly growing science were clearly and philosophically put together, and the greatest. The influence of Balfour's work on embryology was immense and is still felt. He was an active worker in every department of it, and there are few groups of the animal kingdom on which he has not left the impress of his genius.

In the period under consideration the output of embryological work has been enormous. No group of the animal kingdom has escaped exhaustive examination, and no effort has been spared to obtain the embryos of isolated and out of the way forms, the development of which might have a bearing upon important questions of phylogeny and classification. Of this work it is impossible to speak in detail in this summary. It is only possible to call attention to some of its more important features, to mention the more important advances, and to refer to some of the more striking memoirs.

Marine zoological stations have been established, expeditions have been sent to distant countries, and the methods of investigation have been greatly improved. Since Anton Dohrn founded the Stazione Zoologica at Naples in 1872, observatories for the study of marine organisms have been established in most countries. Of journeys which have been made to distant countries and which have resulted in important contributions to embryology, may be mentioned the expedition (1884–1886) of the cousins Sarasin to Ceylon (development of Gymnophiona), of E. Selenka to Brazil and the East Indies (development of Marsupials, Primates and other mammals, 1877, 1889, 1892), of A. A. W. Hubrecht to the East Indies (1890, development of *Tarsius*), of W. H. Caldwell to Australia (1883–1884, discovery of the nature of the ovum and oviposition of *Echidna* and of *Ceratodus*), of A. Sedgwick to the Cape (1883, development of *Peripatus*), of J. Graham Kerr to Paraguay (1896, development of *Lepidosiren*), of R. Semon to Australia and the Malay Archipelago (1891–1893, development of Monotremata, Marsupialia), and of J. S. Budgett to Africa (1898, 1900, 1901, 1903, development of *Polypterus*).

In methods, while great improvements have been made in the processes of hardening and staining embryos, the principal advance has been the introduction in 1883 by W. H. Caldwell in his work on the development of *Phoronis* of the method of making tape-worm like strings of sections as a result of which the process of mounting in order all the sections obtained from an embryo was much facilitated, and the use of an automatic microtome rendered possible. The method of Golgi for the investigation of the nervous system, introduced in 1875, must also be mentioned here.

The word "coelom" (*q.v.*) was introduced into zoology by E. Haeckel in 1872 (*Kalkschwämme*, p. 468) as a convenient term for the body-cavity (pleuroperitoneal). The word was generally adopted, and was applied alike to the blood-containing body-cavity of Arthropods and to the body-cavity of Vertebrata and segmented worms, in which there is no blood. In 1875 Huxley (*Quarterly Journ. of Mic. Science*, 15, p. 53), relying on the researches of Agassiz, Metschnikoff and Kowalewsky above mentioned, put forward the idea that according to their development three kinds of body-cavity ought to be distinguished: (1) the enterocoelic which arises from enteric diverticula, (2) the schizocoelic which develops as a split in the embryonic mesoblast, and (3) the epicoelic which was enclosed by folds of the skin and lined by ectoderm (*e.g.* atrial cavity of Tunicates, &c.). This suggestion was of great importance, because it led the embryologists of the day (Balfour, the brothers Hertwig, Lankester and others) to discuss the question as to whether there was not more than one kind of body-cavity. The Hertwigs (*Coelomtheorie*, Jena, 1881) distinguished two kinds, the enterocoel and the pseudocoel. The former, to which they limited the use of the word coelom, and which is developed directly or indirectly from the enteron, is found in Annelida, Arthropoda, Echinodermata, Chordata, &c. The latter they regarded as something quite different from the coelom and as arising by a split in what they called for the first time mesenchyme; the mesenchyme being the non-epithelial mesoderm, which they described as consisting of amoeboid cells, but which we now know to consist of a continuous reticulum. The next step was made by E. Ray Lankester, who in 1884 (*Zoologischer Anzeiger*) showed that the pericardium of Mollusca does not contain blood, and therein differs from the rest of the body-cavity which does contain blood, but no suggestion is made that the blood-containing space is not coelomic. In fact it was generally held by the anatomists of the day that the coelom and the vascular system were different parts of the same primitive organ, though separate from it in the adult except in Arthropoda and Mollusca. In the Mollusca, it is true, the pericardial part of the coelom was held to be separate from the vascular, and the Hertwigs had reached the correct conception that the pericardium of these animals was alone true coelom, the vascular part being pseudocoel. This was the state of morphological opinion until 1886, when it was shown (*Proc. Cambridge Phil. Soc.*, 6, 1886, p. 27) (1) that the coelom of *Peripatus* gives rise to the nephridia and generative glands only, and to no other part of the body-cavity of the adult, (2) that the nephridia of the adult do not open as had been supposed into the body-cavity, (3) that the body-cavity is entirely formed of the blood-containing space, the coelom having no perivisceral portion. These results were extended by the same author (*Quart. Journ. Mic. Sci.*, 27, 1887, pp. 486-540) to other Arthropods and to the Mollusca, and the modern theory of the coelom was finally established. An increased precision was given to the conception of coelom by the discovery in 1880 (*Quart. Journ. Mic. Sci.*, 20, p. 164) that the nephridia of Elasmobranchs are a direct differentiation of a portion of it. In 1886 this was extended to *Peripatus* (*Proc. Camb. Phil. Soc.*, 6, p. 27) and doubtless holds universally.

In 1864 it was suggested by V. Hensen (Virchow's *Archiv*, 31) that the rudiments of nerve-fibres are present from the beginning of development as persistent remains of connexions between the incompletely separated cells of the segmented ovum. This suggestion fell to the ground because it was held by embryologists that the cleavage of the ovum resulted in the formation of completely separate cells, and that the connexions between the adult cells were secondary. In 1886 it was shown (*Quarterly Journ. Mic. Sci.*, 26, p. 182) that in *Peripatus Capensis* the cells of the segmenting ovum do not separate from one another, but remain connected by a loose protoplasmic network. This discovery has since been extended to other ova, even to the small so-called holoblastic ova, and a basis of fact was found for Hensen's suggestion as to the embryonic origin of nerves (*Quart. Journ. Mic. Sci.*, 33, 1892, pp. 581-584). An extension and further application of the new views as to the cell-theory and the embryonic origin of nerves thus necessitated was made in 1894 (*Quart. Journ. Mic. Sci.*, 37, p. 87), and in 1904 J. Graham Kerr showed that the motor nerves in the dipnoan fish Lepidosiren arise in an essentially similar manner (*Trans. Roy. Society of Edinburgh*, 41, p. 119).

In 1883 Elie Metschnikoff published his researches on the intracellular digestion of invertebrates (*Arbeiten a. d. zoologischen Inst. Wien*, 5; and *Biologisches Centralblatt*, 3, p. 560); these formed the basis of his theory of inflammation and phagocytosis, which has had such an important influence on pathology. As he himself has told us, he was led to make these investigations by his precedent researches on the development of sponges and other invertebrates. To quote his own words: "Having long studied the problem of the germinal layers in the animal series, I sought to give some idea of their origin and significance. The part played by the ectoderm and endoderm appeared quite clear, and the former might reasonably be regarded as the cutaneous investment of primitive multicellular animals, while the latter might be regarded as their organ of digestion. The discovery of intracellular digestion in many of the lower animals led me to regard this phenomenon as characteristic of those ancestral animals from which might be derived all the known types of the animal kingdom (excepting, of course, the Protozoa). The origin and part played by the mesoderm appeared the most obscure. Thus certain embryologists supposed that this layer corresponded to the reproductive organs of primitive animals: others regarded it as the prototype of the organs of locomotion. My embryological and physiological studies on sponges led me to the conclusion that the mesoderm must function in the hypothetically primitive animals as a mass of digestive cells, in all points similar to those of the endoderm. This hypothesis necessarily attracted my attention to the power of seizing foreign corpuscles possessed by the mesodermic cells" (*Immunity in Infective Diseases*, English translation, Cambridge, 1905).

The branch of embryology which concerns itself with the study of the origin, history and conjugation of the individuals (gametes) which are concerned in the reproduction of the species has made great advances. These began in 1875 and following years with a careful examination of the behaviour of the germinal vesicle in the maturation and fertilization of the ovum. The history of the polar bodies, the origin of the female pronucleus, the presence in the ovum of a second nucleus, the male pronucleus, which gave rise to the first segmentation nucleus by fusion with the female pronucleus, were discovered (E. van Beneden, O. Bütschli, O. Hertwig, H. Fol), and in 1876 O. Hertwig (*Morphologisches Jahrbuch*, 3, 1876) for the first time observed the entrance of a spermatozoon into the egg and the formation of the male pronucleus from it. The centrosome was discovered by W. Flemming in 1875 in the egg of the fresh-water mussel, and independently in 1876 by E. van Beneden in Dicyemids. In 1883 came E. van Beneden's celebrated discovery (*Arch.*

Biologie, 4) of the reduction of the number of chromosomes in the nucleus of both male and female gametes, and of the fact that the male and female pronuclei contribute the same number of chromosomes to the zygote-nucleus. He also showed that the gametogenesis in the male is a similar process to that in the female, and paved the way for the acceptation of the view (due to Bütschli) that polar bodies are aborted female gametes. These discoveries were extended and completed by subsequent workers, among whom may be mentioned E. van Beneden, J. B. Carnoy, G. Platner, T. Boveri, O. Hertwig, A. Brauer. The subject is still being actively pursued, and hopes are entertained that some relation may be found between the behaviour of the chromosomes and the facts of heredity.

Since 1874 (W. His, *Unsere Körperform und das physiologische Problem ihrer Entstehung*) a new branch of embryology, which concerns itself with the physiology of development, has arisen (experimental embryology). The principal workers in this field have been W. Roux, who in 1894 founded the *Archiv für Entwickelungsmechanik der Organismen*, T. Boveri and Y. Delage who discovered and elucidated the phenomenon of merogony, J. Loeb who discovered artificial parthenogenesis, O. and R. Hertwig, H. Driesch, C. Herbst, E. Maupas, A. Weismann, T. H. Morgan, C. B. Davenport (*Experimental Morphology*, 2 vols., 1899) and many others.

In the elucidation of remarkable life-histories we may point in the first place to the work of A. Kowalewsky on the development of the Tunicata ("Entwickelungsgeschichte d. einfachen Ascidien," *Mém. Acad. Pétersbourg* (7), 10, 1866, and *Arch. f. Mic. Anatomie*, 7, 1871), in which was demonstrated for the first time the vertebrate relationship of the Tunicata (possession of a notochord, method of development of the central nervous system) and which led to the establishment of the group Chordata. We may also mention the work of Y. Delage in the metamorphosis of *Sacculina* (*Arch. zool. exp.* (2) 2, 1884), A. Giard (*Comptes rendus*, 123, 1896, p. 836) and of A. Malaquin on *Monstrilla* (*Arch. zool. exp.* (3), 9, p. 81, 1901), of Delage (*Comptes rendus*, 103, 1886, p. 698) and Grassi and Calandruccio (*Rend. Acc. Lincei* (5), 6, 1897, p. 43), on the development of the eels, and of P. Pergande on the life-history of the Aphidae (*Bull. U.S. Dep. Agric. Ent.*, technical series, 9, 1901). The work of C. Grobben (*Arbeiten zool. Inst. Wien*, 4, 1882) and of B. Uljanin ("Die Arten der Gattung Doliolum," *Fauna u. Flora des Golfes von Neapel*, 1884) on the extraordinary life-history and migration of the buds in *Doliolum* must also be mentioned. In pure embryological morphology we have had Heymons' elucidation of the Arthropod head, the work of Hatschek on Annelid and other larvae, the works of H. Bury and of E. W. MacBride which have marked a distinct advance in our knowledge of the development of Echinodermata, of K. Mitsukuri, who has founded since 1882 an important school of embryology in Japan, on the early development of Chelonia and Aves, of A. Brauer and G. C. Price on the development of vertebrate excretory organs, of Th. W. Bischoff, E. van Beneden, E. Selenka, A. A. W. Hubrecht, R. Bonnet, F. Keibel and R. Assheton on the development of mammals, of A. A. W. Hubrecht and E. Selenka on the early development and placentation of the Primates, of J. Graham Kerr and of J. S. Budgett on the development of Dipnoan and Ganoid fishes, of A. Kowalewsky, B. Hatschek, A. Willey and E. W. MacBride on the development of Amphioxus, of B. Dean on the development of Bdellostoma, of A. Götte on the development of Amphibia, of H. Strahl and L. Will on the early development of reptiles, of T. H. Huxley, C. Gegenbaur and W. K. Parker on the development of the vertebrate skeleton, of van Wijhe on the segmentation of the vertebrate head, by which the modern theory of head-segmentation, previously adumbrated by Balfour, was first established, of Leche and Röse on the development of mammalian dentitions. We may also specially notice W. Bateson's work on the development of *Balanoglossus* and his inclusion of this genus among the Chordata (1884), the discovery by J. P. Hill of a placenta in the marsupial genus *Perameles* (1895), the work of P. Marchal (1904) on the asexual increase by fission of the early embryos of certain parasitic Hymenoptera (so called germinogony), a phenomenon which had been long ago shown to occur in *Lumbricus trapezoides* by N. Kleinenberg (1879) and by S. F. Harmer in Polyzoa (1893). The work on cell-lineage which has been so actively pursued in America may be mentioned here. It has consisted mainly of an extension of the early work of A. Kowalewsky and B. Hatschek on the formation of the layers, being a more minute and detailed examination of the origin of the embryonic tissues.

The most important text-books and summaries which have appeared in this period have been Korschelt and Heider's *Lehrbuch der vergleichenden Entwickelungsgeschichte der wirbellosen Tiere* (1890–1902), C. S. Minot's *Human Embryology* (1892), and the *Handbuch der vergleichenden und experimentellen Entwickelungslehre der Wirbeltiere*, edited by O. Hertwig (1901, et seq.). See also K. E. von Baer, *Über Entwicklungsgeschichte der Tiere* (Königsberg, 1828, 1837); F. M. Balfour, *A Monograph on the Development of Elasmobranch Fishes* (London, 1878); *A Treatise on Comparative Embryology*, vols. i. and ii. (London, 1885) (still the most important work on Vertebrate Embryology); M. Duval, *Atlas d'Embryologie* (Paris, 1889); M. Foster and F. M. Balfour, *Elements of Embryology* (London, 1883); O. Hertwig, *Lehrbuch der Entwicklungsgeschichte des Menschen u. der Wirbeltiere* (6th ed., Jena, 1898); A. Kölliker, *Entwicklungsgeschichte des Menschen u. der höheren Tiere* (Leipzig, 1879); A. M. Marshall, *Vertebrate Embryology* (London, 1893).

(A. Se.*)

PHYSIOLOGY OF DEVELOPMENT

Physiology of Development [in German, *Entwicklungsmechanik* (W. Roux), *Entwicklungsphysiologie* (H. Driesch), *physiologische Morphologie* (J. Loeb)] is, in the broadest meaning of the word, the experimental science of morphogenesis, *i.e.* of the laws that govern morphological differentiation. In this sense it embraces the study of regeneration and variation, and would, as a whole, best be called rational morphology. Here we shall treat of the Physiology of Development in a narrower sense, as the study of the laws that govern the development of the adult organism from the egg, REGENERATION and VARIATION AND SELECTION forming the subjects of special articles.

After the work done by W. His, A. Goette and E. F. W. Pflüger, who gave a sort of general outline and orientation of the subject, the first to study developmental problems properly in a systematical way, and with full conviction of their great importance, was Wilhelm Roux. This observer, having found by a full analysis of the facts of "development" that the first special problem to be worked out was the question when and where the first differentiation appeared, got as his main result that, when one of the two first blastomeres (cleavage cells) of the frog's egg was killed, the living one developed into a typical half-embryo, *i.e.* an embryo that was either the right or the left part of a whole one. From that Roux concluded that the first cleavage plane determined already the median plane of the adult; and that the basis of all differentiation was given by an unequal division of the nuclear substances during karyokinesis, a result that was also attained on a purely theoretical basis by A. Weismann. Hans Driesch repeated Roux's fundamental experiment with a different method on the sea-urchin's egg, with a result that was absolutely contrary to that of Roux: the isolated blastomere cleaved like half the egg, but it resulted in a whole blastula and a whole embryo, which differed from a normal one only in its small size. Driesch's result was obtained in somewhat the same manner by E. B. Wilson with the egg of Amphioxus, by Zoja with the egg of Medusae, &c. It thus became very probable that an inequality of nuclear division could not be the basis of differentiation. The following experiments were still more fatal to the theories of Roux and of Weismann. Driesch found that even when the first eight or sixteen cells of the cleaving egg of the sea-urchin were brought into quite abnormal positions with regard to one another, still a quite normal embryo was developed; Driesch and T. H. Morgan discovered jointly that in the Ctenophore egg one isolated blastomere developed into a half-embryo, but that the same was the case if a portion of protoplasm was cut off from the fertilized egg not yet in cleavage; last, but not of least importance, in the case of the frog's egg which had been Roux's actual subject of experiment, conditions were discovered by O. Schultze and O. Hertwig under which one of the two first blastomeres of this egg developed into a whole embryo of half size. This result was made still more decisive by Morgan, who showed that it was quite in the power of the experimenter to get either a half-embryo or a whole one of half size, the latter dependent only upon giving to the blastomere the opportunity for a rearrangement of its matter by turning it over.

Thus we may say that the general result of the introductory series of experiments in the physiology of development is the following:—In many forms, *e.g.* Echinoderms, Amphioxus, Ascidians, Fishes and Medusae, the potentiality (*prospective Potenz*—Driesch) of all the blastomeres of the segmented egg is the same, *i.e.* each of them may play any or every part in the future development; the prospective value (*prosp. Bedeutung*—D.) of each blastomere depends upon, or is a function of, its position in the whole of the segmented egg; we can term the "whole" of the egg after cleavage an "aequipotential system" (Driesch). But though aequipotential, the whole of the segmented egg is nevertheless not devoid of orientation or direction; the general law of causality compels us to assume a general orientation of the smallest parts of the egg, even in cases where we are not able to see it. It has been experimentally proved that external stimuli (light, heat, pressure, &c.) are not responsible for the first differentiation of organs in the embryo; thus, should the segmented egg be absolutely equal in itself, it would be incomprehensible that the first organs should be formed at one special point of it and not at another. Besides this general argument, we see a sort of orientation in the typical forms of the polar or bilateral cleavage stages.

Differentiation, therefore, depends on a primary, *i.e.* innate, orientation of the egg's plasma in those forms, the segmented eggs of which represent aequipotential systems; this orientation is capable of a sort of regulation or restoration after disturbances of any sort; in the egg of the Ctenophora such a regulation is not possible, and in the frog's egg it is facultative, *i.e.* possible under certain conditions, but impossible under others. Should this interpretation be right, the difference between the eggs of different animals would not be so great as it seemed at first: differences with regard to the potentialities of the blastomeres would only be differences with regard to the capability of regulation or restoration of the egg's protoplasm.

The foundation of physiological embryology being laid, we now can shortly deal with the whole series of special problems offered to us by a general analysis of that science, but at present worked out only to a very small extent.

We may ask the following questions:—What are the general conditions of development? On what general factors does it depend? How do the different organs of the partly developed embryo stand with regard to their future fate? What are the stimuli (*Reize*) effecting differentiation? What is to be said about the specific character of the different formative effects? And as the most important question of all: Are all the problems offered to us in the physiology of development to be solved with the aid of the laws known hitherto in science, or do we want specifically new "vitalistic" factors?

Conditions of differentiation.

Energy in different forms is required for development, and is provided by the surrounding medium. Light, though of no influence on the cleavage (Driesch), has a great effect on later stages of development, and is also necessary for the formation of polyps in Eudendrium (J. Loeb). That a certain temperature is necessary for ontogeny has long been known; this was carefully studied by O. Hertwig, as was also the influence of heat on the rate of development. Oxygen is also wanted, either from a certain stage of development or from the very beginning of it, though very nearly related forms differ in this respect (Loeb). The great influence of osmotic pressure on growth was studied by J. Loeb, C. Herbst and C. H. Davenport. In all these cases energy may be necessary for development in general, or a specific form of energy may be necessary for the formation of a specific organ; it is clear that, especially in the latter case, energy is shown to be a proper factor for morphogenesis. Besides energy, a certain chemical condition of the medium, whether offered by the water in which the egg lives or (especially in later stages) by the food, is of great importance for normal ontogeny; the only careful study in this respect was carried out by Herbst for the development of the egg of Echinids. This investigator has shown that all salts of the sea water are of great importance for development, and most of them specifically and typically; for instance, calcium is absolutely necessary for holding together the embryonic cells, and without calcium all cells will fall apart, though they do not die, but live to develop further.

What we have dealt with may be called external factors of development; as to their complement, the internal factors, it is clear that every elementary factor of general physiology may be regarded as one of them. Chemical metamorphosis plays, of course, a great part in differentiation, especially in the form of secretions; but very little has been carefully studied in this respect. Movement of living matter, whether of cells or of intracellular substance, is another important factor (O. Bütschli, F. Dreyer, L. Rhumbler.) Cell-division is another, its differences in direction, rate and quantity being of great importance for differentiation. We know very little about it; a so-called law of O. Hertwig, that a cell would divide at right angles to its longest diameter, though experimentally stated in some cases, does not hold for all, and the only thing we can say is, that the unknown primary organization of the egg is here responsible. (Compare the papers on "cell-lineage" of E. B. Wilson, F. R. Lillie, H. S. Jennings, O. Zurstrassen and others.) Of the inner factors of ontogeny there is another category that may be called physical, that already spoken of being physiological. The most important of these is the capillarity of the cell surfaces. Berthold was the first to call attention to its role in the arrangement of cell composites, and afterwards the matter was more carefully studied by Dreyer, Driesch, and especially W. Roux, with the result that the arrangement of cells follows the principle of surfaces *minimae areae* (Plateau) as much as is reconcilable with the conditions of the system.

Potentialities of embryonic cells.

It has already been shown that in many cases the embryo after cleavage, *i.e.* the blastula, is an "aequipotential system." It was shown that in the egg of Echinids there existed such an absolute lack of determination of the cleavage cells that (*a*) the cells may be put in quite abnormal positions with reference to one another without disturbing development; (*b*) a quarter blastomere gives a quite normal little pluteus, even a sixteenth yields a gastrula; (*c*) two eggs may fuse in the early blastula stage, giving one single normal embryo of double size. Our next question concerns the distribution of potentiality, when the embryo is developed further than the blastula stage. In this case it has been shown that the potentialities of the different embryonic organs are different: that, for instance, in Echinoderms or Amphibians the ectoderm, when isolated, is not able to form endoderm, and so on (Driesch, D. Barfurth); but it has been shown at the same time that the ectoderm in itself, the intestine in itself of Echinoderms (Driesch), the medullary plate in itself of Triton (H. Spemann), is as aequipotential as was the blastula: that any part whatever of these organs may be taken away without disturbing the development of the rest into a normal and proportional embryonic part, except for its smaller size.

Formative stimuli.

If the single phases of differentiation are to be regarded as effects, we must ask for the causes, or stimuli, of these effects. For a full account of the subject we refer to Herbst, by whom also the whole botanical literature, much more important than the zoological, is critically reviewed. We have already seen that when the blastula represents an aequipotential system, there must be some sort of primary organization of the egg, recoverable after disturbances, that directs and localizes the formation of the first embryonic organs; we do not know much about this organization. Directive stimuli (*Richtungsreize*) play a great role in ontogeny; Herbst has analysed many cases where their existence is probable. They have been experimentally proved in two cases. The chromatic cells of the yolk sac of Fundulus are attracted by the oxygen of the arteriae (Loeb); the mesenchyme cells of Echinus are attracted by some specific parts of the ectoderm, for they move towards them also when removed from their original positions to any point of the blastocoel by shaking (Driesch). Many directive stimuli might be discovered by a careful study of grafting experiments, such as have been made by Born, Joest, Harrison and others, but at present these experiments have not been carried out far enough to get exact results.

Formative stimuli in a narrower meaning of the word, *i.e.* stimuli affecting the origin of embryonic organs, have long been known in botany; in zoology we know (especially from Loeb) a good deal about the influence of light, gravitation, contact, &c., on the formation of organs in hydroids, but these forms are very plant-like in many respects; as to free-living animals, Herbst proved that the formation of the arms of the pluteus larva depends on the existence of the calcareous tetrahedra, and made in other cases (lens of vertebrate eye, nerves and muscles, &c.) the existence of formative stimuli very probable. Many of the facts generally known as functional adaptation (*functionelle Anpassung*—Roux) in botany and zoology may also belong to this category, *i.e.* be the effects of some external stimulus, but they are far from having been analysed in a satisfactory manner. That the structure of parts of the vertebrate skeleton is always in relation to their function, even under abnormal conditions, is well known; what is the real "cause" of differentiation in this case is difficult to say.

Specific characters.

It is obvious that we cannot answer the question why the different ontogenetic effects are just what they are. Developmental physiology takes the specific nature of form for granted, and it may be left for a really rational theory of the evolution of species in the future to answer the problem of species, as far as it is answerable at all. What we intend to do here is only to say in a few words wherein consists the specific character of embryonic organs. That embryonic parts are specific or typical in regard to their protoplasm is obvious, and is well proved by the fact that the different parts of the embryo react differently to the same chemical or other reagents (Herbst, Loeb). That they may be typical also in regard to their nuclei was shown by Boveri for the generative cells of Ascaris; we are not able at present to say anything definite about the importance of this fact. The specific nature of an embryonic organ consists to a high degree in the number of cells composing it; it was shown for many cases that this number, and also the size of cells, is constant under constant conditions, and that under inconstant conditions the number is variable, the size constant; for instance, embryos which have developed from one of the two first blastomeres show only half the normal number of cells in their organs (Morgan, Driesch).

Self-differentiation.

We have learnt that the successive steps of embryonic development are to be regarded as effects, caused by stimuli, which partly exist in the embryo itself. But it must be noted that not every part of the embryo is dependent on every other one, but that there exists a great independence of the parts, to a varying degree in every case. This partial independence has been called self-differentiation (*Selbstdifferenzierung*) by Roux, and is certainly a characteristic feature of ontogeny. At the same time it must not be forgotten that the word is only relative, and that it only expresses our recognition of a negation.

For instance, we know that the ectoderm of Echinus may develop further if the endoderm is taken away; in other words, that it develops by self-differentiation in regard to the endoderm, that its differentiation is not dependent on the endoderm; but it would be obviously more important to know the factors on which this differentiation is actually dependent than to know one factor on which it is not. The same is true for all other experiments on "self-differentiation," whether analytical (Loeb, Schaper, Driesch) or not (grafting experiments, Born, Joest, &c.).

Vitalism.

Can we understand differentiation by means of the laws of natural phenomena offered to us by physics and chemistry? Most people would say yes, though not yet. Driesch has tried to show that we are absolutely not able to understand development, at any rate one part of it, *i.e.* the localization of the various successive steps of differentiation. But it is impossible to give any idea of this argument in a few words, and we can only say here that it is based on the experiments upon isolated blastomeres, &c., and on an analysis of the character of aequipotential systems. In this way physiology of development would lead us straight on into vitalism.

REFERENCES.—An account of the subject, with full literature, is given by H. Driesch, *Resultate und Probleme der Entwicklungsphysiologie der Tiere in Ergebnissen der Anat. u. Entw.-Gesch.* (1899). Other works are: C. H. Davenport, *Experimental Morphology* (New York, 1897–1899); Y. Delage, *La Structure du protoplasma*, &c. (1895); Driesch, *Mathem. mech. Betrachtung morpholog. Probleme* (Jena, 1891); *Entwicklungsmechan. Studien* (1891–1893); *Analytische Theorie d. organ. Entw.* (Leipzig, 1894); *Studien über d. Regulationsvermögen* (1897–1900), &c.; C. Herbst, "Über die Bedeutung d. Reizphysiologie für die kausale Auffassung von Vorgängen i. d. tier. Ontogenese," *Biolog. Centralblatt*, vols. xiv. u. xv. (Leipzig, 1894). Many papers on influence of salts on development in *Arch. f. Entw.-Mech.*; O. Hertwig, Papers in *Arch. f. mikr. Anat.*, "Die Zelle und die Gewebe," ii. (Jena, 1897); W. His, *Unsere Körperform* (Leipzig, 1875); J. Loeb, *Untersuch. z. physiol. Morph.* (Würzburg, 1891–1892). Papers in *Arch. f. Entw.-Mech.* and Pflüger's *Archiv*; T. H. Morgan, *The Development of the Frog's Egg* (New York, 1897); Papers in *Arch. f. Entw.-Mech.*; Roux, *Gesammelte Abhandlungen* (Leipzig, 1895); Papers in *Arch. f. Entw.-Mech.*; A. Weismann, *Das Keimplasma* (Jena, 1892); E. B. Wilson, papers in *Journ. Morph.*, "The Cell in Development and Inheritance" (New York, 1896). (H. A. E. D.)

EMDEN, a maritime town of Germany, in the Prussian province of Hanover, near the mouth of the Ems, 49 m. N.W. from Oldenburg by rail. Pop. (1885) 14,019; (1905) 20,754. The Ems once flowed beneath its walls, but is now 2 m. distant, and connected with the town by a broad and deep canal, divided into the inner (or dock) harbour and the outer (or "free port") harbour. The latter is ¾ m. in length, has a breadth of nearly 400 ft., and since the construction of the Ems-Jade and Dortmund-Ems canals, has been deepened to 38 ft., thus allowing the largest sea-going vessels to approach its wharves. The town is intersected by canals (crossed by numerous bridges), which bring it into communication with most of the towns in East Friesland, of which it is the commercial capital. The waterways which traverse and surround it and the character of its numerous gabled medieval houses give it the appearance of an old Dutch, rather than of a German, town. Of its churches the most noteworthy are the Reformed "Great Church" (Grosse Kirche), a large Gothic building completed in 1455, containing the tomb of Enno II. (d. 1540), count of East Friesland; the Gasthauskirche, formerly the church of a Franciscan friary founded in 1317; and the Neue Kirche (1643–1647). Of its secular buildings, the Rathaus (town-hall), built in 1574–1576, on the model of that of Antwerp, with a lofty tower, and containing an interesting collection of arms and armour, is particularly remarkable. There are numerous educational institutions, including classical and modern schools, and schools of commerce, navigation and telegraphy. The town has two interesting museums. Emden is the seat of an active trade in agricultural produce and live-stock, horses, timber, coal, tea and wine. The deep-sea fishing industry of the town is important, the fishing fleet in 1902 numbering 67 vessels. Machinery, cement, cordage, wire ropes, tobacco, leather, &c. are manufactured. Emden is also of importance as the station of the submarine cables connecting Germany with England, North America and Spain. It has a regular steamboat service with Borkum and Norderney.

Emden (Emuden, Emetha) is first mentioned in the 12th century, when it was the capital of the Eemsgo (Emsgau, or county of the Ems), one of the three hereditary countships into which East Friesland had been divided by the emperor. In 1252 the countship was sold to the bishops of Münster; but their rule soon became little more than nominal, and in Emden itself the family of Abdena, the episcopal provosts and castellans, established their practical independence. Towards the end of the 14th century the town gained a considerable trade owing to the permission given by the provost to the pirates known as "Viktualienbrüder" to make it their market, after they had been driven out of Gothland by the Teutonic Order. In 1402, after the defeat of the pirates off Heligoland by the fleet of Hamburg, Emden was besieged; but it was not reduced by Hamburg, with the aid of Edzard Cirksena of Greetsyl, until 1431. The town was held jointly by its captors till 1453, when Hamburg sold its rights to Ulrich Cirksena, created count of East Friesland by the emperor Frederick III. in 1454. In 1544 the Reformation was introduced, and in the following years numerous Protestant refugees from the Low Countries found their way to the town. In 1595 Emden became a free imperial city under the protection of Holland, and was occupied by a Dutch garrison until 1744 when, with East Friesland, it was transferred to Prussia. In 1810 Emden became the chief town of the French department of Ems Oriental; in 1815 it was assigned to Hanover, and in 1866 was annexed with that kingdom by Prussia.

See Fürbringer, *Die Stadt Emden in Gegenwart und Vergangenheit* (Emden, 1892).

EMERALD, a bright green variety of beryl, much valued as a gem-stone. The word comes indirectly from the Gr. *σμάραγδος* (Arabic *sumurrud*), but this seems to have been a name vaguely given to a number of stones having little in common except a green colour. Pliny's "smaragdus" undoubtedly included several distinct species. Much confusion has arisen with respect to the "emerald" of the Scriptures. The Hebrew word *nophek*, rendered emerald in the Authorized Version, probably meant the carbuncle: it is indeed translated *ἄνθραξ* in the Septuagint, and a marginal reading in the Revised Version gives carbuncle. On the other hand, the word *bāreqath*, rendered *σμάραγδος* in the LXX., appears in the A.V. as carbuncle, with the alternative reading of emerald in the R.V. It may have referred to the true emerald, but Flinders Petrie suggests that it meant rock-crystal.

The properties of emerald are mostly the same as those described under BERYL. The crystals often show simply the hexagonal prism and basal plane. The prisms cleave, though imperfectly, at right angles to the geometrical axis; and hexagonal slices were formerly worn in the East. Compared with most gems, the emerald is rather soft, its hardness (7·5) being but slightly above that of quartz. The specific gravity is low, varying slightly in stones from different localities, but being for the Muzo emerald about 2·67. The refractive and dispersive powers are not high, so that the cut stones display little brilliancy or "fire." The emerald is dichroic, giving in the dichroscope a bluish-green and a yellowish-green image. The magnificent colour which gives extraordinary value to this gem, is probably due to chromium. F. Wöhler found 0·186% of Cr_2O_3 in the emerald of Muzo,—a proportion which, though small, is sufficient to impart an emerald-green colour to glass. The stone loses colour when strongly heated, and M. Lewy suggested that the colour was due to an organic pigment. Greville Williams showed that emeralds lost about 9% of their weight on fusion, the specific gravity being reduced to about 2·4.

The ancients appear to have obtained the emerald from Upper Egypt, where it is said to have been worked as early as 1650 B.C. It is known that Greek miners were at work in the time of Alexander the Great, and in later times the mines yielded their gems to Cleopatra. Remains of extensive workings were discovered in the northern Etbai by the French traveller, F. Cailliaud, in 1817, and the mines were re-opened for a short time under Mehemet Ali. "Cleopatra's Mines" are situated in Jebel Sikait and Jebel Zabara near the Red Sea coast east of Assuan. They were visited in 1891 by E. A. Floyer, and the Sikait workings were explored in 1900 by D. A. MacAlister and others. The Egyptian emeralds occur in mica-schist and talc-schist.

On the Spanish conquest of South America vast quantities of emeralds were taken from the Peruvians, but the exact locality which yielded the stones was never discovered. The only South American emeralds now known occur near Bogotà, the capital of Colombia. The most famous mine is at Muzo, but workings are known also at Coscuez and Somondoco. The emerald occurs in nests of calcite in a black bituminous limestone containing ammonites of Lower Cretaceous age. The mineral is associated with quartz, dolomite, pyrites, and the rare mineral called "parisite"—a fluo-carbonate of the cerium metals, occurring in brownish-yellow hexagonal crystals, and named after J. J. Paris, who worked the emeralds. It has been suggested that the Colombian emerald is not in its original matrix. The fine stones are called *cañutillos* and the inferior ones *morallion*.

In 1830 emeralds were accidentally discovered in the Ural Mountains. At the present time they are worked on the river Takovaya, about 60 m. N.E. of Ekaterinburg, where they occur in mica-schist, associated with aquamarine, alexandrite, phenacite, &c. Emerald is found also in mica-schist in the Habachthal, in the Salzburg Alps, and in granite at Eidsvold in Norway. Emerald has been worked in a vein of pegmatite, piercing slaty rocks, near Emmaville, in New South Wales. The crystals occurred in association with topaz, fluorspar and cassiterite; but they were mostly of rather pale colour. In the United States, emerald has occasionally been found, and fine crystals have been obtained from the workings for hiddenite at Stonypoint, Alexander county, N.C.

Many virtues were formerly ascribed to the emerald. When worn, it was held to be a preservative against epilepsy, it cured dysentery, it assisted women in childbirth, it drove away evil spirits, and preserved the chastity of the wearer. Administered internally it was reputed to have great medicinal value. In consequence of its refreshing green colour it was naturally said to be good for the eyesight.

The stone known as "Oriental emerald" is a green corundum. Lithia emerald is the mineral called hiddenite; Uralian emerald is a name given to demantoid; Brazilian emerald is merely green tourmaline: evening emerald is the peridot; pyro-emerald is fluorspar which phosphoresces with a green glow when heated; and "mother of emerald" is generally a green quartz or perhaps in some cases a green felspar.

See AQUAMARINE, BERYL. (F. W. R.*)

ÉMERIC-DAVID, TOUSSAINT-BERNARD (1755–1839), French archaeologist and writer on art, was born at Aix, in Provence, on the 20th of August 1755. He was destined for the legal profession, and having gone in 1775 to Paris to complete his legal education, he acquired there a taste for art which influenced his whole future career, and he went to Italy, where he continued his art studies. He soon returned, however, to his native village, and followed for some time the profession of an advocate; but in 1787 he succeeded his uncle Antoine David as printer to the parlement. He was elected mayor of Aix in 1791; and although he speedily resigned his office, he was in 1793 threatened with arrest, and had for some time to adopt a vagrant life. When danger was past he returned to Aix, sold his printing business, and engaged in general commercial pursuits; but he was not long in renouncing these also, in order to devote himself exclusively to literature and art. From 1809 to 1814, under the Empire, he represented his department in the Lower House (*Corps législatif*); in 1814 he voted for the downfall of Napoleon; in 1815 he retired into private life, and in 1816 he was elected a member of the Institute. He died in Paris on the 2nd of April 1839. Émeric-David was placed in 1825 on the commission appointed to continue *L'Histoire littéraire de la France*. His principal works are *Recherches sur l'art statuaire, considéré chez les anciens et les modernes* (Paris, 1805), a work which obtained the prize of the Institute; *Suite d'études calquées et dessinées d'après cinq tableaux de Raphaël* (Paris, 1818–1821), in 6 vols. fol.; *Jupiter, ou recherches sur ce dieu, sur son culte, &c.* (Paris, 1833), 2 vols. 8vo, illustrated; and *Vulcain* (Paris, 1837).

EMERITUS (Lat. from *emereri*, to serve out one's time, to earn thoroughly), a term used of Roman soldiers and public officials who had earned their discharge from the service, a veteran, and hence applied, in modern times, to a university professor (*professor emeritus*) who has vacated his chair, on account of long service, age or infirmity, and, in the Presbyterian church, to a minister who has for like reason given up his charge.

EMERSON, RALPH WALDO (1803–1882), American poet and essayist, was born in Boston, Massachusetts, on the 25th of May 1803. Seven of his ancestors were ministers of New England churches. Among them were some of those men of mark who made the backbone of the American character the sturdy Puritan, Peter Bulkeley, sometime rector of Odell in Bedfordshire, and afterward pastor of the church in the wilderness at Concord, New Hampshire; the zealous evangelist, Father Samuel Moody of Agamenticus in Maine, who pursued graceless sinners even into the alehouse; Joseph Emerson of Malden, "a heroic scholar," who prayed every night that no descendant of his might ever be rich; and William Emerson of Concord, Mass., the patriot preacher, who died while serving in the army of the Revolution. Sprung from such stock, Emerson inherited qualities of self-reliance, love of liberty, strenuous virtue, sincerity, sobriety and fearless loyalty to ideals. The form of his ideals was modified by the metamorphic glow of Transcendentalism which passed through the region of Boston in the second quarter of the 19th century. But the spirit in which Emerson conceived the laws of life, reverenced them and lived them out, was the Puritan spirit, elevated, enlarged and beautified by the poetic temperament.

His father was the Rev. William Emerson, minister of the First Church (Unitarian) in Boston. Ralph Waldo was the fourth child in a family of eight, of whom at least three gave evidence of extraordinary mental powers. He was brought up in an atmosphere of hard work, of moral discipline, and (after his father's death in 1811) of that wholesome self-sacrifice which is a condition of life for those who are poor in money and rich in spirit. His aunt, Miss Mary Moody Emerson, a brilliant old maid, an eccentric saint, was a potent factor in his education. Loving him, believing in his powers, passionately desiring for him a successful career, but clinging with both hands to the old forms of faith from which he floated away, this solitary, intense woman did as much as any one to form, by action and reaction, the mind and character of the young Emerson. In 1817 he entered Harvard College, and graduated in 1821. In scholarship he ranked about the middle of his class. In literature and oratory he was more distinguished, receiving a Boylston prize for declamation, and two Bowdoin prizes for dissertations, the first essay being on "The Character of Socrates" and the second on "The Present State of Ethical Philosophy"—both rather dull, formal, didactic productions. He was fond of reading and of writing verse, and was chosen as the poet for class-day. His cheerful serenity of manner, his tranquil mirthfulness, and the steady charm of his personality made him a favourite with his fellows, in spite of a certain reserve. His literary taste was conventional, including the standard British writers, with a preference for Shakespeare among the poets, Berkeley among the philosophers, and Montaigne (in Cotton's translation) among the essayists. His particular admiration among the college professors was the stately rhetorician, Edward Everett; and this predilection had much to do with his early ambition to be a professor of rhetoric and elocution.

Immediately after graduation he became an assistant in his brother William's school for young ladies in Boston, and continued teaching, with much inward reluctance and discomfort, for three years. The routine was distasteful; he despised the superficial details which claimed so much of his time. The bonds of conventionalism were silently dissolving in the rising glow of his poetic nature. Independence, sincerity, reality, grew more and more necessary to him. His aunt urged him to seek retirement, self-reliance, friendship with nature; to be no longer "the nursling of surrounding circumstances," but to prepare a celestial abode for the muse. The passion for spiritual leadership stirred within him. The ministry seemed to offer the fairest field for its satisfaction. In 1825 he entered the divinity school at Cambridge, to prepare himself for the Unitarian pulpit. His course was much interrupted by ill-health. His studies were irregular, and far more philosophical and literary than theological.

In October 1826 he was "approbated to preach" by the Middlesex Association of Ministers. The same year a threatened consumption compelled him to take a long journey in the south. Returning in 1827, he continued his studies, preached as a candidate in various churches, and improved in health. In 1829 he married a beautiful but delicate young woman, Miss Ellen Tucker of Concord, and was installed as associate minister of the Second Church (Unitarian) in Boston. The retirement of his senior colleague soon left him the sole pastor. Emerson's early sermons were simple, direct, unconventional. He dealt freely with the things of the spirit. There was a homely elevation in his discourses, a natural freshness in his piety, a quiet enthusiasm in his manner, that charmed thoughtful hearers. Early in 1832 he lost his wife, a sorrow that deeply depressed him in health and spirits. Following his passion for independence and sincerity, he arrived at the conviction that the Lord's Supper was not intended by Christ to be a permanent sacrament. To him, at least, it had become an outgrown form. He was willing to continue the service only if the use of the elements should be dropped and the rite made simply an act of spiritual remembrance. Setting forth these views, candidly and calmly, in a sermon, he found his congregation, not unnaturally, reluctant to agree with him, and therefore retired, not without some disappointment, from the pastoral office. He never again took charge of a parish; but he continued to preach, as opportunity offered, until 1847. In fact, he was always a preacher, though of a singular order. His supreme task was to befriend and guide the inner life of man.

The strongest influences in his development about this time were the liberating philosophy of Coleridge, the mystical visions of Swedenborg, the intimate poetry of Wordsworth, and the stimulating essays of Carlyle. On Christmas Day 1832 he took passage in a sailing vessel for the Mediterranean. He travelled through Italy, visited Paris, spent two months in Scotland and England, and saw the four men whom he most desired to see—Landor, Coleridge, Carlyle and Wordsworth. "The comfort of meeting such men of genius as these," he wrote, "is that they talk sincerely." But he adds that he found all four of them, in different degrees, deficient in insight into religious truth. His visit to Carlyle, in the lonely farm-house at Craigenputtock, was the memorable beginning of a lifelong friendship. Emerson published Carlyle's first books in America. Carlyle introduced Emerson's Essays into England. The two men were bound together by a mutual respect deeper than a sympathy of tastes, and a community of spirit stronger than a similarity of opinions. Emerson was a sweet-tempered Carlyle, living in the sunshine. Carlyle was a militant Emerson, moving amid thunderclouds. The things that each most admired in the other were self-reliance, directness, moral courage. A passage in Emerson's Diary, written on his homeward voyage, strikes the keynote of his remaining life. "A man contains all that is needful to his government within himself. . . . All real good or evil that can befall him must be from himself. . . . There is a correspondence between the human soul and everything that exists in the world; more properly, everything that is known to man. Instead of studying things without, the principles of them all may be penetrated into within him. . . . The purpose of life seems to be to acquaint man with himself. . . . The highest revelation is that God is in every man." Here is the essence of that intuitional philosophy, commonly called Transcendentalism. Emerson disclaimed allegiance to that philosophy. He called it "the saturnalia, or excess of faith." His practical common sense recoiled from the amazing conclusions which were drawn from it by many of its more eccentric advocates. His independence revolted against being bound to any scheme or system of doctrine, however nebulous. He said: "I wish to say what I feel and think to-day, with the proviso that to-morrow perhaps I shall contradict it all." But this very wish commits him to the doctrine of the inner light. All through his life he navigated the Transcendental sea, piloted by a clear moral sense, warned off the rocks by the saving grace of humour, and kept from capsizing by a good ballast of New England prudence.

After his return from England in 1833 he went to live with his mother at the old manse in Concord, Mass., and began his career as a lecturer in Boston. His first discourses were delivered before the Society of Natural History and the Mechanics' Institute. They were chiefly on scientific subjects, approached in a poetic spirit. In the autumn of 1835 he married Miss Lydia Jackson of Plymouth, having previously purchased a spacious old house and garden at Concord. There he spent the remainder of his life, a devoted husband, a wise and tender father, a careful householder, a virtuous villager, a friendly neighbour, and, spite of all his disclaimers, the central and luminous figure among the

Transcendentalists. The doctrine which in others seemed to produce all sorts of extravagances—communistic experiments at Brook Farm and Fruitlands, weird schemes of political reform, long hair on men and short hair on women—in his sane, well-balanced nature served only to lend an ideal charm to the familiar outline of a plain, orderly New England life. Some mild departures from established routine he tranquilly tested and as tranquilly abandoned. He tried vegetarianism for a while, but gave it up when he found that it did him no particular good. An attempt to illustrate household equality by having the servants sit at table with the rest of the family was frustrated by the dislike of his two sensible domestics for such an inconvenient arrangement. His theory that manual labour should form part of the scholar's life was checked by the personal discovery that hard labour in the fields meant poor work in the study. "The writer shall not dig," was his practical conclusion. Intellectual independence was what he chiefly desired; and this, he found, could be attained in a manner of living not outwardly different from that of the average college professor or country minister. And yet it was to this property-holding, debt-paying, law-abiding, well-dressed, courteous-mannered citizen of Concord that the ardent and enthusiastic turned as the prophet of the new idealism. The influence of other Transcendental teachers, Dr Hedge, Dr Ripley, Bronson Alcott, Orestes Brownson, Theodore Parker, Margaret Fuller, Henry Thoreau, Jones Very, was narrow and parochial compared with that of Emerson. Something in his imperturbable, kindly presence, his angelic look, his musical voice, his commanding style of thought and speech, announced him as the possessor of the great secret which many were seeking—the secret of a freer, deeper, more harmonious life. More and more, as his fame spread, those who "would live in the spirit" came to listen to the voice, and to sit at the feet, of the Sage of Concord.

It was on the lecture-platform that he found his power and won his fame. The courses of lectures that he delivered at the Masonic Temple in Boston, during the winters of 1835 and 1836, on "Great Men," "English Literature," and "The Philosophy of History," were well attended and admired. They were followed by two discourses which commanded for him immediate recognition, part friendly and part hostile, as a new and potent personality. His Phi Beta Kappa oration at Harvard College in August 1837, on "The American Scholar," was an eloquent appeal for independence, sincerity, realism, in the intellectual life of America. His address before the graduating class of the divinity school at Cambridge, in 1838, was an impassioned protest against what he called "the defects of historical Christianity" (its undue reliance upon the personal authority of Jesus, and its failure to explore the moral nature of man as the fountain of established teaching), and a daring plea for absolute self-reliance and a new inspiration of religion. "In the soul," he said, "let redemption be sought. Wherever a man comes, there comes revolution. The old is for slaves. Go alone. Refuse the good models, even those which are sacred in the imagination of men. Cast conformity behind you, and acquaint men at first hand with Deity." In this address Emerson laid his hand on the sensitive point of Unitarianism, which rejected the divinity of Jesus, but held fast to his supreme authority. A blaze of controversy sprang up at once. Conservatives attacked him; Radicals defended him. Emerson made no reply. But amid this somewhat fierce illumination he went forward steadily as a public lecturer. It was not his negations that made him popular; it was the eloquence with which he presented the positive side of his doctrine. Whatever the titles of his discourses, "Literary Ethics," "Man the Reformer," "The Present Age," "The Method of Nature," "Representative Men," "The Conduct of Life," their theme was always the same, namely, "the infinitude of the private man." Those who thought him astray on the subject of religion listened to him with delight when he poetized the commonplaces of art, politics, literature or the household. His utterance was Delphic, inspirational. There was magic in his elocution. The simplicity and symmetry of his sentences, the modulations of his thrilling voice, the radiance of his fine face, even his slight hesitations and pauses over his manuscript, lent a strange charm to his speech. For more than a generation he went about the country lecturing in cities, towns and villages, before learned societies, rustic lyceums and colleges; and there was no man on the platform in America who excelled him in distinction, in authority, or in stimulating eloquence.

In 1847 Emerson visited Great Britain for the second time, was welcomed by Carlyle, lectured to appreciative audiences in Manchester, Liverpool, Edinburgh and London, made many new friends among the best English people, paid a brief visit to Paris, and returned home in July 1848. "I leave England," he wrote, "with increased respect for the Englishman. His stuff or substance seems to be the best in the world. I forgive him all his pride. My respect is the more generous that I have no sympathy with him, only an admiration." The impressions of this journey were embodied in a book called *English Traits*, published in 1856. It might be called "English Traits and American Confessions," for nowhere does Emerson's Americanism come out more strongly. But the America that he loved and admired was the ideal, the potential America. For the actual conditions of social and political life in his own time he had a fine scorn. He was an intellectual Brahmin. His principles were democratic, his tastes aristocratic. He did not like crowds, streets, hotels—"the people who fill them oppress me with their excessive civility." Humanity was his hero. He loved man, but he was not fond of men. He had grave doubts about universal suffrage. He took a sincere interest in social and political reform, but towards specific "reforms" his attitude was somewhat remote and visionary. On the subject of temperance he held aloof from the intemperate methods of the violent prohibitionists. He was a believer in woman's rights, but he was lukewarm towards conventions in favour of woman suffrage. Even in regard to slavery he had serious hesitations about the ways of the abolitionists, and for a long time refused to be identified with them. But as the irrepressible conflict drew to a head Emerson's hesitation vanished. He said in 1856, "I think we must get rid of slavery, or we must get rid of freedom." With the outbreak of the Civil War he became an ardent and powerful advocate of the cause of the Union. James Russell Lowell said, "To him more than to all other causes did the young martyrs of our Civil War owe the sustaining strength of thoughtful heroism that is so touching in every record of their lives."

Emerson the essayist was a condensation of Emerson the lecturer. His prose works, with the exception of the slender volume entitled *Nature* (1836), were collected and arranged from the manuscripts of his lectures. His method of writing was characteristic. He planted a subject in his mind, and waited for thoughts and illustrations to come to it, as birds or insects to a plant or flower. When an idea appeared, he followed it, "as a boy might hunt a butterfly"; when it was captured he pinned it in his "Thought-book." The writings of other men he used more for stimulus than for guidance. He said that books were for the scholar's idle times. "I value them," he said, "to make my top spin." His favourite reading was poetry and mystical philosophy: Shakespeare, Dante, George Herbert, Goethe, Berkeley, Coleridge, Swedenborg, Jakob Boehme, Plato, the new Platonists, and the religious books of the East (in translation). Next to these he valued books of biography and anecdote: Plutarch, Grimm, St Simon, Varnhagen von Ense. He had some odd dislikes, and could find nothing in Aristophanes, Cervantes, Shelley, Scott, Miss Austen, Dickens. Novels he seldom read. He was a follower of none, an original borrower from all. His illustrations were drawn from near and far. The zodiac of Denderah; the Savoyards who carved their pine-forests into toys; the naked Derar, horsed on an idea, charging a troop of Roman cavalry; the long, austere Pythagorean lustrum of silence; Napoleon on the deck of the "Bellerophon," observing the drill of the English soldiers; the Egyptian doctrine that every man has two pairs of eyes; Empedocles and his shoe; the horizontal stratification of the earth; a soft mushroom pushing its way through the hard ground,—all these allusions and a thousand more are found in the same volume. On his pages, close beside the Parthenon, the Sphinx, St Paul's, Etna and Vesuvius, you will find the White Mountains, Monadnock, Agiocochook, Katahdin, the pickerel-weed in bloom, the wild geese honking through the sky, the chick-a-dee braving the snow, Wall Street and State Street, cotton-mills, railroads and Quincy granite. For an abstract thinker he was strangely in love with the concrete facts of life. Idealism in him assumed the form of a vivid illumination of the real. From the pages of his teeming note-books he took the material for his lectures, arranging and rearranging it under such titles as Nature, School, Home, Genius, Beauty and Manners, Self-Possession, Duty, The Superlative, Truth, The Anglo-Saxon, The Young American. When the lectures had served their purpose he rearranged the material in essays and published them. Thus appeared in succession the following volumes: *Essays* (First Series) (1841); *Essays* (Second Series) (1844); *Representative Men* (1850); *English Traits* (1856); *The Conduct of Life* (1860); *Society and Solitude* (1870); *Letters and Social Aims* (1876). Besides these, many other lectures were printed in separate form and in various combinations.

Emerson's style is brilliant, epigrammatic, gem-like; clear in sentences, obscure in paragraphs. He was a sporadic observer. He saw by flashes. He said, "I do not know what arguments mean in reference to any expression of a thought." The coherence of his writing lies in his personality. His work is fused by a steady glow of optimism. Yet he states this optimism moderately. "The genius which preserves and guides the human race indicates itself by a small excess of good, a small balance in brute facts always favourable to the side of reason."

His verse, though in form inferior to his prose, was perhaps a truer expression of his genius. He said, "I am born a poet"; and again, writing to Carlyle, he called himself "half a bard." He had "the vision," but not "the faculty divine" which translates the vision into music. In his two volumes of verse (*Poems*, 1846; *May Day and other Pieces*, 1867) there are many passages of beautiful insight and profound feeling, some lines of surprising splendour, and a few poems, like "The Rhodora," "The Snow-storm," "Ode to Beauty," "Terminus," "The Concord Ode," and the marvellous "Threnody" on the death of his first-born boy, of beauty unmarred and penetrating truth. But the total value of his poetical work is discounted by the imperfection of metrical form, the presence of incongruous images, the predominance of the intellectual over the emotional element, and the lack of flow. It is the material of poetry not thoroughly worked out. But the genius from which it came—the swift faculty of perception, the lofty imagination, the idealizing spirit enamoured of reality—was the secret source of all Emerson's greatness as a speaker and as a writer. Whatever verdict time may pass upon the bulk of his poetry, Emerson himself must be recognized as an original and true poet of a high order.

His latter years were passed in peaceful honour at Concord. In 1866 Harvard College conferred upon him the degree of LL.D., and in 1867 he was elected an overseer. In 1870 he delivered a course of lectures before the university on "The Natural History of the Intellect." In 1872 his house was burned down, and was rebuilt by popular subscription. In the same year he went on his third foreign journey, going as far as Egypt. About this time began a failure in his powers, especially in his memory. But his character remained serene and unshaken in dignity. Steadily, tranquilly, cheerfully, he finished the voyage of life.

> "I trim myself to the storm of time,
> I man the rudder, reef the sail,
> Obey the voice at eve obeyed at prime:
> 'Lowly faithful, banish fear,
> Right onward drive unharmed;
> The port, well worth the cruise, is near,
> And every wave is charmed.'"

Emerson died on the 27th of April 1882, and his body was laid to rest in the peaceful cemetery of Sleepy Hollow, in a grove on the edge of the village of Concord.

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EMERSON, WILLIAM (1701–1782), English mathematician, was born on the 14th of May 1701 at Hurworth, near Darlington, where his father, Dudley Emerson, also a mathematician, taught a school. Unsuccessful as a teacher he devoted himself entirely to studious retirement, and published many works which are singularly free from errata. In mechanics he never advanced a proposition which he had not previously tested in practice, nor published an invention without first proving its effects by a model. He was skilled in the science of music, the theory of sounds, and the ancient and modern scales; but he never attained any excellence as a performer. He died on the 20th of May 1782 at his native village. Emerson was eccentric and indeed clownish, but he possessed remarkable independence of character and intellectual energy. The boldness with which he expressed his opinions on religious subjects led to his being charged with scepticism, but for this there was no foundation.

Emerson's works include *The Doctrine of Fluxions* (1748); *The Projection of the Sphere, Orthographic, Stereographic and Gnomical* (1749); *The Elements of Trigonometry* (1749); *The Principles of Mechanics* (1754); *A Treatise of Navigation* (1755); *A Treatise of Algebra*, in two books (1765); *The Arithmetic of Infinites, and the Differential Method, illustrated by Examples* (1767); *Mechanics, or the Doctrine of Motion* (1769); *The Elements of Optics*, in four books (1768); *A System of Astronomy* (1769); *The Laws of Centripetal and Centrifugal Force* (1769); *The Mathematical Principles of Geography* (1770); *Tracts* (1770); *Cyclomathesis, or an Easy Introduction to the several branches of the Mathematics* (1770), in ten vols.; *A Short Comment on Sir Isaac Newton's Principia*; to which is added, *A Defence of Sir Isaac against the objections that have been made to several parts of his works* (1770); *A Miscellaneous Treatise containing several Mathematical Subjects* (1776).

EMERY (Ger. *Smirgel*), an impure variety of corundum, much used as an abrasive agent. It was known to the Greeks under the name of *σμύρις* or *σμίρις*, which is defined by Dioscorides as a stone used in gem-engraving. The Hebrew word *shamir* (related to the Egyptian *asmir*), where translated in our versions of the Old Testament "adamant" and "diamond," probably signified the emery-stone or corundum.

Emery occurs as a granular or massive, dark-coloured, dense substance, having much the appearance of an iron-ore. Its specific gravity varies with its composition from 3·7 to 4·3. Under the microscope, it is seen to be a mechanical aggregate of corundum, usually in grains or minute crystals of a bluish colour, with magnetite, which also is granular and crystalline. Other iron oxides, like haematite and limonite, may be present as alteration-products of the magnetite. Some of the alumina and iron oxide may occasionally be chemically combined, so as to form an iron spinel, or hercynite. In addition to these minerals emery sometimes contains quartz, mica, tourmaline, cassiterite, &c. Indeed emery may be regarded as a rock rather than a definite mineral species.

The hardness of emery is about 8, whereas that of pure corundum is 9. The "abrasive power," or "effective hardness," of emery is by no means proportional to the amount of alumina which it contains, but seems rather to depend on its physical condition. Thus, taking the effective hardness of sapphire as 100, Dr J. Lawrence Smith found that the emery of Samos with 70·10% of alumina had a corresponding hardness of 56; that of Naxos, with 68·53 of Al_2O_3, a hardness of 46; and that of Gumach with 77·82 of Al_2O_3, a hardness of 47.

Emery has been worked from a very remote period in the Isle of Naxos, one of the Cyclades, whence the stone was called *naxium* by Pliny and other Roman writers. The mineral occurs as loose blocks and as lenticular masses or irregular beds in granular limestone, associated with crystalline schists. The Naxos emery has been described by Professor G. Tschermak. From a chemical analysis of a sample it has been calculated that the emery contained 52·4% of corundum, 32·1 of magnetite, 11·5 of tourmaline, 2 of muscovite and 2 of margarite.

Important deposits of corundum were discovered in Asia Minor by J. Lawrence Smith, when investigating Turkish mineral resources about 1847. The chief sources of emery there are Gumach Dagh, a mountain about 12 m. E. of Ephesus; Kula, near Ala-shehr; and the mines in the hills between Thyra and Cosbonnar, south of Smyrna. The occurrence is similar to that in Naxos. The emery is found as detached blocks in a reddish soil, and as rounded masses embedded in a crystalline limestone associated with mica-schist, gneiss and granite. The proportion of corundum in this emery is said to vary from 37 to 57%. Emery is worked at several localities in the United States, especially near Chester, in Hampden county, Mass., where it is associated with peridotites. The corundum and magnetite are regarded by Dr J. H. Pratt as basic segregations from an igneous magma. The deposits were discovered by H. S. Lucas in 1864.

The hardness and toughness of emery render it difficult to work, but it may be extracted from the rock by blasting in holes bored with diamond drills. In the East fire-setting is employed. The emery after being broken up is carefully picked by hand, and then ground or stamped, and separated into grades by wire sieves. The higher grades are prepared by washing and eleutriation, the finest being known as "flour of emery." A very fine emery dust is collected in the stamping room, where it is deposited after floating in the air. The fine powder is used by lapidaries and plate-glass manufacturers. Emery-wheels are made by consolidating the powdered mineral with an agglutinating medium like shellac or silicate of soda or vulcanized india-rubber. Such wheels are not only used by dentists and lapidaries but are employed on a large scale in mechanical workshops for grinding, shaping and polishing steel. Emery-sticks, emery-cloth and emery-paper are made by coating the several materials with powdered emery mixed with glue, or other adhesive media. (See CORUNDUM.) (F. W. R.*)

EMETICS (from Gr. ἐμετικός, causing vomit), the term given to substances which are administered for the purpose of producing vomiting. It is customary to divide emetics into two classes, those which produce their effect by acting on the vomiting centre in the medulla, and those which act directly on the stomach itself. There is considerable confusion in the nomenclature of these two divisions, but all are agreed in calling the former class central emetics, and the latter gastric. The gastric emetics in common use are alum, ammonium carbonate, zinc sulphate, sodium chloride (common salt), mustard and warm water. Copper sulphate has been purposely omitted from this list, since unless it produces vomiting very shortly after administration, being itself a violent gastro-intestinal irritant, some other emetic must promptly be administered. The central emetics are apomorphine, tartar emetic, ipecacuanha, senega and squill. Of these tartar emetic and ipecacuanha come under both heads: when taken by the mouth they act as gastric emetics before absorption into the blood, and later produce a further and more vigorous effect by stimulation of the medullary centre. It must be remembered, however, that, valuable though these drugs are, their action is accompanied by so much depression, they should never be administered except under medical advice.

Emetics have two main uses: that of emptying the stomach, especially in cases of poisoning, and that of expelling the contents of the air passages, more especially in children before they have learnt or have the strength to expectorate. Where a physician is in attendance, the first of these uses is nearly always replaced by lavage of the stomach, whereby any subsequent depression is avoided. Emetics still have their place, however, in the treatment of bronchitis, laryngitis and diphtheria in children, as they aid in the expulsion of the morbid products. Occasionally also they are administered when a foreign body has got into the larynx. Their use is contra-indicated in the case of anyone suffering from aneurism, hernia or arterio-sclerosis, or where there is any tendency to haemorrhage.

EMEU, evidently from the Port. *Ema*,[1] a name which has in turn been applied to each of the earlier-known forms of Ratite birds, but has finally settled upon that which inhabits Australia, though, up to the close of the 18th century, it was given by most authors to the bird now commonly called cassowary—this last word being a corrupted form of the Malayan *Suwari* (see Crawfurd, *Gramm. and Dict. Malay Language*, ii. pp. 178 and 25), apparently first printed as *Casoaris* by Bontius in 1658 (*Hist. nat. et med. Ind. Orient.* p. 71).

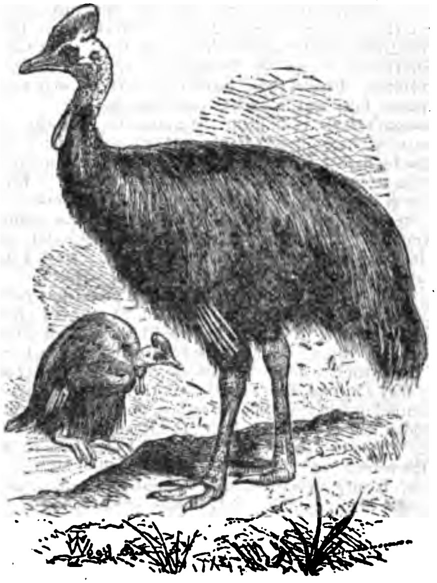

FIG. 1.—Ceram Cassowary.[2]

The cassowaries (*Casuariidae*) and emeus (*Dromaeidae*)—as the latter name is now used—have much structural resemblance, and form the order *Megistanes*,[3] which is peculiar to the Australian Region. Huxley showed (*Proc. Zool. Soc.*, 1867, pp. 422, 423, that they agree in differing from the other *Ratitae* in many important characters; one of the most obvious of them is that each contour-feather appears to be double, its *hyporachis*, or aftershaft, being as long as the main shaft—a feature noticed in the case of either form so soon as examples were brought to Europe. The external distinctions of the two families are, however, equally plain. The cassowaries, when adult, bear a horny helmet on their head; they have some part of the neck bare, generally more or less ornamented with caruncles, and the claw of the inner toe is remarkably elongated. The emeus have no helmet, their head is feathered, their neck has no caruncles, and their inner toes bear a claw of no singular character.

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[1] By Moraes (1796) and Sousa (1830) the word is said to be from the Arabic *Na'âma* or *Na'ëma*, an ostrich (*Struthio camelus*); but no additional evidence in support of the assertion is given by Dozy in 1869 (*Glossaire des mots espagnols et portugais dérivés de l'arabe*, 2nd ed., p. 260). According to Gesner in 1555 (lib. iii. p. 709), it was the Portuguese name of the crane (*Grus communis*), and had been transferred with the qualifying addition of "*di Gei*" (*i.e.* ground-crane) to the ostrich. This statement is confirmed by Aldrovandus (lib. ix. cap. 2). Subsequently, but in what order can scarcely now be determined, the name was naturally enough used for the ostrich-like birds inhabiting the lands discovered by the Portuguese, both in the Old and in the New World. The last of these are now known as rheas, and the preceding as cassowaries.

[2] The figures are taken, by permission, from Messrs Mosenthal and Harting's *Ostriches and Ostrich Farming* (Trübner & Co., 1877).

[3] *Ann. and Mag. Nat. Hist.* ser. 4, xx. p. 500.

The type of the *Casuariidae* is the species named by Linnaeus *Struthio casuarius* and by John Latham *Casuarius emeu*. Vieillot subsequently called it *C. galeatus*, and his epithet has been very commonly adopted by writers, to the exclusion of the older specific appellation. It seems to be peculiar to the island of Ceram, and was made known to naturalists, as we learn from Clusius, in 1597, by the first Dutch expedition to the East Indies, when an example was brought from Banda, whither it had doubtless been conveyed from its native island. It was said to have been called by the inhabitants "Emeu," or "Ema," but this name they must have had from the earlier Portuguese navigators.[1] Since that time examples have been continually imported into Europe, so that it has become one of the best-known members of the subclass *Ratitae*. For a long time its glossy, but coarse and hair-like, black plumage, its lofty helmet, the gaudily-coloured caruncles of its neck, and the four or five barbless quills which represent its wing-feathers, made it appear unique among birds. But in 1857 Dr George Bennett certified the existence of a second and perfectly distinct species of cassowary, an inhabitant of New Britain, where it was known to the natives as the *Mooruk*, and in his honour it was named by John Gould *C. bennetti*. Several examples were soon after received in England, and these confirmed the view of it already taken. A considerable number of other species of the genus have since been described from various localities in the same subregion.

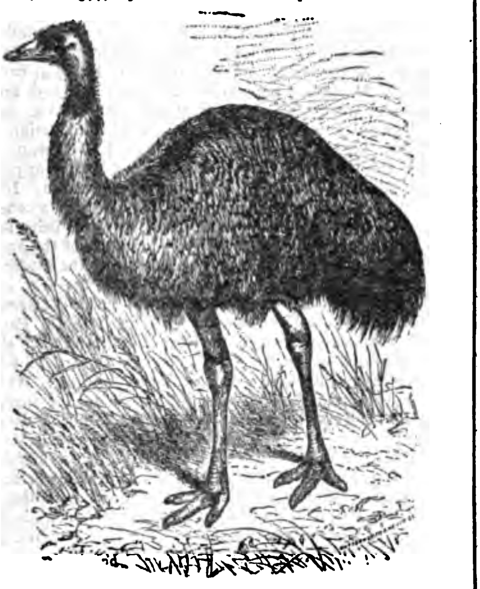

FIG. 2.—Emeu.

Conspicuous among them from its large size and lofty helmet is the *C. australis*, from the northern parts of Australia. Its existence indeed had been ascertained, by T. S. Wall, in 1854, but the specimen obtained by that unfortunate explorer was lost, and it was not until 1867 that an example was submitted to competent naturalists.

Not much seems to be known of the habits of any of the cassowaries in a state of nature. Though the old species occurs rather plentifully over the whole of the interior of Ceram, A. R. Wallace was unable to obtain or even to see an example. They all appear to bear captivity well, and the hens in confinement frequently lay their dark-green and rough-shelled eggs, which, according to the custom of the *Ratitae*, are incubated by the cocks. The nestling plumage is mottled (*Proc. Zool. Soc.*, 1863, pl. xlii.), and when about half grown they are clothed in dishevelled feathers of a deep tawny colour.

Of the emeus (as the word is now restricted) the best known is the *Casuarius novae-hollandiae* of John Latham, made by Vieillot the type of his genus *Dromaeus*,[2] whence the name of the family (*Dromaeidae*) is taken. This bird immediately after the colonization of New South Wales (in 1788) was found to inhabit the south-eastern portion of Australia, where, according to John Hunter (*Hist. Journ.*, &c., pp. 409, 413), the natives call it *Maracry*, *Marryang* or *Maroang*; but it has now been so hunted down that not an example remains at large in the districts that have been fully settled. It is said to have existed also on the islands of Bass Straits and in Tasmania, but it has been exterminated in both, without, so far as is known, any ornithologist having had the opportunity of determining whether the race inhabiting those localities was specifically identical with that of the mainland or distinct. Next to the ostrich the largest of existing birds, the common emeu is an inhabitant of the more open country, feeding on fruits, roots and herbage, and generally keeping in small companies. The nest is a shallow pit scraped in the ground, and from nine to thirteen eggs, in colour varying from a bluish-green to a dark bottle-green, are laid therein. These are hatched by the cock-bird, the period of incubation lasting from 70 to 80 days. The young at birth are striped longitudinally with dark markings on a light ground. A remarkable structure in *Dromaeus* is a singular opening in the front of the windpipe, communicating with a tracheal pouch. This has attracted the attention of several anatomists, and has been well described by Dr Murie (*Proc. Zool. Soc.*, 1867, pp. 405-415). Various conjectures have been made as to its function, the most probable of which seems to be that it is an organ of sound in the breeding-season, at which time the hen-bird has long been known to utter a remarkably loud booming note. Due convenience being afforded to it, the emeu thrives well, and readily propagates its kind in Europe. Like other Ratite birds it will take to the water, and examples have been seen voluntarily swimming a wide river. (A. N.)

EMIGRATION (from Lat. *emigrare*; *e*, *ex*, out of, and *migrare*, to depart), the movement of population out of one country into another (see MIGRATION).

EMILIA, a territorial division (*compartimento*) of Italy, bounded by Venetia and Lombardy on the N., Liguria on the W., Tuscany on the S., the Marches on the S.E., and the Adriatic Sea on the E. It has an area of 7967 sq. m., and a population of 2,477,690 (1901), embracing eight provinces, as follows:—(1) Bologna (pop. 529,612; 61 communes); (2) Ferrara (270,558; 16 communes); (3) Forli (283,996; 41 communes); (4) Modena (323,598; 45 communes); (5) Parma (303, 694; 50 communes); (6) Piacenza (250,491; 47 communes); (7) Ravenna (234,656; 18 communes); (8) Reggio nell' Emilia (281,085; 43 communes). In these provinces the chief towns, with communal populations, are as follows:—

(1) Bologna (147,898), Imola (33,144), Budrio (17,077), S. Giovanni in Persiceto (15,978), Castelfranco (13,484), Castel

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[1] It is known that the Portuguese preceded the Dutch in their voyages to the East, and it is almost certain that the latter were assisted by pilots of the former nation, whose names for places and various natural objects would be imparted to their employers (see DODO).

[2] The obvious misprint of *Dromeicus* in this author's work (*Analyse*, &c., p. 54) was foolishly followed by many naturalists, forgetful that he corrected it a few pages farther on (p. 70) to *Dromaius*—the properly latinized form of which is *Dromaeus*.

S. Pietro (13,426), Medicina (12,575), Molinella (12,081), Crevalcore (11,408).

(2) Ferrara (86,675), Copparo (39,222), Argenta (20,474), Portomaggiore (20,141), Cento (19,078), Bondeno (15,682), Comacchio (10,745).

(3) Forlì (43,321), Rimini (43,595), Cesena (42,509).

(4) Modena (63,012), Carpi (22,876), Mirandola (13,721), Finale nell' Emilia (12,896), Pavullo nel Frignano (12,034).

(5) Parma (48,523), Borgo S. Donnino (12,019).

(6) Piacenza (35,647).

(7) Ravenna (63,364), Faenza (39,757), Lugo (27,244), Bagnacavallo (15,176), Brisighella (13,815), Alfonsine (10,369).

(8) Reggio nell' Emilia (58,993), Correggio (14,445), Guastalla (11,091).

The northern portion of Emilia is entirely formed by a great plain stretching from the Via Aemilia to the Po; its highest point is not more than 200 ft. above sea-level, while along the E. coast are the lagoons at the mouth of the Po and those called the Valli di Comacchio to the S. of them, and to the S. again the plain round Ravenna (10 ft.), which continues as far as Rimini, where the mountains come down to the coast.

Immediately to the S.E. of the Via Aemilia the mountains begin to rise, culminating in the central chain of the Ligurian and Tuscan Apennines. The boundary of Emilia follows the highest summits of the chain in the provinces of Parma, Reggio and Modena, passing over the Monte Bue (5915 ft.) and the Monte Cimone (7103 ft.), while in the provinces of Bologna and Forlì it keeps somewhat lower along the N.E. slopes of the chain. With the exception of the Po, the main rivers of Emilia descend from this portion of the Apennines, the majority of them being tributaries of the Po; the Trebbia (which rises in the province of Genoa), Taro, Secchia and Panaro are the most important. Even the Reno, Ronco and Montone, which now flow directly into the Adriatic, were, in Roman times, tributaries of the Po, and the Savio and Rubicone seem to be the only streams of any importance from these slopes of the Tuscan Apennines which ran directly into the sea in Roman times (see APENNINES).

Railway communication in the plain of Emilia is unattended by engineering difficulties (except for the bridging of rivers) and is mainly afforded by the line from Piacenza to Rimini. This, as far as Bologna, forms part of the main route from Milan to Florence and Rome, while beyond Rimini it follows the S.E. coast of Italy past Ancona as far as Brindisi and Lecce. The description follows this main line in a S.E. direction. Piacenza, being immediately S. of a bridge over the Po, is an important centre; a line runs to the W. to Voghera, through which it communicates with the lines of W. Lombardy and Piedmont, and immediately N. of the Po a line goes off to Cremona. A new bridge over the Po carries a direct line from Cremona to Borgo S. Donnino. From Parma starts a main line, followed by expresses from Milan to Rome, which crosses the Apennines to Spezia (and Sarzana, for Pisa and Rome), tunnelling under the pass of La Cisa, while in a N. and N.E. direction lines run to Brescia and Suzzara. From Reggio branch lines run to Guastalla, Carpi and Sassuolo, there being also a line from Sassuolo to Modena. At Modena the main line to Verona through Suzzara and Mantua diverges to the N.; there is also a branch N.N.E. to Mirandola, and another S. to Vignola. Bologna is, however, the most important railway centre; besides the line S. to Pistoia and Florence over the Apennines and the line S.E. to Rimini, Ancona and Brindisi, there is the main line N.N.E. to Ferrara, Padua and Venice, and there are branches to Budrio and Portomaggiore to the N.E., and to S. Felice sul Panaro and Poggio Rusco to the N., which connect the main lines of the district.

At Castel Bolognese, 5 m. N.W. of Faenza, a branch goes off to Lugo, whence there are connexions with Budrio, Lavezzola (on the line between Ravenna and Ferrara) and Ravenna, and at Faenza a line, not traversed by express trains, goes across the Apennines to Florence. Rimini is connected by a direct line with Ravenna and Ferrara; and Ferrara, besides the main line S.S.W. to Bologna and N. by E. to Padua, has a branch to Poggio Rusco, which goes on to Suzzara, a station on the main line between Modena and Verona. There are also many steam tramways in the flatter part of the province, the fertility and agricultural activity of which are considerable. The main products of the plain are cereals, wine, and, in the marshy districts near the Po, rice; the system prevailing is that of the mezzadria—half the produce to the owner and half to the cultivator. The ancient Roman divisions of the fields are still preserved in some places. There are also considerable pastures, and cheese is produced, especially Parmesan. Flax, hemp and silk-worms are also cultivated, and a considerable quantity of poultry kept. The hill districts produce cereals, vines, olives and fruit; while on the mountains are considerable chestnut and other forests, and extensive summer pastures, the flocks going in part to the Maremma in summer, and in part to the pastures of the plain of the Emilia.

The name Emilia comes from the Via Aemilia (*q.v.*), the Roman road from Ariminum to Placentia, which traversed the entire district from S.E. to N.W., its line being closely followed by the modern railway. The name was transferred to the district (which formed the eighth Augustan region of Italy) as early as the time of Martial, in popular usage (*Epigr.* vi. 85. 5), and in the 2nd and 3rd centuries it is frequently named as a district under imperial judges (*iuridici*), generally in combination with Flaminia or Liguria and Tuscia. The district of Ravenna was, as a rule, from the 3rd to the 5th century, not treated as part of Aemilia, the chief town of the latter being Placentia. In the 4th century Aemilia and Liguria were joined to form a consular province; after that Aemilia stood alone, Ravenna being sometimes temporarily added to it. The boundaries of the ancient district correspond approximately with those of the modern.

In the Byzantine period Ravenna became the seat of an exarch; and after the Lombards had for two centuries attempted to subdue the Pentapolis (Ravenna, Bologna, Forlì, Faenza, Rimini), Pippin took these cities from Aistulf and gave them, with the March of Ancona, to the papacy in 755, to which, under the name of Romagna, they continued to belong. At first, however, the archbishop of Ravenna was in reality supreme. The other chief cities of Emilia—Ferrara, Modena, Reggio, Parma, Piacenza—were, on the other hand, independent, and in the period of the communal independence of the individual towns of Italy each of the chief cities of Emilia, whether belonging to Romagna or not, had a history of its own; and, notwithstanding the feuds of Guelphs and Ghibellines, prospered considerably. The study of Roman law, especially at Bologna, acquired great importance. The imperial influence kept the papal power in check. Nicholas III. obtained control of the Romagna in 1278, but the papal dominion almost fell during the Avignon period, and was only maintained by the efforts of Cardinal Albornoz, a Spaniard sent to Italy by Innocent VI. in 1353. Even so, however, the papal supremacy was little more than a name; and this state of things only ceased when Caesar Borgia, the natural son of Alexander VI., crushed most of the petty princes of Romagna, intending to found there a dynasty of his own; but on the death of Alexander VI. it was his successors in the papacy who carried on and profited by what Caesar Borgia had begun. The towns were thenceforth subject to the church and administered by cardinal legates. Ferrara and Comacchio remained under the house of Este until the death of Alphonso II. in 1597, when they were claimed by Pope Clement VIII. as vacant fiefs. Modena and Reggio, which had formed part of the Ferrara duchy, were thenceforth a separate duchy under a branch of the house of Este, which was descended from a natural son of Alphonso I. Carpi and Mirandola were small principalities, the former of which passed to the house of Este in 1525, in which year Charles V. expelled the Pio family, while the last of the Pico dynasty of Mirandola, Francesco Maria, having sided with the French in the war of Spanish Succession, was deprived of his duchy in 1709 by the emperor Joseph I., who sold it to the house of Este in 1710. Parma and Piacenza were at first under the Farnese, Pope Paul III. having placed his natural son Pier Luigi there in 1545, and then, after the extinction of the family in 1731, under a secondary branch of the Bourbons of Spain. In 1796–1814, Emilia was first incorporated in the Italian republic and then in the Napoleonic Italian kingdom; after 1815 there was a return to the *status quo ante*, Romagna returning to the papacy and its ecclesiastical government, the duchy of Parma being given to Marie Louise, wife of the deposed Napoleon, and Modena to the archduke Francis of Austria, the heir of the last Este. In Romagna and Modena the government was oppressive, arbitrary, corrupt and unprogressive, while in Parma things were better. In 1821 and 1831 there were unsuccessful attempts at revolt in Emilia, which were sternly and cruelly repressed; chronic discontent continued and the people joined again in the movement of 1848–1849, which was crushed by Austrian troops. In 1859 the struggle for independence was finally successful, Emilia passing to the Italian kingdom almost without resistance.

EMINENCE (Lat. *eminentia*), a title of honour now confined to the cardinals of the Church of Rome. It was originally given as a complimentary title to emperors, kings, and then to less conspicuous persons. The Roman empire of the 4th century adopted from the "vanity of the East the forms and ceremonies of ostentatious greatness." Gibbon includes in the "profusion of epithets" by which "the purity of the Latin language was debased," and which were lavished on "the principal officers of the empire," "your Sincerity, your Gravity, your Excellency, your Eminence, your sublime and wonderful Magnitude, your illustrious and magnificent Highness." From the *notitia dignitatum* it passed into the Latin of the middle ages as a flattering epithet, and was applied in the church and by the popes to the dignified clergy at large, and sometimes as a pure form of civility to churchmen of modest rank. On the 10th of June 1630, Urban VIII. confined the use of the titles *Eminentiae* and *Eminentissimi* to the cardinals, to imperial electors, and to the master of the Hospital of St John of Jerusalem (order of the Knights of Malta). Since the dissolution of the Holy Roman Empire, and the entire change, if not actual destruction, of the order of St John, the title "eminence" has become strictly confined to the cardinals. Before 1630 the members of the Sacred College were "Illustrissimi" and "Reverendissimi." It is, therefore, not correct to speak of a cardinal who lived before that time as "his Eminence."

See du Cange, *Glossarium mediae et infimae latinitatis* (Niort and London, 1884), s.v. "Eminentia."

EMINENT DOMAIN (Lat. *eminens*, rising high above surrounding objects: and *dominium*, domain), a term applied in law to the sovereign right of a state to appropriate private property to public uses, whether the owner consents or not. It is repeatedly employed by Grotius (*e.g. De jure belli*, bk. iii. c. 20, s. 7), Bynkershoek (*Quaest. jur. pub.* bk. 2, c. 15), and Puffendorf (*De jure naturae et gentium*, bk. i. c. 1, s. 19),—the two latter, however, preferring the word *imperium* to *dominium*; and by other Dutch jurists. But in modern times it is chiefly in the United States of America that the doctrine of eminent domain has received its application, and it is chiefly to American law that the following remarks refer (see also the article COMPENSATION). Eminent domain is distinguishable alike from the *police power*, by which restrictions are imposed on private property in the public interest, *e.g.* in connexion with the liquor traffic or public health (see *re Haff* (1904), 197 U.S. 488); from the *power of taxation*, by which the owner of private property is compelled to contribute a portion of it for public purposes; and from the *war-power*, involving the destruction of private property in the course of military operations. The police power fetters rights of property; eminent domain takes them away. The power of taxation is analogous to eminent domain as regards the purposes to which the contribution of the taxpayer is to be applied. But, unlike eminent domain, it does not necessarily involve a taking of specific property for those purposes. The destruction of property in military operations—or in the discharge by Government of other duties in cases of necessity, *e.g.* in order to check the progress of a fire in a city—clearly cannot be said to be an exercise of the power of eminent domain.

The question whether the element of compensation is necessarily involved in the idea of eminent domain has in modern times aroused much controversy. According to one school of thought (see Lewis, *Eminent Domain*, s. 10), this question must be answered in the negative. According to a second, whose view has the support of the civilians (see Randolph, *Eminent Domain*, s. 227; Mills, *Eminent Domain*, s. 1) compensation is an inherent attribute of the power. An intermediate view is advocated by Professor Thayer (*Cases on Constitutional Law*, vol. 1, 953), according to which eminent domain springs from the necessities of government, while the obligation to reimburse rests upon the natural right of individuals. The right to compensation is thus not a component part of the power to take, but arises at the same time and the latter cannot exist without it. The relation between the two is that of substance and shadow. The matter is not, however, of great practical importance, for the Federal Constitution prohibits the exercise of the power "without just compensation" (5th Amendment), while in most of the states the State constitution or other legislation has imposed upon it a similar limitation: and the tendency of modern judicial decisions is in favour of the view that the absence of such a limitation will make an enactment so far unconstitutional and invalid.

In order to justify the exercise of the power of eminent domain, the purposes to which the property taken is to be applied must be "public," *i.e.* primarily public, and not primarily of private interest and merely incidentally beneficial to the public (*Madisonville Traction Co.* v. *Mining Co.*, 1904, 196 U.S. 239). Subject to this definition, the term "public" receives a wide interpretation. All kinds of property may be taken; and the procedure indicated by the different legislatures must be followed. Any contravention of this rule would involve a breach of the 5th Amendment of the Federal Constitution, which provides that "no persons . . . shall be deprived of property without due process of law." It may be added that if the performance of a covenant is rendered impossible by an act of eminent domain the covenantor is excused.

In *English law*, the only exact analogue to the doctrine of eminent domain is to be found in the prerogative right of the crown to enter upon the lands of subjects or to interfere with their enjoyment for the defence of the realm (see *A. G.* v. *Tomline*; 1879; 12 Ch. D. 214). No attempt is made to exercise this prerogative, and lands are acquired for state purposes by statute usually framed on or incorporating the Lands Clauses Acts (see COMPENSATION). The French *Code Civil* secures compensation to the owner of property in cases of *expropriation pour cause d'utilité publique* (art. 545), and there is similar provision in Belgium (Const. Law, art. II.), Holland (Fundamental Law, art. 147), Spain (Civil Code, art. 349, and Law of 3rd May, 1841), and most other European states. It has been held in France that the right to compensation does not arise under art. 545 of the Code Civil where only a *servitude d'utilité publique* is created on a private individual's land.

In addition to the authorities cited in the text, see Lewis, *Eminent Domain* (2nd ed., Chicago, 1900); Mills, *Eminent Domain* (2nd ed., St Louis, 1888); Randolph, *Eminent Domain in the United States* (Boston, 1894). (A. W. R.)

EMINESCU, MICHAIL (1849–1889), the greatest Rumanian poet of the 19th century, was born on the 20th of December in Ipateshti near Botoshani, in the north of Moldavia. He was of Turco-Tatar origin, and his surname was originally Emin; this was changed to Eminovich and finally to the Rumanian form Eminescu. He was educated for a time in Czernowitz, and then entered the civil service. In 1864 he resumed his studies in Transylvania, but soon joined a roving theatrical company where he played in turn the rôles of actor, prompter and stage-manager. After a few years he went to Vienna, Jena and Berlin, where he attended lectures, especially on philosophy. In 1874 he was appointed school inspector and librarian at the university of Jassy, but was soon turned out through the change of government, and took charge, as editor in chief, of the Conservative paper *Timpul* (Times). In 1883 he had the first attack of the insanity hereditary in his family, and in 1889 he died in a private institution in Bucharest. In 1870 his great poetical talent was revealed by two contributions to the *Convorbiri literare*, the organ of the Junimist party in Jassy; these were the poems "Venera si Madona" and "Epigonii." Other poems followed and soon established his claim to be the first among the modern poets of his country. He was thoroughly acquainted with the chronicles of the past, had a complete mastery of the Rumanian language, and was a lover and admirer of Rumanian popular poetry. Influenced by these studies and by the philosophy of Schopenhauer, he introduced a new spirit into Rumanian poetry. Mystically inclined and himself of a melancholy disposition, he lived in the glory of the medieval Rumanian past; stifled by the artificiality of the world around him, he rebelled against the conventionality of society and his surroundings. In inimitable language he denounced the vileness of the present and painted in glowing pictures the heroism of the past; he also surprised nature in its primitive beauty, and he gave expression to stirring emotions in lyrics couched in the language and metre of popular poetry. He further proved himself an unsurpassed master in satire. Over all his poetry hangs a cloud of sadness, the sense of coming doom. Simplicity of language, masterly handling of rhyme and verse, deep thought and plastic expression made Eminescu the creator of a school of poetry which dominated the thought of Rumania and the expression of Rumanian writers and poets at the end of the 19th century and the beginning of the 20th.

Five editions of his collected poems appeared after 1890. Some of them were translated into German by "Carmen Sylva" and Mite Kremnitz, and others have also been translated into several other languages. Eminescu also wrote two short novels, real poems in prose (Jassy, 1890). (M. G.)

EMIN PASHA [EDUARD SCHNITZER] (1840–1892), German traveller, administrator and naturalist, was the son of Ludwig Schnitzer, a merchant of Oppeln in Silesia, and was born in Oppeln on the 28th of March 1840. He was educated at the universities of Breslau, Berlin and Königsberg, and took the degree of M.D. at Berlin. He displayed an early predilection for zoology and ornithology, and in later life became a skilled and enthusiastic collector, particularly of African plants and birds. When he was four-and-twenty he determined to seek his fortunes abroad, and made his way to Turkey, where, after practising medicine on his own account for a short time, he was appointed (in 1865) quarantine medical officer at Antivari. The duties of the post were not heavy, and allowed him leisure for a diligent study of Turkish, Arabic and Persian. From 1870 to 1874 he was in the service of the governor of northern Albania, had adopted a Turkish name (though not that by which he afterwards became so widely known), and was practically naturalized as a Turk.

After a visit home in 1875 he went to Cairo, and then to Khartum, in the hope of an opportunity for travelling in the interior of Africa. This came to him in the following year, when General Charles George Gordon, who had recently succeeded Sir Samuel Baker as governor of the equatorial provinces of Egypt, invited Schnitzer, who was now known as "Emin Effendi," to join him at Lado on the upper Nile. Although nominally Gordon's medical officer, Emin was soon entrusted with political missions of some importance to Uganda and Unyoro. In these he acquitted himself so well that when, in 1878, Gordon's successor at Lado was deprived of his office on account of malpractices (Gordon himself having been made governor-general of the Sudan), Emin was chosen to fill the post of governor of the Equatorial Province (*i.e.* the old equatorial provinces minus the Bahr-el-Ghazal) and given the title of "bey." He proved an energetic and enterprising governor; indeed, his enterprise on more than one occasion brought him into conflict with Gordon, who eventually decided to remove Emin to Suakin. Before the change could be effected, however, Gordon resigned his post in the Sudan, and his successor revoked the order.

The next three or four years were employed by Emin in various journeys through his province, and in the initiation of schemes for its development, until in 1882, on his return from a visit to Khartum, he became aware that the Mahdist rising, which had originated in Kordofan, was spreading southward. The effect of the rising was, of course, more markedly felt in Emin's province after the abandonment of the Sudan by the Egyptian government in 1884. He was obliged to give up several of his stations in face of the Mahdist advance, and ultimately to retire from Lado, which had been his capital, to Wadelai. This last step followed upon his receipt of a letter from Nubar Pasha, informing him that it was impossible for the Egyptian government to send him help, and that he must stay in his province or retire towards the coast as best he could. Emin (who about this time was raised to the rank of pasha) had some thoughts of a retreat to Zanzibar, but decided to remain where he was and endeavour to hold his own. To this end he carried on protracted negotiations with neighbouring native potentates. When, in 1887, (Sir) H. M. Stanley's expedition was on its way to relieve him, it is clear from Emin's diary that he had no wish to leave his province, even if relieved. He had done good work there, and established a position which he believed himself able to maintain. He hoped, however, that the presence of Stanley's force, when it came, would strengthen his position; but the condition of the relieving party, when it arrived in April 1888, did not seem to Emin to promise this. Stanley's proposal to Emin, as stated in the latter's diary, was that Emin should either remain as governor-general on behalf of the king of the Belgians, or establish himself on Victoria Nyanza on behalf of a group of English merchants who wished to start an enterprise in Africa on the model of the East India Company. After much hesitation, and prompted by a growing disaffection amongst the natives (owing, as he maintained, to his loss of prestige after the arrival of Stanley's force), Emin decided to accompany Stanley to the coast, where the expedition arrived in December 1889. Unfortunately, on the evening of a reception dinner given in his honour, Emin met with an accident which resulted in fracture of the skull. Careful nursing gradually restored him to health, and on his convalescence he resolutely maintained his decision to remain in Africa, and, if possible, to work there in future on behalf of the German government. The seal was definitely set upon this decision by his formal engagement on behalf of his native country, early in 1890. Preparations for a new expedition into the interior were set on foot, and meanwhile Emin was honoured in various ways by learned societies in Germany and elsewhere.

The object of the new expedition was (to quote Emin's instructions) "to secure on behalf of Germany the territories situated south of and along Victoria Nyanza up to Albert Nyanza," and to "make known to the population there that they were placed under German supremacy and protection, and to break or undermine Arab influence as far as possible." The force, which was well equipped, started at the end of April 1890. But before it had penetrated far inland the political reasons for sending the expedition vanished with the signature, on the 1st of July 1890, of the Anglo-German agreement defining the spheres of influence of the two nations, an agreement which excluded the Albert Nyanza region from the German sphere. For a time things went well enough with the expedition; Emin occupied the important town of Tabora on the route from the coast to Tanganyika and established the post of Bukoba on Victoria Nyanza, but by degrees ill-fortune clouded its prospects. Difficulties on the route; dissensions between Emin and the authorities in German East Africa, and misunderstandings on the part of both; epidemics of disease in Emin's force, followed by a growing spirit of mutiny among his native followers; an illness of a painful nature which attacked him—all these gradually undermined Emin's courage, and his diaries at the close of 1891 reflect a gloomy and almost hopeless spirit. In May that year he had crossed into the Congo State by the south shore of Albert Edward Nyanza, and many months were spent on the borders of the great Congo Forest and in the Undusuma country south-west of Albert Nyanza, breaking ground new to Europeans.

In December 1891 he sent off his companion, Dr Stuhlmann, with the bulk of the caravan, on the way back to the east coast. Emin remained behind with the sick, and with a very reduced following left the lake district in March 1892 for the Congo river. On reaching Ipoto on the Ituri he came within the region of the Arab slave raiders and ivory hunters, in whose company he at times travelled. These gentry were incensed against Emin for the energetic way in which he had dealt with their comrades while in German territory, and against Europeans generally by the campaign for their suppression begun by the Congo State. At the instigation of one of these Arabs Emin was murdered on the 23rd or 24th of October 1892 at Kinena, a place about 80 m. E.S.E. of Stanley Falls.

See *Emin Pasha, his Life and Work*, by Georg Schweitzer, with introduction by R. W. Felkin (2 vols., London, 1898); *Emin Pasha in Central Africa* (London, 1888), a collection of Emin's papers contributed to scientific journals; and *Mit Emin Pascha ins Herz von Afrika* (Berlin, 1894), by Dr Franz Stuhlmann. Major G. Casati (1838–1902), an Italian officer who spent several years with Emin, and accompanied him and Stanley to the coast, narrated his experiences in *Dieci anni in Equatoria* (English edition, *Ten Years in Equatoria and the Return with Emin Pasha*, London, 1891).

EMLYN, THOMAS (1663–1741), English nonconformist divine, was born at Stamford, Lincolnshire. He served as chaplain to the presbyterian Letitia, countess of Donegal, and then to Sir Robert Rich, afterwards (1691) becoming colleague to Joseph Boyse, presbyterian minister in Dublin. From this office he was virtually dismissed on his own confession of unitarianism, and for publishing *An Humble Inquiry into the Scripture Account of Jesus Christ* (1702) was sentenced to a year's imprisonment and a fine of £1000. Thanks to the intervention of Boyse he was released in 1705 on payment of £90. He is said to have been the first English preacher definitely to describe himself as "unitarian," and writes in his diary, "I thank God that He did not call me to this lot of suffering till I had arrived at maturity of judgment and firmness of resolution, and that He did not desert me when my friends did. He never let me be so cast down as to renounce the truth or to waver in my faith." Of Christ he writes, "We may regard with fervent gratitude so great a benefactor, but our esteem and rational love must ascend higher and not rest till it centre in his God and ours." Emlyn preached a good deal in Paul's Alley, Barbican, in his later years, and died in London in 1741.

EMMANUEL, or IMMANUEL, a Hebrew symbolical proper name, meaning "God (is) with us." When in 734–733 B.C. Ahaz, king of Judah, alarmed at the preparations made against him by the Syro-Ephraimitish alliance, was inclined to seek aid from Tiglath-pileser of Assyria, the prophet Isaiah endeavoured to allay his fear by telling him that the danger would pass away, and as a sign from Yahweh that this should be so, any young woman who should within the year bear a son, might call his name Immanuel in token of the divine protection accorded to Judah. For before the infant should come to even the immature intelligence of childhood the lands of the foe would be laid waste (Isaiah vii. 14–16). For other interpretations, especially as regards the mother, see *Ency. Bib.* col. 2162-3, and the commentaries. In the post-exilic period the historical meaning of the passage was forgotten, and a new significance was given to it in accordance with the gradually developing eschatological doctrine. This new interpretation finds expression in Matt. i. 23, where the name is applied to Jesus as the Messiah. At the close of Isaiah viii. 8 for "of thy land, O Immanuel," we should probably read "of the land, for God is with us." The three passages quoted are the only instances where this word occurs in Scripture; it is frequent in hymns and devotional literature as a title of Jesus Christ.

EMMANUEL PHILIBERT (1528–1580), duke of Savoy, son of Charles III. and Beatrice of Portugal, one of the most renowned princes of the later Renaissance, was born on the 8th of July 1528. Charles, after trying in vain to remain neutral in the wars between France and the emperor Charles V., had been forced to side with the latter, whereupon his duchy was overrun with foreign soldiery and became the battlefield of the rival armies. Prince Emmanuel took service with the emperor in 1545 and distinguished himself in Germany, France and the Low Countries. On the death of his father in 1553 he succeeded to the title, little more than an empty one, and continued in the emperor's service. Having been refused the command of the imperial troops in Piedmont, he tried in vain to negotiate a separate peace with France; but in 1556 France and Spain concluded a five years' truce, by which each was to retain what it then occupied. This would have been the end of Savoy, but within a year the two powers were again at war. The chief events of the campaign were the successful resistance of Cuneo, held for the duke by Count Luserna, and the victory of St Quentin (1557), won by Emmanuel Philibert himself against the French. At last in 1558 the powers agreed to an armistice, and in 1559 the peace of Cateau-Cambrésis was made, by which Emmanuel regained his duchy, but on onerous terms, for France was to occupy several Piedmontese fortresses, including Turin and Pinerolo, for not more than three years, and a marriage was arranged between the duke and Margaret, duchess of Berry, sister of the French king; while Spain was to garrison Asti and Vercelli (afterwards exchanged for Santhià) until France evacuated the above-mentioned fortresses. The duke's marriage took place in Paris a few months later; and after the French evacuation he re-entered his dominions amidst the rejoicings of the people. The condition of Piedmont at that time was deplorable; for wars, the exactions and devastations of the foreign soldiery, and religious antagonism between Catholics and Protestants had wrought terrible havoc. "Uncultivated," wrote the Venetian ambassador, quoted by E. Ricotti, "no citizens in the cities, neither man nor beast in the fields, all the land forest-clad and wild; one sees no houses, for most of them are burnt, and of nearly all the castles only the walls are visible; of the inhabitants, once so numerous, some have died of the plague or of hunger, some by the sword, and some have fled elsewhere preferring to beg their bread abroad rather than support misery at home which is worse than death." There was no army, the administration was chaotic, and the finances were in a hopeless state. The duke set to work to put his house in order, and inaugurated a series of useful reforms, ably assisted by his minister, Niccolò Balbo. But progress was slow, and was accompanied by measures which abolished the states general, the last survival of feudal liberties. Savoy, following the tendency of the other states of Europe at that time, became thenceforth an absolute monarchy, but without that transformation the achievement of complete independence from foreign powers would have been impossible.

One of the first questions with which he had to deal was the religious difficulty. The inhabitants of the Pellice and Chisone valleys had long professed a primitive form of Christianity which the orthodox regarded as heretical, and had been subject to numerous persecutions in consequence (see WALDENSES). At the time of the Reformation they had gone over to Protestantism, and during the wars of the 16th century the new religion made great progress in Piedmont. The duke as a devout Catholic desired to purge the state of heresy, and initiated repressive measures against the Waldenses, but after some severe and not very successful fighting he ended by allowing them a measure of religious liberty in those valleys (1561). At the pope's instigation he recommenced persecution some years later, but his duchess and some German princes pleaded successfully in favour of the Protestants. He next turned his attention to getting rid of the French garrisons; the negotiations proved long and troublesome, but in December 1562 the French departed on payment of 100,000 scudi, retaining only Pinerolo and Savigliano, and Turin became the capital once more. There remained the Bernese, who had occupied some of the duke's territories in Savoy and Vaud, and in Geneva, over which he claimed certain rights. With Bern he made a compromise, regaining Gex, the Chablais, and the Genevois, on condition that Protestantism should be tolerated there, but he renounced Vaud and some other districts (1566). Disagreements with the Valais were settled in a similar way in 1569; but the Genevans refused to recognize Savoyard suzerainty. Emmanuel reformed the currency, reorganized justice, prepared the way for the emancipation of the serfs, raised the standing army to 25,000 men, and fortified the frontiers, ostensibly against Huguenot raids, but in reality from fear of France. On the death of Charles IX. of France in 1574 the new king, Henry III., passed through Piedmont on his way from Poland; Emmanuel gave him a magnificent reception, and obtained from him a promise that Pinerolo and Savigliano should be evacuated, which was carried out at the end of the year. Philip of Spain was likewise induced to evacuate Asti and Santhià in 1575. Thus, after being more or less under foreign occupation for 39 years, the duchy was at last free. The duke rounded off his dominions by the purchase of Tenda and Oneglia, which increased his seaboard, and the last years of his life were spent in fruitless negotiations to obtain Monferrato, held by the Gonzagas under Spanish protection, and Saluzzo, which was a French fief. He died on the 30th of August 1580, and was succeeded by his son Charles Emmanuel I. As a statesman Emmanuel Philibert was able, business-like and energetic; but he has been criticized for his duplicity, although in this respect he was no worse than most other European princes, whose ends were far more questionable. He was autocratic, but just and very patriotic. During his reign the duchy, which had been more than half French, became predominantly Italian. By diplomacy, which, although he was a capable and brave soldier, he preferred to war, he succeeded in freeing his country, and converting it from a ruined and divided land into a respectable independent power of the second rank, and, after Venice, the best-governed state in Italy.

The most accurate biography of Emmanuel Philibert is contained in E. Ricotti's *Storia della monarchia Piemontese*, vol. ii. (Florence, 1861), which is well done and based on documents; cf. Claretta's *La Successione di Emanuele Filiberto* (Turin, 1884).

EMMAUS, the name of two places in Palestine.

1. A village mentioned by Luke (xxiv. 13), without any indication of direction, as being 60 stadia (almost 7 m.), or according to some MSS.[1] 160 stadia, from Jerusalem. Its identification is a matter of mere guesswork: it has been sought at (*a*) Emmaus-Nicopolis (see 2 below), distant 176 stadia from Jerusalem; (*b*) Kuryet el-'Enab, distant 66 stadia, on the carriage road to Jaffa; (*c*) Kulonieh, distant 36 stadia, on the same road; (*d*) el-Kubeibeh, distant 63 stadia, on the Roman road to Lydda; (*e*) 'Urtas, distant 60 stadia; and (*f*) Khurbet el-Khamasa, distant 86 stadia, on the Roman road to Eleutheropolis. Of these, el-Kubeibeh or 'Urtas seems the most probable, though many favour Kulonieh because of its nearness to Bet Mizza, in which name there is similarity with Emmaus, and because of a reading (30 stadia) in Josephus.

2. Emmaus-Nicopolis, now 'Amwās, a town on the maritime plain, and a place of importance during the Maccabaean and Jewish wars. Near it Judas Maccabaeus defeated Gorgias in 164 B.C., and Vespasian established a fortified camp in A.D. 69. It was afterwards rebuilt and named Nicopolis, and became an episcopal see. It was also noted for a healing spring.

EMMENDINGEN, a town of Germany, in the grand-duchy of Baden, close to the Black Forest, on the Elz and the main line of railway Mannheim-Constance. Pop. 6200. It has a Protestant church with a fine spire, a Roman Catholic church, a handsome town-hall, an old castle (now a hospital), once the residence of the counts of Hochberg, spinning mills, tanneries and manufactures of photographic instruments, paper, machinery and cigars. There is also a considerable trade in timber and cattle. Here the author Johann Georg Schlosser (1739–1799), the husband of Goethe's sister Cornelia (who died in 1777 and is interred in the old graveyard), was *Oberamtmann* (bailiff) for a few years.

Emmendingen was formerly the seat of the counts of Hochberg, a cadet branch of the margraves of Baden. In 1418 it received market rights from the emperor, and in 1590 was raised to the status of a town, and walled, by Margrave Jacob III.

EMMERICH (the ancient *Embrica*), a town of Germany, in the Prussian Rhine province, on the right bank of the Rhine and the railway from Cologne to Amsterdam, 5 m. N.E. of Cleves. Pop. (1905) 12,578. It has a considerable shipping trade, and manufactories of tobacco and cigars, chocolate, margarine, oil, chemicals, brushes, vinegar, soap, guano and perfumery. There are also iron foundries and machine factories. The old minster church, built in the middle of the 11th century, contains some fine choir stalls.

Emmerich, formerly called Embrika and Emrik, originally a Roman colony, is mentioned in records so early as the 7th century. St Willibrord founded a monastery and church here. In 1233 the place came into the possession of the dukes of Gelderland and received the status of a town in 1247. In 1371 it fell to the duchy of Cleves, and passed with it in 1609 to Brandenburg. The town joined the Hanseatic League in 1407. In 1794 it was bombarded by the French under General Vandamme, and in 1806 it was assigned to the grand-duchy of Berg. It passed into the possession of Prussia in 1815.

See A. Dederich, *Annalen der Stadt Emmerich* (Emmerich, 1867).

EMMET, ROBERT (1778–1803), Irish rebel, youngest son of Robert Emmet, physician to the lord-lieutenant of Ireland, was born in Dublin in 1778, and entered Trinity College in October 1793, where he had a distinguished academic career, showing special aptitude for mathematics and chemistry, and acquiring a reputation as an orator. Without taking a degree he removed his name from the college books in April 1798, as a protest against the inquisitorial examination of the political views of the students conducted by Lord Clare as chancellor of the university. Thus cut off from entering a learned profession, he turned towards political intrigue, being already to some extent in the secrets of the United Irishmen, of whom his elder brother Thomas Addis Emmet (see below) was one of the most prominent. In April 1799 a warrant was issued for his arrest, but was not executed; and in 1800 and the following year he travelled on the continent of Europe, where he entered into relations with the leaders of the United Irishmen, exiled since the rebellion of 1798, who were planning a fresh outbreak in Ireland in expectation of support from France. Emmet went to Paris in October 1802, where he had an interview with Bonaparte which convinced him that the peace of Amiens would be of short duration and that a French invasion of England might be looked for in August 1803. The councils of the conspirators were weakened by divided opinions as to the ultimate aim of their policy; and no clearly thought-out scheme of operations appears to have been arrived at when Emmet left Paris for Ireland in October 1802. Those in his confidence afterwards denied that Emmet was himself the originator of the plan on which he acted; and several of the ablest of the United Irishmen held aloof, believing the project to be impracticable. Among the latter was Lord Cloncurry, at one time on the executive of the United Irishmen, with whom Emmet dined the night before he left Paris, and to whom he spoke of his plans with intense enthusiasm and excitement. Emmet's lack of discretion was shown by his revealing his intentions in detail to an Englishman named Lawrence, resident near Honfleur, with whom he sought shelter when travelling on foot on his way to Ireland. Arriving in Dublin at the end of October he received information to the effect that seventeen counties were ready to take up arms if a successful effort were made in Dublin. For some time he remained concealed in his father's house near Miltown, making his preparations. A large number of pikes were collected and stored in Dublin during the spring of 1803, but fire-arms and ammunition were not plentiful.

The probability of a French invasion in August was increased by the renewal of the war in May, Emmet's brother Thomas being then in Paris in communication with Talleyrand and Bonaparte. But a discovery by the government of concealed arms, and an explosion at one of Emmet's depôts in Patrick Street on the 16th of July, necessitated immediate action; and the 23rd of that month was accordingly fixed for the projected rising. An elaborate plan of operations, which he described in detail in a letter to his brother after his arrest, had been prepared by Emmet, the leading feature of which was a simultaneous attack on the castle, the Pigeon House and the artillery barracks at Island bridge; while bodies of insurgents from the neighbouring counties were to march on the capital. But the whole scheme miscarried. Some of Emmet's bolder proposals, such as a plan for capturing the commander-in-chief, were vetoed by the timidity of his associates, none of whom were men of any ability. On the 23rd of July all was confusion at the depôts, and the leaders were divided as to the course to be pursued; orders were not obeyed; a trusted messenger despatched for arms absconded with the money committed to him to pay for them; treachery, quite unsuspected by Emmet, honeycombed the conspiracy; the Wicklow contingent failed to appear; the Kildare men turned back on hearing that the rising had been postponed; a signal expected by a contingent at the Broadstone was never given. In this hopeless state of affairs a false report reached Emmet at one of his depôts at nine o'clock in the evening that the military were approaching. Without taking any step to verify it, Emmet put on a green and white uniform and placed himself at the head of some eighty men, who marched towards the castle, being joined in the streets by a second body of about equal strength. None of these insurgents had any discipline, and many of them were drunk. Lord Kilwarden, proceeding to a hastily summoned meeting of the privy council, was dragged from his carriage by this rabble and murdered, together with his nephew Richard Wolfe; his daughter who accompanied him being conveyed to safety by Emmet himself. Emmet, now seeing that the rising had become a mere street brawl, made his escape; a detachment of soldiers quickly dispersed his followers.

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[1] Including Codex ℵ. But this distance is too great for the conditions of Luke's narrative and the reading (160) is evidently an attempt to harmonize with the traditional identification of Emmaus-Nicopolis held by Eusebius and Jerome. For a curious reading in three old Latin MSS. which makes Emmaus the name of the second traveller on the journey, see *Expos. Times*, xiii. 429. 477. 561.

After hiding for some days in the Wicklow mountains Emmet repaired to the house of a Mrs Palmer at Harold's Cross, in order to be near the residence of John Philpot Curran (*q.v.*), to whose daughter Sarah he had for some time been secretly attached, and with whom he had carried on a voluminous correspondence, afterwards seized by the authorities at her father's house. Attempting without success to persuade this lady to fly with him to America, Emmet lingered in the neighbourhood till the 25th of August, when he was apprehended by Major H. C. Sirr, the same officer who had captured Lord Edward Fitzgerald in 1798. At his trial he was defended and betrayed by the infamous Leonard MacNally (*q.v.*), and was convicted of treason; and after delivering an eloquent speech from the dock, was hanged on the 20th of September 1803.

By the universal testimony of his friends, Robert Emmet was a youth of modest character, pure motives and winning personality. But he was entirely lacking in practical statesmanship. Brought up in a revolutionary atmosphere, his enthusiasm was uncontrolled by judgment. Thomas Moore, who warmly eulogizes Emmet, with whom he was a student at Trinity College, records that one day when he was playing on the piano the melody "Let Erin remember," Emmet started up exclaiming passionately, "Oh, that I were at the head of 20,000 men marching to that air!" He had no knowledge of the world or of men; he trusted every one with child-like simplicity; except personal courage he had none of the qualities essential to leadership in such an enterprise as armed rebellion. The romance of his love affair with Sarah Curran—who afterwards married Robert Henry Sturgeon, an officer distinguished in the Peninsular War—has cast a glamour over the memory of Robert Emmet; and it inspired Thomas Moore's well-known songs, "She is far from the land where her young hero sleeps," and "Oh, breathe not his name"; it is also the subject of Washington Irving's "The Broken Heart." Emmet was short and slight in figure; his face was marked by smallpox, and he was described in 1803 for the purpose of identification as being "of an ugly, sour countenance and dirty brown complexion." A few poems by Emmet of little merit are appended to Madden's biography.

See R. R. Madden, *The United Irishmen, their Lives and Times* (2nd ed. 4 vols., Dublin, 1858–1860); Charles Phillips, *Recollections of Curran and Some of his Contemporaries* (2nd ed., London, 1822); Henry Grattan, *Memoirs of the Life and Times of the Right Hon. H. Grattan* (5 vols., London, 1839–1846); W. H. Maxwell, *History of the Irish Rebellion in 1798; with Memoirs of the Union and Emmet's Insurrection in 1803* (London, 1845); W. H. Curran, *Life of J. P. Curran* (2 vols., Edinburgh, 1822); Thomas Moore, *Life and Death of Lord Edward Fitzgerald* (2 vols. 3rd ed., London, 1832); and *Memoirs, Journals and Correspondence of Thomas Moore*, edited by Lord John Russell (8 vols., London, 1853–1856). (R. J. M.)

EMMET, THOMAS ADDIS (1764–1827), Irish lawyer and politician, second son of Robert Emmet, physician to the lord-lieutenant of Ireland, and elder brother of Robert Emmet (*q.v.*), the rebel, was born at Cork on the 24th of April 1764, and was educated at Trinity College, Dublin, and at Edinburgh University, where he studied medicine and was a pupil of Dugald Stewart in philosophy. After visiting the chief medical schools on the continent, he returned to Ireland in 1788; but the sudden death of his elder brother, Christopher Temple Emmet (1761–1788), a barrister of some distinction, induced him to follow the advice of Sir James Mackintosh to forsake medicine for the law as a profession. He was called to the Irish bar in 1790, and quickly obtained a practice, principally as counsel for prisoners charged with political offences, and became the legal adviser of the leading United Irishmen. When the Dublin corporation issued a declaration of Protestant ascendancy in 1792, the counter-manifesto of the United Irishmen was drawn up by Emmet; and in 1795 he took the oath of the society in open court, becoming secretary in the same year and a member of the executive in 1797. Although Grattan had a profound contempt for Emmet's political understanding, describing him as a quack in politics who set up his own crude notions as settled rules, Emmet was among the more prudent of the United Irishmen on the eve of the rebellion. It was only when convinced that parliamentary reform and Catholic emancipation were not to be obtained by constitutional methods, that he reluctantly engaged in treasonable conspiracy; and in opposition to bolder spirits like Lord Edward Fitzgerald, he discountenanced the taking up of arms until help should be obtained from France. Though not among those taken at the house of Oliver Bond on the 12th of March 1798 (see FITZGERALD, LORD EDWARD), he was arrested about the same time, and he was one of the leaders who after the rebellion were imprisoned at Fort George till 1802. Being then released, he went to Brussels, where he was visited by his brother Robert in October of that year; and he was in the secrets of those who were preparing for a fresh rising in Ireland in conjunction with French aid. After the failure of Robert Emmet's rising in July 1803, the news of which reached him in Paris, where he was in communication with Bonaparte, he emigrated to the United States. Joining the New York bar he obtained a lucrative practice and in 1812–13 was attorney-general of New York; his abilities and success being such that Judge Story declared him to be "by universal consent in the first rank of American advocates." He died while conducting a case in court on the 14th of November 1827. Thomas Emmet married, in 1791, Jane, daughter of the Rev. John Patten, of Clonmel.

See authorities under EMMET, ROBERT; also Alfred Webb, *Compendium of Irish Biography* (Dublin, 1878); C. S. Haynes, *Memoirs of Thomas Addis Emmet* (London, 1829); Theobald Wolfe Tone, *Memoirs*, edited by W. T. W. Tone (2 vols., London, 1827); W. E. H. Lecky, *Hist. of Ireland in the Eighteenth Century*, vol. iv. (Cabinet edition, 5 vols., London, 1892). (R. J. M.)

EMMETT, DANIEL DECATUR (1815–1904), American song-writer, was born at Mount Vernon, Ohio. He started the "negro minstrel" performances, which from 1842 onwards became so popular in America and England, and he composed a number of songs which had a great temporary vogue. He is remembered particularly as the writer of the famous Southern war-song "Dixie," which he composed in 1859.

EMMITSBURG, a town in Frederick county, Maryland, U.S.A., 61 m. by rail W. by N. of Baltimore, and 1¼ m. S. of the northern boundary of the state. Pop. (1900) 849; (1910) 1054. It is served by the Emmitsburg railway (7 m. long) to Rocky Ridge on the Western Maryland railway. The town is in a picturesque region on the eastern slope of the Blue Ridge Mountains. Two miles S.W. is Mount St. Mary's College (Roman Catholic), founded in 1808 by the Rev. John du Bois (1764–1842)—its president until 1826, when he became bishop of New York—and chartered by the state in 1830. The Ecclesiastical Seminary of the college has been a great training school, and has been called the "Nursery of Bishops"; among its graduates have been Bishop Hughes, Cardinal McCloskey and Archbishop Corrigan. In 1908 the college had 25 instructors and 350 students, of whom 57 were in the Ecclesiastical Seminary, and 61 in the Minim Department. Half a mile S. of the town is St Joseph's College and Academy (incorporated in 1816), for young women, which is conducted by the Sisters of Charity—this order was introduced into the United States at Emmitsburg by Mrs Elizabeth Ann Seton in 1809. The first settlement at Emmitsburg was made about 1773. It was at first called "Silver Fancy," and then for a time was known as "Poplar Fields"; but in 1786 the present name was adopted in honour of William Emmitt, one of the original settlers. The town was incorporated in 1824.

EMMIUS, UBBO (1547–1625), Dutch historian and geographer, was born at Gretha in East Friesland on the 5th of December 1547. After studying at Rostock, he spent two years in Geneva, where he became intimate with Theodore Beza; and returning to the Netherlands was appointed the principal of a college at Norden, a position which he lost in 1587 because, as a Calvinist, he would not subscribe to the confession of Augsburg. Subsequently he was head of a college at Leer, and in 1594 became rector of the college at Groningen, and when in 1614 this college became a university he was chosen principal and professor of history and Greek, and by his wise guidance and his learning speedily raised the new university to a position of eminence. He was on friendly terms with Louis, count of Nassau; corresponded with many of the learned men of his time; and died at Groningen on the 9th of December 1625. He was twice married, and left a son and a daughter. The chief works of Emmius are: *Rerum Frisicarum historiae decades*, in six parts, a complete edition of which was published at Leiden in 1616; *Opus chronologicum* (Groningen, 1619); *Vetus Graecia illustrata* (Leiden, 1626); and *Historia temporis nostri*, which was first published at Groningen in 1732. An account of his life, written by Nicholas Mulerius, was published, with the lives of other professors of Groningen, at Groningen in 1638.

See N. G. van Kampen, *Geschiedenis der letteren en wetenschappen in de Nederlanden* (The Hague, 1821–1826).

EMMONS, EBENEZER (1800–1863), American geologist, was born at Middlefield, Massachusetts, on the 16th of May 1800. He studied medicine at Albany, and after taking his degree practised for some years in Berkshire county. His interest in geology was kindled in early life, and in 1824 he had assisted Prof. Chester Dewey (1784–1867) in preparing a geological map of Berkshire county, in which the first attempt was made to classify the rocks of the Taconic area. While thus giving much of his time to natural science, undertaking professional work in natural history and geology in Williams College, he also accepted the professorship of chemistry and afterwards of obstetrics in the Albany Medical College. The chief work of his life was, however, in geology, and he has been designated by Jules Marcou as "the founder of American palaeozoic stratigraphy, and the first discoverer of the primordial fauna in any country." In 1836 he became attached to the Geological Survey of the State of New York, and after lengthened study he grouped the local strata (1842) into the Taconic and overlying New York systems. The latter system was subdivided into several groups that were by no means well defined. Emmons had previously described the Potsdam sandstone (1838), and this was placed at the base of the New York system. It is now regarded as Upper Cambrian. In 1844 Emmons for the first time obtained fossils in his Taconic system: a notable discovery because the species obtained were found to differ from all then-known Palaeozoic fossils, and they were regarded as representing the primordial group. Marcou was thus led to advocate that the term Taconic be generally adopted in place of Cambrian. Nevertheless the Taconic fauna of Emmons has proved to include only the lower part of Sedgwick's Cambrian. Considerable discussion has taken place on the question of the Taconic system, and whether the term should be adopted; and the general opinion has been adverse. Emmons made contributions on agriculture and geology to a series of volumes on the natural history of New York. He also issued a work entitled *American Geology; containing a statement of the principles of the Science, with full illustrations of the characteristic American Fossils* (1855–1857). From 1851 to 1860 he was state geologist of North Carolina. He died at Brunswick, North Carolina, on the 1st of October 1863.

See the *Biographical Notice of Ebenezer Emmons*, by J. Marcou; *Amer. Geologist*, vol. vii. (Jan., 1891), p. 1 (with portrait and list of publications).

EMMONS, NATHANAEL (1745–1840), American theologian, was born at East Haddam, Connecticut, on the 20th of April 1745. He graduated at Yale in 1767, studied theology under the Rev. John Smalley (1734–1820) at Berlin, Connecticut, and was licensed to preach in 1769. After preaching four years in New York and New Hampshire, he became, in April 1773, pastor of the Second church at Franklin (until 1778 a part of Wrentham, Massachusetts), of which he remained in charge until May 1827, when failing health compelled his relinquishment of active ministerial cares. He lived, however, for many years thereafter, dying of old age at Franklin on the 23rd of September 1840. It was as a theologian that Dr Emmons was best known, and for half a century probably no clergyman in New England exerted so wide an influence. He developed an original system of divinity, somewhat on the structural plan of that of Samuel Hopkins, and, in Emmons's own belief, contained in and evolved from Hopkinsianism. While by no means abandoning the tenets of the old Calvinistic faith, he came to be looked upon as the chief representative of what was then known as the "new school" of theologians. His system declared that holiness and sin are free voluntary exercises; that men act freely under the divine agency; that the slightest transgression deserves eternal punishment; that it is through God's mere grace that the penitent believer is pardoned and justified; that, in spite of total depravity, sinners ought to repent; and that regeneration is active, not passive, with the believer. Emmonsism was spread and perpetuated by more than a hundred clergymen, whom he personally trained. Politically, he was an ardent patriot during the War of Independence, and a strong Federalist afterwards, several of his political discourses attracting wide attention. He was a founder and the first president of the Massachusetts Missionary Society, and was influential in the establishment of Andover Theological Seminary. More than two hundred of his sermons and addresses were published during his lifetime. His *Works* were published in 6 vols. (Boston, 1842; new edition, 1861).

See also the *Memoir*, by Dr E. A. Park (Andover, 1861).

EMPEDOCLES (*c.* 490–430 B.C.), Greek philosopher and statesman, was born at Agrigentum (Acragas, Girgenti) in Sicily of a distinguished family, then at the height of its glory. His grandfather Empedocles was victorious in the Olympian chariot race in 496; in 470 his father Meto was largely instrumental in the overthrow of the tyrant Thrasydaeus. We know almost nothing of his life. The numerous legends which have grown up round his name yield very little that can fairly be regarded as authentic. It seems that he carried on the democratic tradition of his house by helping to overthrow an oligarchic government which succeeded the tyranny in Agrigentum, and was invited by the citizens to become their king. That he refused the honour may have been due to a real enthusiasm for free institutions or to the prudential recognition of the peril which in those turbulent times surrounded the royal dignity. Ultimately a change in the balance of parties compelled him to leave the city, and he died in the Peloponnese of the results of an accident in 430.

Of his poem on nature (*φύσις*) there are left about 400 lines in unequal fragments out of the original 5000; of the hymns of purification (*καθαρμοί*) less than 100 verses remain; of the other works, improbably assigned to him, nothing is known. His grand but obscure hexameters, after the example of Parmenides, delighted Lucretius. Aristotle, it is said, called him the father of rhetoric. But it was as at once statesman, prophet, physicist, physician and reformer that he most impressed the popular imagination. To his contemporaries, as to himself, he seemed more than a mere man. The Sicilians honoured his august aspect as he moved amongst them with purple robes and golden girdle, with long hair bound by a Delphic garland, and brazen sandals on his feet, and with a retinue of slaves behind him. Stories were told of the ingenuity and generosity by which he had made the marshes round Selinus salubrious, of the grotesque device by which he laid the winds that ruined the harvests of Agrigentum, and of the almost miraculous restoration to life of a woman who had long lain in a death-like trance. Legends stranger still told of his disappearance from among men. Empedocles, according to one story, was one midnight, after a feast held in his honour, called away in a blaze of glory to the gods; according to another, he had only thrown himself into the crater of Etna, in the hope that men, finding no traces of his end, would suppose him translated to heaven. But his hopes were cheated by the volcano, which cast forth his brazen sandals and betrayed his secret (Diog. Laërt. viii. 67). The people of Agrigentum have never ceased to honour his name, and even in modern times he has been celebrated by followers of Mazzini as the democrat of antiquity *par excellence*.

As his history is uncertain, so his doctrines are hard to put together. He does not belong to any one definite school. While, on one hand, he combines much that had been suggested by Parmenides, Pythagoras and the Ionic schools, he has germs of truth that Plato and Aristotle afterwards developed; he is at once a firm believer in Orphic mysteries, and a scientific thinker, precursor of the physical scientists. There are, according to Empedocles, four ultimate elements, four primal divinities, of which are made all structures in the world—fire, air, water, earth. These four elements are eternally brought into union, and eternally parted from each other, by two divine beings or powers, love and hatred—an attractive and a repulsive force which the ordinary eye can see working amongst men, but which really pervade the whole world. According to the different proportions in which these four indestructible and unchangeable matters are combined with each other is the difference of the organic structure produced; *e.g.* flesh and blood are made of equal (in weight but not in volume) parts of all four elements, whereas bones are one-half fire, one-fourth earth, and one-fourth water. It is in the aggregation and segregation of elements thus arising that Empedocles, like the atomists, finds the real process which corresponds to what is popularly termed growth, increase or decrease. Nothing new comes or can come into being; the only change that can occur is a change in the juxtaposition of element with element.

Empedocles apparently regarded love (*φιλότης*) and discord (*νεῖκος*) as alternately holding the empire over things,—neither, however, being ever quite absent. As the best and original state, he seems to have conceived a period when love was predominant, and all the elements formed one great sphere or globe. Since that period discord had gained more sway; and the actual world was full of contrasts and oppositions, due to the combined action of both principles. His theory attempted to explain the separation of elements, the formation of earth and sea, of sun and moon, of atmosphere. But the most interesting and most matured part of his views dealt with the first origin of plants and animals, and with the physiology of man. As the elements (his deities) entered into combinations, there appeared quaint results—heads without necks, arms without shoulders. Then as these fragmentary structures met, there were seen horned heads on human bodies, bodies of oxen with men's heads, and figures of double sex. But most of these products of natural forces disappeared as suddenly as they arose; only in those rare cases where the several parts were found adapted to each other, and casual member fitted into casual member, did the complex structures thus formed last. Thus from spontaneous aggregations of casual aggregates, which suited each other as if this had been intended, did the organic universe originally spring. Soon various influences reduced the creatures of double sex to a male and a female, and the world was replenished with organic life. It is impossible not to see in this theory a crude anticipation of the "survival of the fittest" theory of modern evolutionists.

As man, animal and plant are composed of the same elements in different proportions, there is an identity of nature in them all. They all have sense and understanding; in man, however, and especially in the blood at his heart, mind has its peculiar seat. But mind is always dependent upon the body, and varies with its changing constitution. Hence the precepts of morality are with Empedocles largely dietetic.

Knowledge is explained by the principle that the several elements in the things outside us are perceived by the corresponding elements in ourselves. We know only in so far as we have within us a nature cognate to the object of knowledge. Like is known by like. The whole body is full of pores, and hence respiration takes place over the whole frame. But in the organs of sense these pores are specially adapted to receive the effluxes which are continually rising from bodies around us; and in this way perception is somewhat obscurely explained. The theory, however unsatisfactory as an explanation, has one great merit, that it recognizes between the eye, for instance, and the object seen an intermediate something. Certain particles go forth from the eye to meet similar particles given forth from the object, and the resultant contact constitutes vision. This idea contains within it the germ of the modern idea of the subjectivity of sense-given data; perception is not merely a passive reflection of external objects.

It is not easy to harmonize these quasi-scientific theories with the theory of transmigration of souls which Empedocles seems to expound. Probably the doctrine that the divinity (*δαίμων*) passes from element to element, nowhere finding a home, is a mystical way of teaching the continued identity of the principles which are at the bottom of every phase of development from inorganic nature to man. At the top of the scale are the prophet and the physician, those who have best learned the secret of life; they are next to the divine. One law, an identity of elements, pervades all nature; existence is one from end to end; the plant and the animal are links in a chain where man is a link too; and even the distinction between male and female is transcended. The beasts are kindred with man; he who eats their flesh is not much better than a cannibal.

Looking at the opposition between these and the ordinary opinions, we are not surprised that Empedocles notes the limitation and narrowness of human perceptions. We see, he says, but a part, and fancy that we have grasped the whole. But the senses cannot lead to truth; thought and reflection must look at the thing on every side. It is the business of a philosopher, while he lays bare the fundamental difference of elements, to display the identity that subsists between what seem unconnected parts of the universe.

See Diog. Laërt. viii. 51-77; Sext. Empiric. *Adv. math.* vii. 123; Simplicius, *Phys.* f. 24, f. 76. For text Simon Karsten, "Empedoclis Agrigenti carminum reliquiae," in *Reliq. phil. vet.* (Amsterdam, 1838); F. W. A. Mullach, *Fragmenta philosophorum Graecorum*, vol. i.; H. Stein, *Empedoclis Agrigenti fragmenta* (Bonn, 1882); H. Ritter and L. Preller, *Historia philosophiae* (4th ed., Gotha, 1869), chap. iii. *ad fin.*; A. Fairbanks, *The First Philosophers of Greece* (1898). Verse translation, W. E. Leonard (1908). For criticism E. Zeller, *Phil. der Griechen* (Eng. trans. S. F. Alleyne, 2 vols., London, 1881); A. W. Benn, *Greek Philosophers* (1882); J. A. Symonds, *Studies of the Greek Poets* (3rd ed., 1893), vol. i. chap. 7; C. B. Renouvier, *Manuel de philosophie ancienne* (Paris, 1844); T. Gomperz, *Greek Thinkers*, vol. i. (Eng. trans. L. Magnus, 1901); W. Windelband, *Hist. of Phil.* (Eng. trans. 1895); many articles in periodicals (see Baldwin's *Dict. of Philos.* vol. iii. p. 190).

(W. W.; X.)

EMPEROR (Fr. *empereur*, from the Lat. *imperator*), a title formerly borne by the sovereigns of the Roman empire (see EMPIRE), and since their time, partly by derivation, partly by imitation, used by a variety of other sovereigns. Under the Republic, the term *imperator* applied in theory to any magistrate vested with *imperium*; but in practice it was only used of a magistrate who was acting abroad (*militiae*) and was thus in command of troops. The term *imperator* was the natural and regular designation employed by his troops in addressing such a magistrate; but it was more particularly and specially employed by them to salute him after a victory; and when he had been thus saluted he could use the title of *imperator* in public till the day of his triumph at Rome, after which it would lapse along with his *imperium*. The senate itself might, in the later Republic, invite a victorious general to assume the title; and in these two customs—the salutation of the troops, and the invitation of the senate—we see in the germ the two methods by which under the Empire the *princeps* was designated; while in the military connotation attaching to the name even under the Republic we can detect in advance the military character by which the emperor and the Empire were afterwards distinguished. Julius Caesar was the first who used the title continuously (from 58 B.C. to his death in 44 B.C.), as well *domi* as *militiae*; and his nephew Augustus took a further step when he made the term imperator a *praenomen*, a practice which after the time of Nero becomes regular. But apart from this amalgamation of the term with his regular name, and the private right to its use which that bestowed, every emperor had an additional and double right to the title on public grounds, possessed as he was of an *imperium infinitum majus*, and commanding as he did all the troops of the Empire. From the latter point of view—as *generalissimo* of the forces of Rome, he had the right to the insignia of the commander (the laurel wreath and the fasces), and to the protection of a bodyguard, the *praetoriani*. This public title of imperator was normally conferred by the senate; and an emperor normally dates his reign from the day of his salutation by the senate. But the troops were also regarded as still retaining the right of saluting an *imperator*; and there were emperors who regarded themselves as created by such salutation and dated their reigns accordingly. The military associations of the term thus resulted, only too often, in making the emperor the nominee of a turbulent soldiery.

Augustus had been designated (not indeed officially, but none the less regularly) as *princeps*—the first citizen or foremost man of the state. The designation suited the early years of the Empire, in which a dyarchy of *princeps* and senate had been maintained. But by the 2nd century the dyarchy is passing into a monarchy: the title of princeps recedes, and the title of imperator comes into prominence to designate not merely the possessor of a certain *imperium*, or the general of troops, but the simple monarch in the fulness of his power as head of the state. From the days of Diocletian one finds occasionally two emperors, but not, at any rate in theory, two Empires; the two emperors are the dual sovereigns of a single realm. But from the time of Arcadius and Honorius (A.D. 395) there are in reality (though not in theory) two Empires as well as two emperors, one of the East and one of the West. When Greek became the sole language of the East Roman Empire, *imperator* was rendered sometimes by *βασιλεύς* and sometimes by *αὐτοκράτωρ*, the former word being the usual designation of a sovereign, the latter specially denoting that despotic power which the *imperator* held, and being in fact the official translation of *imperator*. Justinian uses *αὐτοκράτωρ* as his formal title, and *βασιλεύς* as the popular term.

On the revival of the Roman empire in the West by Charlemagne in 800, the title (at first in the form *imperator*, or *imperator Augustus*, afterwards *Romanorum imperator Augustus*) was taken by him and by his Frankish, Italian and German successors, heads of the Holy Roman Empire, down to the abdication of the emperor Francis II. in 1806. The doctrine had, however, grown up in the earlier middle ages (about the time of the emperor Henry II., 1002–1024) that although the emperor was chosen in Germany (at first by the nation, afterwards by a small body of electors), and entitled from the moment of his election to be crowned in Rome by the pope, he could not use the title of emperor until that coronation had actually taken place. The German sovereign, therefore, though he exercised, as soon as chosen, full imperial powers both in Germany and Italy, called himself merely "king of the Romans" (*Romanorum rex semper Augustus*) until he had received the sacred crown in the sacred city. In 1508 Maximilian I., being refused a passage to Rome by the Venetians, obtained from Pope Julius II. a bull permitting him to style himself emperor elect (*imperator electus*, erwählter Kaiser). This title was taken by Ferdinand I. (1558) and all succeeding emperors, immediately upon their coronation in Germany; and it was until 1806 their strict legal designation, and was always employed by them in proclamations and other official documents. The term "elect" was, however, omitted even in formal documents when the sovereign was addressed or was spoken of in the third person.

In medieval times the emperor, conceived as vicegerent of God and co-regent with the pope in government of the Christian people committed to his charge, might almost be regarded as an ecclesiastical officer. Not only was his function regarded as consisting in the defence and extension of true religion; he was himself arrayed in ecclesiastical vestments at his coronation; he was ordained a subdeacon; and assisting the pope in the celebration of the Eucharist, he communicated in both kinds as a clerk. The same sort of ecclesiastical character came also to be attached to the tsars[1] of Russia, who—especially in their relations with the Orthodox Eastern Church—may vindicate for themselves (though the sultans of Turkey have disputed the claim) the succession to the East Roman emperors (see EMPIRE). But the title of emperor was also used in the middle ages, and is still used, in a loose and vague sense, without any ecclesiastical connotation or hint of connexion with Rome (the two attributes which should properly distinguish an emperor), and merely in order to designate a non-European ruler with a large extent of territory. It was thus applied, and is still applied, to the rulers of China and Japan; it was attributed to the Mogul sovereigns of India; and since 1876 it has been used by British monarchs in their capacity of sovereigns of India (*Kaiser-i-Hind*).[2]

Since the French Revolution and during the course of the 19th century the term emperor has had an eventful history. In 1804 Napoleon took the title of "Emperor of the French," and posed as the reviver of the Empire of Charlemagne. Afraid that Napoleon would next proceed to deprive him of his title of Holy Roman Emperor, Francis II. first took the step, in 1804, of investing himself with a new title, that of "Hereditary Emperor of Austria," and then, in 1806, proceeded to the further step of abdicating his old historical title and dissolving the Holy Roman Empire. Thus the old and true sense of the term emperor—the sense in which it was connected with the church in the present and with Rome in the past—finally perished; and the term became partly an apanage of Bonapartism (Louis Napoleon resuscitated it as Napoleon III. in 1853), and partly a personal title of the Habsburgs as rulers of their various family territories. In 1870, however, a new and most important use of the title was begun, when the union of Germany was achieved, and the Prussian king, who became the head of united Germany, received in that capacity the title of German Emperor. Here the title of emperor designates the president of a federal state; and here the Holy Roman emperor of the 17th and 18th centuries, the president of a loose confederation of German states, may be said to have found his successor. But the term has been widely and loosely used in the course of the 19th century. It was the style from 1821 to 1889 of the princes of the house of Braganza who ruled in Brazil; it has been assumed by usurpers in Haiti, and in Mexico it was borne by Augustin Iturbide in 1822 and 1823, and by the ill-fated Archduke Maximilian of Austria from 1864 to 1867. It can hardly, therefore, be said to have any definite descriptive force at the present time, such as it had in the middle ages. So far as it has any such force in Europe, it may be said partly to be connected with Bonapartism, and to denote a popular but military dictatorship, partly to be connected with the federal idea, and to denote a precedence over other kings possessed by a ruler standing at the head of a composite state which may embrace kings among its members. It is in this latter sense that it is used of Germany, and of Britain in respect of India; it is in something approaching this latter sense that it may be said to be used of Austria.

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[1] The word *Tsar*, like the German *Kaiser*, is derived from Caesar (see TSAR). Peter the Great introduced the use of the style "Imperator," and the official designation is now "Emperor of all the Russias, Tsar of Poland, and Grand Duke of Finland," though the term tsar is still popularly used in Russia.

[2] For the titles of *βασιλεύς*, *imperator Augustus*, &c., applied in the 10th century to the Anglo-Saxon kings, see EMPIRE (note). The claim to the style of emperor, as a badge of equal rank, played a considerable part in the diplomatic relations between the Sultan and certain European sovereigns. Thus, at a time when this style (*Padishah*) was refused by the Sultan to the tsars of Russia, and even to the Holy Roman Emperor himself, it was allowed to the French kings, who in diplomatic correspondence and treaties with Turkey called themselves "emperor of France" (*empereur de France*).—[ED.].

See J. Selden, *Titles of Honour* (1672); J. Bryce, *Holy Roman Empire* (London, 1904); and Sir E. Colebrooke, "On Imperial and Other Titles" in the *Journal of the Royal Asiatic Society* (1877). See also the articles on "Imperator" and "Princeps" in Smith's *Dictionary of Greek and Roman Antiquities* (1890). (E. Br.)

EMPHYSEMA (Gr. ἐμφυσᾶν to inflate) is a word vaguely meaning the abnormal presence of air in certain parts of the body. At the present day, however, there are two conditions to which it refers, "pulmonary emphysema" (and the word pulmonary is often omitted) and "surgical emphysema." Of pulmonary emphysema there are two forms, true vesicular and interstitial (or interlobular). Vesicular emphysema signifies that there is an enlargement of air-vesicles, resulting either from their excessive distension, from destruction of the septa, or from both causes combined (see Respiratory System). In interstitial emphysema the air is infiltrated into the connective tissue beneath the pleura and between the pulmonary air-cells.

The former variety is by far the more common, and appears to be capable of being produced by various causes, the chief of which are the following:—

1. Where a portion of the lung has become wasted, or its vesicular structure permanently obliterated by disease, without corresponding falling in of the chest wall, the neighbouring air-vesicles or some of them undergo dilatation to fill the vacuum (vicarious emphysema).

2. In some cases of bronchitis, where numbers of the smaller bronchial tubes become obstructed, the air in the pulmonary vesicles remains imprisoned, the force of expiration being insufficient to expel it; while, on the other hand, the stronger force of inspiration being adequate to overcome the resistance, the air-cells tend to become more and more distended, and permanent alterations in their structure, including emphysema, are the result (inspiratory theory).

3. Emphysema also arises from exertion involving violent expiratory efforts, during which the glottis is constricted, as in paroxysms of coughing, in straining, and in lifting heavy weights (expiratory theory). Whooping-cough is well known as the exciting cause of emphysema in many persons.

4. Another view, known as the nutritive theory, maintains that emphysema depends essentially on a primary nutritive change in the walls of the air-vesicles. Thus these are impaired in their resisting power, and are far more likely to become distended by any force acting on them from within.

5. Again in certain cases the cartilages of the chest become hypertrophied and rigid, thus causing a primary chronic enlargement, and the lungs become emphysematous in order to fill up the increased space (Freund's theory).

In whatever manner produced, this disease gives rise to important morbid changes in the affected portions of the lungs, especially the loss of the natural elasticity of the air-cells, and likewise the destruction of many of the pulmonary capillary blood-vessels, and the diminution of aerating surface for the blood. As a consequence an increased strain is thrown on the right ventricle with a consequent dilatation leading on to heart failure and all its attendant troubles. The chief symptom in this complaint is shortness of breath, more or less constant but greatly aggravated by exertion, and by attacks of bronchitis, to which persons suffering from emphysema appear to be specially liable. The respiration is of similar character to that already described in the case of asthma. In severe forms of the disease the patient comes to acquire a peculiar puffy or bloated appearance, and the configuration of the chest is altered, assuming the character known as the *barrel-shaped* or *emphysematous* chest.

The main element in the treatment of emphysema consists in attention to the general condition of the health, and in the avoidance of all causes likely to aggravate the disease or induce its complications. Compressed air baths and expiration into rarefied air may be useful. During attacks of urgent dyspnoea and lividity, with engorgement of veins, the patient should be repeatedly bled until relief is obtained. Interstitial emphysema arising from the rupture of air-cells in the immediate neighbourhood of the pleura may occur as a complication of the vesicular form, or separately as the result of some sudden expulsive effort, such as a fit of coughing, or, as has frequently happened, in parturition. Gangrene or post-mortem decomposition may lead to the presence of air in the interstitial tissue of the lung. Occasionally the air infiltrates the cellular tissue of the posterior mediastinum, and thence comes to distend the integument of the whole surface of the body (surgical emphysema). Surgical emphysema signifies the effusion of air into the general connective tissues of the body. The commonest causes are a wound of some air-passage, or a penetrating wound of the chest wall without injury to the lung. It may, however, occur in any situation of the body and in many other ways. Its severity varies from very slight cases where only a little crepitation may be felt under the skin, to extreme cases where the whole body is blown up and death is imminent from impeded respiration and failure of the action of the heart. In the milder cases no treatment is necessary as the air gradually becomes absorbed, but in the more severe cases incisions must be made in the swollen cellular tissues to allow the air to escape.

EMPIRE, a term now used to denote a state of large size and also (as a rule) of composite character, often, but not necessarily, ruled by an emperor—a state which may be a federation, like the German empire, or a unitary state, like the Russian, or even, like the British empire, a loose commonwealth of free states united to a number of subordinate dependencies. For many centuries the writers of the Church, basing themselves on the Apocalyptic writings, conceived of a cycle of four empires, generally explained—though there was no absolute unanimity with regard to the members of the cycle—as the Assyrian, the Persian, the Macedonian and the Roman. But in reality the conception of Empire, like the term itself (Lat. *imperium*), is of Roman origin. The empire of Alexander had indeed in some ways anticipated the empire of Rome. "In his later years," Professor Bury writes, "Alexander formed the notion of an empire, both European and Asiatic, in which the Asiatics should not be dominated by the European invaders, but Europeans and Asiatics alike should be ruled on an equality by a monarch, indifferent to the distinction of Greek and barbarian, and looked upon as their own king by Persians as well as by Macedonians." The contemporary Cynic philosophy of cosmopolitanism harmonized with this notion, as Stoicism did later with the practice of the Roman empire; and Alexander, like Diocletian and Constantine, accustomed a Western people to the forms of an Oriental court, while, like the earlier Caesars, he claimed and received the recognition of his own divinity. But when he died in 323, his empire, which had barely lasted ten years, died with him; and it was divided among Diadochi who, if in some other respects (for instance, the Hellenization of the East) they were heirs of their master's policy, were destitute of the imperial conception. The work of Alexander was rather that of the forerunner than the founder. He prepared the way for the world-empire of Rome; he made possible the rise of a universal religion. And these are the two factors which, throughout the middle ages, went together to make the thing which men called Empire.

The Roman empire.

At Rome the term *imperium* signified generally, in its earlier use, the sovereignty of the state over the individual, a sovereignty which the Romans had disengaged with singular clearness from all other kinds of authority. Each of the higher magistrates of the Roman people was vested, by a *lex curiata* (for power was distinctly conceived as resident in, and delegated by, the community), with an *imperium* both civil and military, which varied in degree with the magnitude of his office. In the later days of the Republic such *imperium* was enjoyed, partly in Rome by the resident consuls and praetors, partly in the provinces by the various proconsuls or propraetors. There was thus a certain *morcellement* of *imperium*, delegated as it was by the people to a number of magistrates: the coming of the Empire meant the reintegration of this *imperium*, and its unification, by a gradual process, in the hands of the *princeps*, or emperor. The means by which this process was achieved had already been anticipated under the Republic. Already in the days of Pompey it had been found convenient to grant to an extraordinary officer an *imperium aequum* or *majus* over a large area, and that officer thus received powers, within that area, equal to, or greater than, the powers of the provincial governors. This precedent was followed by Augustus in the year 27 B.C., when he acquired for himself sole *imperium* in a certain number of provinces (the imperial provinces), and an *infinitum imperium majus* in the remaining provinces (which were termed senatorial). As a result, Augustus enjoyed an *imperium* coextensive indeed with the whole of the Roman world, but concurrent, in part of that world, with the *imperium* of the senatorial proconsuls; and the early Empire may thus be described as a dyarchy. But the distinction between imperial and senatorial provinces finally disappeared; by the time of Constantine the emperor enjoyed sole *imperium*, and an absolute monarchy had been established. We shall not, however, fully understand the significance of the Roman empire, unless we realize the importance of its military aspect. All the soldiers of Rome had from the first to swear *in verba Caesaris Augusti*; and thus the whole of the Roman army was his army, regiments of which he might indeed lend, but of which he was sole *Imperator* (see under EMPEROR). Thus regarded as a permanent commander-in-chief, the emperor enjoyed the privileges, and suffered from the weaknesses, of his position. He had the power of the sword behind him; but he became more and more liable to be deposed, and to be replaced by a new commander, at the will of those who bore the sword in his service.

Development under Diocletian and Constantine.

The period which is marked by the reigns of Diocletian and Constantine (A.D. 284–337) marks a great transformation in the character of the Empire. The old dyarchy, under which the emperor might still be regarded as an official of the *respublica Romana*, passed into a new monarchy, in which all political power became, as it were, the private property of the monarch. There was now no distinction of provinces; and the old public *aerarium* became merely a municipal treasury, while the *fiscus* of the emperor became the exchequer of the Empire. The officers of the imperial *praetorium*, or bodyguard, are now the great officers of state; his private council becomes the public consistory, or supreme court of appeal; and the *comites* of his court are the administrators of his empire. "All is in him, and all comes from him," as our own year-books say of the medieval king; his household, for instance, is not only a household, but also an administration. On the other hand, this unification seems to be accompanied by a new bifurcation. The exigencies of frontier defence had long been drawing the Empire towards the troubled East; and this tendency reached its culmination when a new Rome arose by the Bosporus, and Constantinople became the centre of what seemed a second Empire in the East (A.D. 324). Particularly after the division of the Empire between Arcadius and Honorius in 395 does this bifurcation appear to be marked; and one naturally speaks of the two Empires of the West and the East. Yet it cannot be too much emphasized that in reality such language is utterly inexact. The Roman empire was, and always continued to be, ideally one and indivisible. There were two emperors, but one Empire—two persons, but one power. The point is of great importance for the understanding of the whole of the middle ages: there only is, and can be, one Empire, which may indeed, for convenience, be ruled conjointly by two emperors, resident, again for convenience, in two separate capitals. And, as a matter of fact, not only did the residence of an emperor in the East not spell bifurcation, it actually fostered the tendency towards unification. It helped forward the transformation of the Empire into an absolute and quasi-Asiatic monarchy, under which all its subjects fell into a single level of loyal submission: it helped to give the emperor a gorgeous court, marked by all the ceremony and the servility of the East.[1] The deification of the emperor himself dates from the days of Augustus; by the time of Constantine it has infected the court and the government. Each emperor, again, had from the first enjoyed the sacrosanct position which was attached to the tribunate; but now his palace, his chamber, his charities, his letters, are all "sacred," and one might almost speak in advance of a "Holy Roman Empire."

Division of the Empire.

Influence of Christianity.

But there is one factor, the greatest of all, which still remains to be added, before we have counted the sum of the forces that made the world think in terms of empire for centuries to come; and that is the reception of Christianity into the Roman empire by Constantine. That reception added a new sanction to the existence of the Empire and the position of the emperor. The Empire, already one and indivisible in its aspect of a political society, was welded still more firmly together when it was informed and permeated by a common Christianity, and unified by the force of a spiritual bond. The Empire was now the Church; it was now indeed indestructible, for, if it perished as an empire, it would live as a church. But the Church made it certain that it would not perish, even as an empire, for many centuries to come. On the one hand the Church thought in terms of empire and taught the millions of its disciples (including the barbarians themselves) to think in the same terms. No other political conception—no conception of a πόλις or of a nation—was any longer possible. When the Church gained its hold of the Roman world, the Empire, as it has been well said, was already "not only a government, but a fashion of conceiving the world": it had stood for three centuries, and no man could think of any other form of political association. Moreover, the gospel of St Paul—that there is *one* Church, whereof Christ is the Head, and we are all members—could not but reinforce for the Christian the conception of a necessary political unity of all the world under a single head. *Una Chiesa in uno Stato*—such, then, was the theory of the Church. But not only did the Church perpetuate the conception of empire by making it a part of its own theory of the world: it perpetuated that conception equally by materializing it in its own organization of itself. Growing up under the shadow of the Empire, the Church too became an empire, as the Empire had become a church. As it took over something of the old pagan ceremonial, so it took over much of the old secular organization. The pope borrowed his title of *pontifex maximus* from the emperor: what is far more, he made himself gradually, and in the course of centuries, the Caesar and Imperator of the Church. The offices and the dioceses of the Church are parallel to the offices and dioceses of the Diocletian empire: the whole spirit of orderly hierarchy and regular organization, which breathes in the Roman Church, is the heritage of ancient Rome. The Donation of Constantine is a forgery; but it expresses a great truth when it represents Constantine as giving to the pope the imperial palace and insignia, and to the clergy the ornaments of the imperial army (see DONATION OF CONSTANTINE).

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[1] Bryce points out, with much subtlety and truth, that the rise of a second Rome in the East not only helped to perpetuate the Empire by providing a new centre which would take the place of Rome when Rome fell, but also tended to make it more universal; "for, having lost its local centre, it subsisted no longer by historic right only, but, so to speak, naturally, as a part of an order of things which a change in external conditions seemed incapable of disturbing" (*Holy Roman Empire*, p. 8 of the edition of 1904).

Barbarian invasions.

Upon this world, informed by these ideas, there finally descended, in the 5th century, the avalanche of barbaric invasion. Its impact seemed to split the Empire into fragmentary kingdoms; yet it left the universal Church intact, and with it the conception of empire. With that conception, indeed, the barbarians had already been for centuries familiar: service in Roman armies, and settlement in Roman territories, had made the Roman empire for them, as much as for the civilized provincial, part of the order of the world. One of the barbarian invaders, Odoacer (Odovakar), might seem, in 476, to have swept away the Empire from the West, when he commanded the abdication of Romulus Augustulus; and the date 476 has indeed been generally emphasized as marking "the fall of the Western empire." Other invaders, again, men like the Frank Clovis or the great Ostrogoth Theodoric, might seem, in succeeding years, to have completed the work of Odoacer, and to have shattered the sorry scheme of the later Empire, by remoulding it into national kingdoms. *De facto*, there is some truth in such a view: *de jure*, there is none.[1] All that Odoacer did was to abolish one of the two joint rulers of the indivisible Empire, and to make the remaining ruler at Constantinople sole emperor from the Bosporus to the pillars of Hercules. He abolished the dual sovereignty which had been inaugurated by Diocletian, and returned to the unity of the Empire in the days of Marcus Aurelius. He did not abolish the Roman empire in the West: he only abolished its separate ruler, and, leaving the Empire itself subsisting, under the sway (nominal, it is true, but none the less acknowledged) of the emperor resident at Constantinople, he claimed to act as his vicar, under the name of patrician, in the administration of the Italian provinces.[2] As Odoacer thus fitted himself into the scheme of empire, so did both Clovis and Theodoric. They do not claim to be emperors (that was reserved for Charlemagne): they claim to be the vicars and lieutenants of the Empire. Theodoric spoke of himself to Zeno as *imperio vestro famulans*; he left justice and administration in Roman hands, and maintained two annual consuls in Rome. Clovis received the title of consul from Anastasius; the Visigothic kings of Spain (like the kings of the savage Lombards) styled themselves Flavii, and permitted the cities of their eastern coast to send tribute to Constantinople. Yet it must be admitted that, as a matter of fact, this adhesion of the new barbaric kings to the Empire was little more than a form. The Empire maintained its ideal unity by treating them as its vicars; but they themselves were forming separate and independent kingdoms within its borders. The Italy of the Ostrogoths cannot have belonged, in any real sense, to the Empire; otherwise Justinian would never have needed to attempt its reconquest. And in the 7th and 8th centuries the form of adhesion itself decayed: the emperor was retiring upon the Greek world of the East, and the German conquerors, settled within their kingdoms, lost the width of outlook of their old migratory days.

The Church and the Empire.

Growing divergence between East and West. The popes.

It is here that the action of the Church becomes of supreme importance. The Church had not ceased to believe in the continuous life of the Empire. The Fathers had taught that when the cycle of empires was finally ended by the disappearance of the empire of Rome, the days of Antichrist would dawn; and, since Antichrist was not yet come, the Church believed that the Empire still lived, and would continue to live till his coming. Meanwhile the Eastern emperor, ever since Justinian's reconquest of Italy, had been able to maintain his hold on the centre of Italy; and Rome itself, the seat of the head of the Church, still ranked as one of the cities under his sway. The imperialist theory of the Church found its satisfaction in this connexion of its head with Constantinople; and as long as this connexion continued to satisfy the Church, there was little prospect of any change. For many years after their invasion of 568, the pressure which the Lombards maintained on central Italy, from their kingdom in the valley of the Po, kept the popes steadily faithful to the emperor of the East and his representative in Italy, the exarch of Ravenna. But it was not in the nature of things that such fidelity should continue unimpaired. The development of the East and the West could not but proceed along constantly diverging lines, until the point was reached when their connexion must snap. On the one hand, the development of the West set towards the increase of the powers of the bishop of Rome until he reached a height at which subjection to the emperor at Constantinople became impossible. Residence in Rome, the old seat of empire, had in itself given him a great prestige; and to this prestige St Gregory (pope from 590 to 604) had added in a number of ways. He was one of the Fathers of the Church, and turned its theology into the channels in which it was to flow for centuries; he had acquired for his church the great spiritual colony of England by the mission of St Augustine; he had been the protector of Italy against the Lombards. As the popes thus became more and more spiritual emperors of the West, they found themselves less and less able to remain the subjects of the lay emperor of the East. Meanwhile the emperors of the East were led to interfere in ecclesiastical affairs in a manner which the popes and the Western Church refused to tolerate. Brought into contact with the pure monotheism of Mahommedanism, Leo the Isaurian (718–741) was stimulated into a crusade against image-worship, in order to remove from the Christian Church the charge of idolatry. The West clung to its images: the popes revolted against his decrees; and the breach rapidly became irreparable. As the hold of the Eastern emperor on central Italy began to be shaken, the popes may have begun to cherish the hope of becoming their successors and of founding a temporal dominion; and that hope can only have contributed to the final dissolution of their connexion with the Eastern empire.

Thus, in the course of the 8th century, the Empire, *as represented by the emperors at Constantinople*, had begun to fade utterly out of the West. It had been forgotten by lay sovereigns; it was being abandoned by the pope, who had been its chosen apostle. But it did not follow that, because the Eastern emperor ceased to be the representative of the Empire for the West, the conception of Empire itself therefore perished. The popes only abandoned the representative: they did not abandon the conception. If they had abandoned the conception, they would have abandoned the idea that there was an order of the world; they would have committed themselves to a belief in the coming of Antichrist. The conception of the world as a single Empire-Church remained: what had to be discovered was a new representative of one of the two sides of that conception. For a brief time, it would seem, the pope himself cherished the idea of becoming, in his own person, the successor of the ancient Caesars in their own old capital. By the aid of the Frankish kings, he had been able to stop the Lombards from acquiring the succession to the derelict territories of the Eastern emperor in Italy (from which their last exarch had fled overseas in 752), and he had become the temporal sovereign of those territories. Successor to the Eastern emperor in central Italy, why should he not also become his successor as representative of the Empire—all the more, since he was the head of the Church, which was coextensive with the Empire? Some such hope seems to inspire the Donation of Constantine, a document forged between 754 and 774, in which Constantine is represented as having conferred on Silvester I. the imperial palace and insignia, and therewith *omnes Italiae seu occidentalium regionum provincias loca et civitates*. But the hope, if it ever was cherished,

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[1] The *de facto* importance of the event of 476 can only be seen in the light of later events, and it was not therefore noticed by contemporaries. Marcellinus is the only contemporary who remarks on its importance, cf. *Marcellini Chronicon* (*Mon. Germ. Hist., Chronica minora*, ii. 91), *Hesperium Romanae gentis imperium . . . cum hoc Augustulo periit . . . Gothorum dehinc regibus Romam tenentibus.*

[2] A passage in Malchus, a Byzantine historian (quoted by Bryce, *Holy Roman Empire*, p. 25, note *u*, in the edition of 1904), expresses this truth exactly. The envoys sent to Zeno by Odoacer urge ὡς ἰδίας μὲν αὐτοῖς βασιλείας οὐ δέοι· κοινὸν δὲ ἀποχρήσει μόνος ὢν αὐτοκράτωρ ἐπ' ἀμφοτέροις τοῖς πέρασι. The envoys then suggest the name of Odoacer, as one able to manage their affairs, and ask Zeno to give him, *as an officer of the Empire*, the title of Patricius and the administration of Italy.

Coronation of Charlemagne as emperor of the West.

proved to be futile. The popes had not the material force at their command which would have made them adequate to the position. The strong arm of the Frankish kings had alone delivered them from the Lombards: the same strong arm, they found, was needed to deliver them from the wild nobility of their own city. So they turned to the power which was strong enough to undertake the task which they could not themselves attempt, and they invited the Frankish king to become the representative of the imperial conception they cherished.[1] In the year 800 central Italy ceased to date its documents by the regnal years of the Eastern emperors; for Charlemagne was crowned emperor in their stead.

The king of the Franks was well fitted for the position which he was chosen to fill. He was king of a stock which had been from the first Athanasian, and had never been tainted, like most of the Germanic tribes, by the adoption of Arian tenets. His grandfather, Charles Martel, had saved Europe from the danger of a Mahommedan conquest by his victory at Poitiers (732); his father, Pippin the Short, had helped the English missionary Boniface to achieve the conversion of Germany. The popes themselves had turned to the Frankish kings for support again and again in the course of the 8th century. Gregory III., involved in bitter hostilities with the iconoclastic reformers of the East, appealed to Charles Martel for aid, and even offered the king, it is said, the titles of consul and patrician. Zacharias pronounced the deposition of the last of the Merovingians, and gave to Pippin the title of king (751); while his successor, Stephen II., hard pressed by the Lombards, who were eager to replace the Eastern emperors in the possession of central Italy, not only asked and received the aid of the new king, but also acquired, in virtue of Pippin's donation (754), the disputed exarchate itself. Thus was laid the foundation of the States of the Church; and the grateful pope rewarded the donation by the gift of the title of *patricius Romanorum*, which conferred on its recipient the duty and the privilege of protecting the Roman Church, along with some undefined measure of authority in Rome itself.[2] Finally, in 773, Pope Adrian I. had to appeal to Charles, the successor of Pippin, against the aggressions of the last of the Lombard kings; and in 774 Charles conquered the Lombard kingdom, and himself assumed its iron crown. Thus by the end of the 8th century the Frankish king stood on the very steps of the imperial throne. He ruled a realm which extended from the Pyrenees to the Harz, and from Hamburg to Rome—a realm which might be regarded as in itself a *de facto* empire. He bore the title of *patricius*, and he had shown that he did not bear it in vain by his vigorous defence of the papacy in 774. Here there stood, ready to hand, a natural representative of the conception of Empire; and Leo III., finding that he needed the aid of Charlemagne to maintain himself against his own Romans, finally took the decisive step of crowning him emperor, as he knelt in prayer at St Peter's, on Christmas Day, 800.

Theory of the Carolingian empire.

The coronation of Charlemagne in 800 marks the coalescence into a single unity of two facts, or rather, more strictly speaking, of a fact and a theory. The fact is German and secular: it is the wide *de facto* empire, which the Frankish sword had conquered, and Frankish policy had organized as a single whole. The theory is Latin and ecclesiastical: it is a theory of the necessary political unity of the world, and its necessary representation in the person of an emperor—a theory half springing from the unity of the old Roman empire, and half derived from the unity of the Christian Church as conceived in the New Testament. If we seek for the force which caused this fact and this theory to coalesce in the Carolingian empire, we can only answer—the papacy. The idea of Empire was in the Church; and the head of the Church translated this idea into fact. If, however, we seek to conceive the event of 800 from a political or legal point of view, and to determine the residence of the right of constituting an emperor, we at once drift into the fogs of centuries of controversy. Three answers are possible from three points of view; and all have their truth, according to the point of view. From the ecclesiastical point of view, the right resides with the pope. This theory was not promulgated (indeed no theory was promulgated) until the struggles of Papacy and Empire in the course of the middle ages; but by the time of Innocent III. it is becoming an established doctrine that a *translatio Imperii* took place in 800, whereby the pope transferred the Roman empire from the Greeks to the Germans in the person of the magnificent Charles.[3] One can only say that, as a matter of fact, the popes ceased to recognize the Eastern emperors, and recognized Charles instead, in the year 800; that, again, this recognition alone made Charles emperor, as nothing else could have done; but that no question arose, at the time, of any right of the pope to give the Empire to Charlemagne, for the simple reason that neither of the actors was acting or thinking in a legal spirit. If we now turn to study the point of view of the civil lawyer, animated by such a spirit, and basing himself on the code of Justinian, we shall find that an emperor must derive his institution and power from a *lex regia* passed by the *populus Romanus*; and such a view, strictly interpreted, will lead us to the conclusion that the citizens of Rome had given the crown to Charlemagne in 800, and continued to bestow it on successive emperors afterwards. There is indeed some speech, in the contemporary accounts of Charlemagne's coronation, of the presence of "ancients among the Romans" and of "the faithful people"; but they are merely present to witness or applaud, and the conception of the Roman people as the source of Empire is one that was only championed, at a far later date, by antiquarian idealists like Arnold of Brescia and Cola di Rienzi. The *faex Romuli*, a population of lodging-house keepers, living upon pilgrims to the papal court, could hardly be conceived, except by an ardent imagination, as heir to the *Quirites* of the past. Finally, from the point of view of the German tribesman, we must admit that the Empire was something which, once received by his king (no matter how), descended in the royal family as an heirloom; or to which (when the kingship became elective) a title was conferred, along with the kingship, by the vote of electors.[4]

But apart from these questions of origin, two difficulties have still to be faced with regard to the nature and position of the Carolingian empire. Did Charlemagne and his successors enter into a new relation with their subjects, in virtue of their coronation? And what was the nature of the relation between the new emperor now established in the West and the old emperor still reigning in the East? It is true that Charlemagne exacted a new oath of allegiance from his subjects after his coronation, and again that he had a revision of all the laws of his dominions made in 802. But the revision did not amount to much in bulk: what there was contained little that was Roman; and, on the whole, it hardly seems probable that Charlemagne entered into any new relation with his subjects. The relation of his empire to the empire in the East is a more difficult and important problem. In 797 the empress Irene had deposed and blinded her son, Constantine VI., and usurped his throne. Now it would seem that Charlemagne, whose thoughts

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[1] According to the view here followed, the Church was the ark in which the conception of Empire was saved during the dark ages between 600 and 800. Some influence should perhaps also be assigned to Roman law, which continued to be administered during these centuries, especially in the towns, and maintained the imperial tradition. But the influence of the Church is the essential fact.

[2] In the 5th century the title *patricius* came to attach particularly to the head of the Roman army (*magister utriusque militiae*) to men like Aetius and Ricimer, who made and unmade emperors (cf. Mommsen, *Gesammelte Schriften*, iv. 537, 545 sqq.). Later it had been borne by the Greek exarchs of Ravenna: The concession to Pippin of this great title makes him military head of the Western empire, in the sense in which the title was used in the 5th century; it makes him representative of the Empire for Italy, in the sense in which it had been used of the exarchs.

[3] See the famous bull *Venerabilem* (*Corp. Jur. Canon.* Decr. Greg. i. 6, c. 34).

[4] Even on this view, an imperial coronation at the hands of the pope was necessary to complete the title; but this was regarded by the Germans (though not by the pope) as a form which necessarily followed.

Relations of the Carolingians to the Eastern empire.

were already set on Empire, hoped to depose and succeed Irene, and thus to become sole representative of the conception of Empire, both for the East and for the West. Suddenly there came, in 800, his own coronation as emperor, an act apparently unpremeditated at the moment, taking him by surprise, as one gathers from Einhard's *Vita Karoli*, and interrupting his plans. It left him representative of the Empire for the West only, confronting another representative in the East. Such a position he did not desire: there had been a single Empire vested in a single person since 476, and he desired that there should still continue to be a single Empire, vested only in his own person. He now sought to achieve this unity by a proposal of marriage to Irene. The proposal failed, and he had to content himself with a recognition of his imperial title by the two successors of the empress. This did not, however, mean (at any rate in the issue) that henceforth there were to be two conjoint rulers, amicably ruling as colleagues a single Empire, in the manner of Arcadius and Honorius. The dual government of a single Empire established by Diocletian had finally vanished in 476; and the unity of the Empire was now conceived, as it had been conceived before the days of Diocletian, to demand a single representative. Henceforth there were two rulers, one at Aix-la-Chapelle and one at Constantinople, each claiming, whatever temporary concessions he might make, to be the sole ruler and representative of the Roman empire. On the one hand, the Western emperors held that, upon the deposition of Constantine VI., Charlemagne had succeeded him, after a slight interval, in the government of the whole Empire, both in the East and in the West; on the other hand, the Eastern emperors, in spite of their grudging recognition of Charlemagne at the moment, regarded themselves as the only lawful successors of Constantine VI., and viewed the Carolings and their later successors as upstarts and usurpers, with no right to their imperial pretensions. Henceforth two halves confronted one another, each claiming to be the whole; two finite bodies touched, and each yet claimed to be infinite.

Character of the Carolingian empire.

If, as has been suggested, Charlemagne did not enter into any fundamentally new relations with his subjects after his coronation, it follows that the results of his coronation, in the sphere of policy and administration, cannot have been considerable. The Empire added a new sanction to a policy and administration already developed. Charlemagne had already showed himself *episcopus episcoporum*, anxious not only to suppress heresy and supervise the clergy within his borders, but also to extend true Christianity without them even before the year when his imperial coronation gave him a new title to supreme governorship in all cases ecclesiastical. He had already organized his empire on a new uniform system of counties, and the *missi dominici* were already at work to superintend the action of the counts, even before the *renovatio imperii Romani* came to suggest such uniformity and centralization. Charlemagne had a new title; but his subjects still obeyed the king of the Franks, and lived by Frankish law, in the old fashion. In their eyes, and in the eyes of Charlemagne's own descendants, the Empire was something appendant to the kingship of the Franks, which made that kingship unique among others, but did not radically alter its character. True, the kingship might be divided among brothers by the old Germanic custom of partition, while the Empire must inhere in one person; but that was the one difference, and the one difficulty, which might easily be solved by attaching the name of emperor to the eldest brother. Such was the conception of the Carolings: such was not, however, the conception of the Church. To the popes the Empire was a solemn office, to which the kings of the Franks might most naturally be called, in view of their power and the traditions of their house, but which by no means remained in their hands as a personal property. By thus seeking to dissociate the Empire from any indissoluble connexion with the Carolingian house, the popes were able to save it. Civil wars raged among the descendants of Charlemagne: partitions recurred: the Empire was finally dissolved, in the sense that the old realm of Charlemagne fell asunder, in 888. But the Empire, as an office, did not perish. During the 9th century the popes had insisted, as each emperor died, that the new emperor needed coronation at their hands; and they had thus kept alive the conception of the Empire as an office to which they invited, if they did not appoint, each successive emperor. The quarrels of the Carolingian house helped them to make good their claim. John VIII. was able to select Charles the Bald in preference to other claimants in 875; and before the end of his pontificate he could write that "he who is to be ordained by us to the Empire must be by us first and foremost invited and elected." Thus was the unity of the Empire preserved, and the conception of a united Empire continued, in spite of the eventual dissolution of the realm of Charlemagne. When the Carolingian emperors disappeared, Benedict IV. could crown Louis of Provence (901) and John X. could invite to the vacant throne an Italian potentate like Berengar of Friuli (915); and even when Berengar died in 924, and the Empire was vacant of an emperor, they could hold, and hold with truth, that the Empire was not dead, but only suspended, until such time as they should invite a new ruler to assume the office.

Break-up of the Carolingian empire.

Attitude of the papacy.

Various causes had contributed to the dissolution of the realm of Charlemagne. Partitions had split it; feudalism had begun to honeycomb it; incessant wars had destroyed its core, the fighting Franks of Austrasia. But, above all, the rise of divisions within the realm, which, whether animated by the spirit of nationality or no, were ultimately destined to develop into nations, had silently undermined the structure of Pippin and Charlemagne. Already in 842 the oath of Strassburg shows us one Caroling king swearing in French and another in German: already in 870 the partition of Mersen shows us the kings of France and Germany dividing the middle kingdom which lay between the two countries by the linguistic frontier of the Meuse and Moselle. The year 888 is the birth-year of modern Europe. France, Germany, Italy, stood distinct as three separate units, with Burgundy and Lorraine as debatable lands, as they were destined to remain for centuries to come. If the conception of Empire was still to survive, the pope must ultimately invite the ruler of the strongest of these three units to assume the imperial crown; and this was what happened when in 962 Pope John XII. invited Otto I. of Germany to renew once more the Roman Empire. As the imperial strength of the whole Frankish tribe had given them the Empire in 800, so did the national strength of the East Frankish kingdom, now resting indeed on a Saxon rather than a Frankish basis, bring the Empire to its ruler in 962. The centre of political gravity had already been shifting to the east of the Rhine in the course of the 9th century. While the Northmen had carried their arms along the rivers and into the heart of France, Louis the German had consolidated his kingdom in a long reign of sixty years (817-876); and at the end of the 9th century two kings of Germany had already worn the imperial crown. Early in the 10th century the kingship of Germany had come to the vigorous Saxon dukes (919); and strong in their Saxon basis Henry I. and his son Otto had built a realm which, disunited as it was, was far more compact than that which the Carolings of the West ruled from Laon. Henry I. had thought in his later years of going to Rome for the imperial crown: under Otto I. the imperial idea becomes manifest. On the one hand, he established a semi-imperial position in the West: by 946 Louis IV. d'Outremer is his protégé, and it is his arms which maintain the young Conrad of Burgundy on his throne. On the other hand, he showed, by his policy towards the German Church, that he was the true heir of the Carolingian traditions. He made churchmen his ministers; he established missionary bishoprics on the Elbe which should spread Christianity among the Wends; and his dearest project was a new archbishopric of Magdeburg. The one thing needful was that he should, like Charlemagne, acquire the throne of Italy; and the dissolute condition of that country during the first half of the

The German kingdom and the empire.

10th century made its acquisition not only possible, but almost imperative. Begun in 952, the acquisition was completed ten years later; and all the conditions were now present for Otto's assumption of the imperial throne. He was crowned by John XII. on Candlemas Day 962, and thus was begun the Holy Roman Empire, which lasted henceforth with a continuous life until 1806.[1]

The Holy Roman Empire.

The Empire and feudalism.

The same ideas underlay the new empire which had underlain that of Charlemagne, strengthened and reinforced by the fact that they had already found a visible expression before in that earlier empire. Historically, there was the tradition of the old Roman empire, preserved by the Church as an idea, and preserved in the Church, and its imperial organization, as an actual fact. Ecclesiastically, there was the Pauline conception of a single Christian Church, one in subjection to Christ as its Head, and needing (so men still thought) a secular counterpart of its indivisible unity.[2] To these two sanctions philosophy later added a third; and the doctrine of Realism, that the one universal is the true abiding substance—the doctrine which pervades the *De monarchia* of Dante,—reinforced the feeling which demanded that Europe should be conceived as a single political unity. But if the Holy Roman empire of the German nation has the old foundations, it is none the less a thing *sui generis*. Externally, it meant far less than the empire of Charlemagne; it meant simply a union of Germany and northern Italy (to which, after 1032, one must also add Burgundy, though the addition is in reality nominal) under a single rule. Historians of the 19th century, during the years in which the modern German empire was in travail, disputed sorely on the advantages of this union; but whatever its advantages or disadvantages, the fact remains that the union of Teutonic Germany and Latin Italy was, from an external point of view, the essential fact in the structure of the medieval Empire. Internally, again, the Empire of the Ottos and their successors was new and unprecedented. If Latin imperialism had been combined with Frankish tribalism in the Empire of Charlemagne, it now met and blended with feudalism. The Holy Roman emperor of the middle ages, as Frederick I. proudly told the Roman envoys, found his senate in the diet of the German baronage, his *equites* in the ranks of the German knights. Feudalism, indeed, came in time to invade the very conception of Empire itself. The emperors began to believe that their position of emperor made them feudal overlords of other kings and princes; and they came to be regarded as the topmost summit of the feudal pyramid, from whom kings held their kingdoms, while they themselves held directly of God. In this way the old conception of the world as a single political society entered upon a new phase: but the translation of that conception into feudal terms, which might have made Diocletian gasp, only gave it the greater hold on the feudal society of the middle ages. Yet in one way the feudal conception was a source of weakness to the Empire; for the popes, from the middle of the 12th century onwards, began to claim for themselves a feudal overlordship of the world, and to regard the emperor as the chief of their vassals. The theory of the *Translatio* buttressed their claim to be overlords of the Empire; and the emperors found that their very duty to defend the Papacy turned them into its vassals—for was not the *advocatus* who defended the lands of an abbey or church its tenant by feudal service, and might not analogy extend the feudal relation to the imperial advocate himself?

The Empire and the Papacy.

The relation of the Empire to the Papacy is indeed the cardinal fact in its history for the three centuries which followed the coronation of Otto I. (962–1250). For a century (962–1076) the relation was one of amity. The pope and the emperor stood as co-ordinate sovereigns, ruling together the commonwealth of Europe.[3] If either stood before the other, the emperor stood before the pope. The Romans had sworn to Otto I. that they would never elect or ordain a pope without his consent; and the rights over papal elections conceived to belong to the office of *patricius*, which they generally held, enabled the emperors, upon occasion, to nominate the pope of their choice. The partnership of Otto III., son of a Byzantine princess, and his nominee Silvester II. (already distinguished as Gerbert, *scholasticus* of the chapter school of Reims) forms a remarkable page in the annals of Empire and Papacy. Otto, once the pupil of Silvester in classical studies, and taught by his mother the traditions of the Byzantine empire, dreamed of renewing the Empire of Constantine, with Rome itself for its centre; and this antiquarian idealism (which Arnold of Brescia and Cola di Rienzi were afterwards, though with some difference of aim, to share) was encouraged in his pupil by the pope. Tradition afterwards ascribed to the two the first project of a crusade, and the institution of the seven electors: in truth their faces were turned to the past rather than to the future, and they sought not to create, but to renovate. The dream of restoring the age of Constantine passed with the premature death of Otto; and after the death of Silvester II. the papacy was degraded into an appendage of the Tusculan family. From that degradation the Church was rescued by Henry III. (the second emperor of the new Salian house, which reigned from 1024 to 1125), when in 1046 he caused the deposition of three competing popes, and afterwards filled the papal chair with his own nominees; but it was rescued more effectually by itself, when in 1059 the celebrated bull *In nomine Domini* of Nicholas II. reserved the right of electing the popes to the college of cardinals (see CONCLAVE). A new era of the Papacy begins with the decree, and that era found its exponent in Hildebrand. If under Henry III. the Empire stands in many respects at its zenith, and the emperor nominates to the Papacy, it sinks, under Henry IV., almost to the nadir of its fortunes, and a pope attempts, with no little success, to fight and defeat an emperor.

The investiture contest.

The rise of the Papacy, which the action of Henry III. in 1046 had helped to begin, and the bull of 1059 had greatly promoted, was ultimately due to an ecclesiastical revival, which goes by the name of the Cluniac movement. The aim of that movement was to separate the Church from the world, and thus to make it independent of the laity and the lay power; and it sought to realize its aim first by the prohibition of clerical marriage and simony, and ultimately by the prohibition of lay investiture. A decree of Gregory VII. in 1075 forbade emperor, king or prince to "presume to give investiture of bishoprics," under pain of excommunication; and Henry IV., contravening the decree, fell under the penalty, and the War of Investitures began (1076–1122). Whether or no Henry humiliated himself at Canossa (and the opinion of German historians now inclines to regard the traditional account as exaggerated) the Empire certainly suffered in his reign a great loss of prestige. The emperor lost his hold over Germany, where the aid of the pope strengthened the hands of the discontented nobility: he lost his hold over Italy, where the Lombard towns gradually acquired municipal independence, and the donation of the Countess Matilda gave the popes the germ of a new and stronger *dominium temporale*. The First Crusade came, and the emperor, its natural leader, could not lead it; while the centre of learning and civilization, in the course of the fifty years' War of Investitures, gradually shifted to France. The struggle was finally ended by a compromise—the Concordat of Worms—in 1122; but the Papacy, which had fought the long War of Investitures and inspired the First Crusade, was a far greater power than it had been at the beginning of the struggle, and the emperor, shaken in his hold on Germany and Italy, had lost both power and prestige (see INVESTITURE). It is significant that a theory of the feudal subjection of the emperor to the pope, foreshadowed in the pontificate of Innocent II., and definitely enounced by the envoys of Adrian IV. at the diet of Besançon in 1157, now begins to arise. The popes, who had called the emperors to be heads of the European commonwealth in 800 and again in 962, begin to vindicate that headship for themselves. Gregory VII. had already claimed that the pope stood to the emperor, as the sun to the moon; and gradually the old co-ordination disappeared in a new subordination of the Empire to the papal *plenitudo potestatis*. The claim of ecclesiastical independence of the middle of the 11th century was rapidly becoming a claim of ecclesiastical supremacy in the middle of the 12th: the imperial claim to nominate popes, which had lasted till 1059, was turning into the papal claim to nominate emperors. Yet at this very time a new period of splendour dawned for the Empire; and the rule of the three Hohenstaufen emperors, Frederick I., Henry VI. and Frederick II. (1152–1250), marks the period of its history which attracts most sympathy and admiration.

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[1] It is a curious fact that imperial titles (*imperator* and *basileus*) are used in the Anglo-Saxon diplomata of the 10th century. Edred, for instance (946–955) is "imperator," "cyning and casere totius Britanniae," "basileus Anglorum hujusque insulae barbarorum": Edgar is "totius Albionis imperator Augustus" (cf. Stubbs, *Const. Hist.* i. c. vii. § 71). These titles partly show the turgidity of English Latinity in the 10th century, partly indicate the quasi-imperial position held by the Wessex kings after the reconquest of the Danelaw. But there seems to be no real ground for Freeman's view (*Norman Conquest*, i. 548 sqq.), that England was regarded as a third Empire, side by side with the other Empires of West and East Europe. That the titles were assumed in order to repudiate possible claims of the Western Empire to the overlordship of England is disproved by the fact that they are assumed at a time when there is no Western emperor. The assumption of an imperial style by Henry VIII., which is mentioned below, is explained by the Reformation, and does not mean any recurrence to a forgotten Anglo-Saxon style.

[2] It is in virtue of this aspect that the Empire is holy. The term *sacrum imperium* seems to have been first used about the time of Frederick I., when the emperors were anxious to magnify the sanctity of their office in answer to papal opposition. The emperor himself (see under EMPEROR) was always regarded, and at his coronation treated, as a *persona ecclesiastica*.

[3] The emperor claimed suzerainty over the greater part of Europe at various dates. Hungary and Poland, France and Spain, the Scandinavian peninsula, the British Isles, were all claimed for the Empire at different times (see Bryce, *Holy Roman Empire*, c. xii.). The "effective" empire, if indeed it may be called effective, embraced only Germany, Burgundy and the *regnum Italiae* (the old Lombard kingdom in the valley of the Po).

The Hohenstaufen emperors.

Frederick I. regained a new strength in Germany, partly because he united in his veins the blood of the two great contending families, the Welfs and the Waiblingens; partly because he had acquired large patrimonial possessions in Swabia, which took the place of the last Saxon demesne; partly because he had a greater control over the German episcopate than his predecessors had enjoyed for many years past. At the same time the revival of interest in the study of Roman law gave the emperor, as source and centre of that law, a new dignity and prestige, particularly in Italy, the home and hearth of the revival. Confident in this new strength, he attempted to vindicate his claims on Italy, and sought, by uniting the two under his sway, to inspire with new life the old Ottonian Empire He failed to crush Lombard municipal independence: defeated at Legnano in 1176, he had to recognize his defeat at the treaty of Constance in 1183. He failed to acquire control over the Papacy: a new struggle of Empire and Papacy, begun in the pontificate of Adrian IV. on the question of control over Rome, and continued in the pontificate of Alexander III., because Frederick recognized an anti-pope, ended in the emperor's recognition of his defeat at Venice in 1177. The one success was the acquisition of the Norman kingdom for Henry VI., who was married to its heiress, Constance. But the one success of Frederick's Italian policy proved the ruin of his house in the reign of his grandson Frederick II. On the one hand, the possession of Sicily induced Frederick II. to neglect Germany; and by two documents, one of 1220 and one of 1231, he practically abdicated his sovereign powers to the German princes in order to conciliate their support for his Italian policy. On the other hand, the possession of Sicily involved him in the third great struggle of Empire and Papacy. Strong in his Sicilian kingdom in the south, and seeking, like his grandfather, to establish his power in Lombardy, Frederick practically aimed at the unification of Italy, a policy which threatened to engulf the States of the Church and to reduce the Papacy to impotence. The popes excommunicated the emperor: they aided the Lombard towns to maintain their independence; finally, after Frederick's death (1250), they summoned Charles of Anjou into Sicily to exterminate his house. By 1268 he had done his work, and the medieval Empire was practically at an end. When Rudolph of Habsburg succeeded in 1273, he was only the head of a federation of princes in Germany, while in Italy he abandoned all claims over the centre and south, and only retained titular rights in the Lombard plain.

Overthrow of the Empire in Italy.

Thus ended the first great chapter in the history of the Holy Roman Empire which Otto had founded in 962. In those three centuries the great fact had been its relation to the Papacy: in the last two of those three centuries the relation had been one of enmity. The basis of the enmity had been the papal claim to supreme headship of Latin Christianity, and to an independent temporal demesne in Italy as the condition of that headship. Because they desired supreme headship, the popes had sought to reduce the emperor's headship to something lower than, and dependent upon, their own—to a mere fief held of St Peter: because they desired a temporal demesne, they had sought to expel him from Italy, since any imperial hold on Italy threatened their independence. They had succeeded in defeating the Empire, but they had also destroyed the Papacy; for the French aid which they had invoked against the Hohenstaufen developed, within fifty years of the fall of that house, into French control, and the captivity at Avignon (1308–1378) was the logical result of the final victory of Charles of Anjou at Tagliacozzo. The struggle seemed to have ended in nothing but the exhaustion of both combatants. Yet in many respects it had in reality made for progress. It had set men thinking of the respective limits of church and state, as the many *libelli de lite imperatorum et pontificum* show; and from that thought had issued a new conception of the state, as existing in its own right and supreme in its own sphere, a conception which is the necessary basis of the modern nation-state. If it had dislocated Germany into a number of territorial principalities, it had produced a college of electors to represent the cause of unity: if it had helped to prevent the unification of Italy, and had left to Italy the fatal legacy of Guelph and Ghibelline feuds, it had equally helped to produce Italian municipal independence.

The Empire from the election of Rudolph of Habsburg, 1273.

A new chapter of the history of the Empire fills the three centuries from 1273 to 1556—from the accession of Rudolph of Habsburg to the abdication of Charles V. Italy was now lost: the Empire had now no peculiar connexion with Rome, and far less touch with the Papacy. A new Germany had risen. The extinction of several royal stocks and the nomination of anti-kings in the course of civil wars had made the monarchy elective, and raised to the side of the emperor a college of electors (see ELECTORS), which appears as definitely established soon after 1250. With Italy lost, and Germany thus transmuted, why should the Empire have still continued to exist? In the first place, it continued to exist because the Germans still found a king necessary and because, the German king having been called for three centuries emperor, it seemed necessary that he should still continue to bear the name. In this sense the Empire existed as the presidency of a Germanic confederation, and as something analogous to the modern German empire, with the one great difference that the Hohenzollerns now derive from Prussia a strength which enables them to make their imperial position a reality, while no Luxemburg or Habsburg was able to make his imperial position otherwise than honorary and nominal. In the second place, it continued to exist because the conception of the unity of western Europe still lingered, and was still conceived to need an exponent. In this sense the Empire existed as a presidency, still more honorary and still more nominal, of the nations of western Europe. In both capacities the emperor existed to a great extent because he was a legal necessity—because, in Germany, he was necessary for the investiture of princes with their principalities, and because, in Europe, he was necessary, as the source of all rights, to bestow crowns upon would-be kings, or to act as the head of the great orders of chivalry, or to give patents to notaries. With the history of the Empire regarded as a German confederation we are not here concerned. The reigns of the Habsburg, Luxemburg and

Wittelsbach emperors belong to the history of Germany. Yet two of these emperors, Henry VII. and Louis IV., should not pass without notice, the one for his own sake, the other for the sake of his adherents, and both because, by interfering in Italy, and coming into conflict with the Papacy, they brought once more into prominence the European aspect of the Empire.

Henry VII., the contemporary and the hero of Dante, descended into Italy in 1310, partly because he had no power and no occupation in Germany, partly because he was deeply imbued with the sense of his imperial dignity. Coming as a peacemaker and mediator, he was driven by Guelph opposition into a Ghibelline rôle; and he came into conflict with Clement V., the first of the Avignonese popes, who under the pressure of France attempted to enforce upon Henry a recognition of his feudal subjection. Henry asserted his independence: he claimed Rome for his capital, and the lordship of the world for his right; but, just as a struggle seemed impending, he died, in 1313. During the reign of his successor, Louis IV., the struggle came. Louis had been excommunicated by John XXII. in 1324 for acting as emperor before he had received papal recognition. None the less, in 1328, he came to Rome for his coronation. He had gathered round him strange allies; on the one hand, the more advanced Franciscans, apostles of the cause of clerical disendowment, and inimical to a wealthy papacy; on the other hand, jurists like Marsilius of Padua and John of Jandun, who brought to the cause of Louis the spirit and the doctrines which had already been used in the struggle between Boniface VIII. and Philip IV. of France. Marsilius in particular, in a treatise called the *Defensor Pacis*, insisted on the majesty of the lay state, and even on its superiority to the Church. Perhaps it was Marsilius, learned as he was in Roman law, and remembering the *lex regia* by which the Roman people had of old conferred its power on the emperor, who suggested to Louis the policy, which he followed, of receiving the imperial crown by the decree and at the hands of the Roman people. The policy was remarkable: Louis embraced an alliance which Frederick Barbarossa had spurned, and recognized the medieval Romans as the source of imperial power. Not less remarkable was the new attitude of the German electors, who for the first time supported an emperor against the pope, because they now felt menaced in their own electoral rights; and the one permanent result which finally flowed from the struggle was the enunciation and definition of the rights and privileges of the electors in the Golden Bull of 1356 (see GOLDEN BULL).

The Empire and the rise of the idea of national states.

In this struggle with the Papacy the Empire had shown something of its old universal aspect. It had come into connexion with Italy, and into close connexion with Rome: it had enlisted in defence of its rights at once an Italian like Marsilius and an Englishman like Ockham. The same universal aspect appeared once more in the age of the conciliar movement, at the beginning of the 15th century. One of the essential duties of the emperor, as defender of the Church, was to help the assembling and the deliberations of general councils of the Church. This was the duty discharged by Sigismund, when he forced John XXIII. to summon a council at Constance in 1414, and sought, though in vain, to guide its deliberations. The journey which Sigismund undertook in the interests of the council (1415–1417) is particularly noteworthy. He sought to make peace throughout western Europe, acting as international arbitrator—in virtue of his presidency of western Europe—between England and France, between Burgundians and Armagnacs; but he failed in his aim, and when he returned to the council, it was only to witness the defeat of the party of reform, which he championed National feeling and national antipathies proved too strong for Sigismund's attempt to revive the medieval empire for the purposes of international arbitration: the same feeling, the same antipathies, made inevitable the failure of the council itself, in which western Europe had sought to meet once more as a single religious commonwealth. Early in the 15th century, therefore, the conception of the unity of western Europe, as a single Empire-Church, was already waning in both its aspects. The unity of the Church Universal was dissolving, and the conception of the nation-church arising (as the separate concordats granted by Martin V. to the different nations prove); while the unity of the Empire was proved a dream, by the powerlessness of the emperor in the face of the struggle of England and France.

Influence of the Reformation.

Renaissance and Reformation combined to complete the fall which the failure of Sigismund to guide the conciliar movement had already foreshadowed. The Renaissance, revolting against the medievalism of the *studium* and not sparing even the *sacerdotium* of the middle ages, had little respect for the medieval *imperium*; and, going back to pure Latin and original Greek, it went back beyond even the classical empire to find its ideals and inspirations. But it is the coming of the Reformation, and with it of the nation-church, which finally marks the epoch at which the last vestige of the old conception of the political unity of the world disappears before the nation-state. Externally indeed it seemed, at the time of the Reformation, as if the old Empire had been revived in the person of Charles V., who owned territories as vast as those of Charlemagne. But Charles's dominions were a dynastic agglomeration, knit together by no vivifying conception; and, though Charles was a champion of the one Catholic Church against the Reformation, he did not in any way seek to revive the power of the medieval empire. Meanwhile the reforming monarchs, while they cast off the Roman Church, cast off with it the Roman empire. Henry VIII. declared himself free, not only of the pope, but of all other foreign power; not only so, but as he sought to take the place of the pope with regard to his own church, so he sought to take the place of the emperor with regard to his kingdom, and spoke of his "imperial" crown, a style which recurs in later Tudor reigns.[1] The conception of one Empire passed out of Europe, or, if it remained, it remained only in an honorary precedence accorded by other sovereigns to the king of Germany, who still entitled himself emperor. In Germany itself the honorary presidency which the emperor enjoyed over the princes came to mean still less than before, when religious differences divided the country, and the principle of *cujus regio ejus religio* accentuated the local autonomy of the prince. When Charles abdicated in 1556, the change which the accession of Rudolph of Habsburg had already marked was complete: there was no empire except in Germany, and in Germany the Empire was nothing more than a convenient legal conception. The Reformation, by sweeping away the spiritual unity of western Christendom, had swept away any real conception of its political unity, and with that conception it had swept away the Empire; while it had also, by splitting Germany into two religious camps, and making the emperor at the most the head of a religious faction, dissipated the last vestiges of a real Empire in the country which had, since 962, been its peculiar home.

The Empire as a German confederation.

From 1556 to 1806 the Empire means a loose federation of the different princes of Germany, lay and ecclesiastical, under the presidency, elective in theory but hereditary in practice, of the house of Habsburg. It is an empire much in the same sense as the modern German empire, with a diet somewhat analogous to the modern Bundesrat, and a cumbrous imperial chamber for purposes of justice, hardly at all analogous to the highly organized system of federal justice which prevails in Germany to-day. The dissolution of the Holy Roman Empire into this loose federation had already been anticipated by the concessions made to the princes by Frederick II. in 1220 and 1231; but the final organization of Germany on federal lines was only attained in the treaty of Westphalia of 1648. The attempt of Ferdinand II., in the course of the Thirty Years' War, to assert a practically monarchical authority over the princes of Germany, only led to the regular vindication by the princes of their own monarchical authority. The emperor, who had tried in the 15th century to be the international authority of all Europe, now sank to the position of less than inter-state arbitrator in Germany. That the Empire and the emperor were retained at all, when the princes became so many independent sovereigns, was due partly to a lingering sense of quasi-national sentiment for a *magni nominis umbra*, partly to the need of some authority which should combine in one whole principalities of very different sizes and strengths, and should protect the weak from the strong, and all from France. But this authority only found its *symbol* in the emperor. Such real federal authority as there was remained with the diet, a congress of sovereign princes through their accredited representatives; and the emperor's sole rights, as emperor, were those of granting titles and confirming tolls. The Habsburgs, emperors in each successive generation, never pursued an imperial, but always a dynastic policy; and they were perfectly ready to sacrifice to the aggrandizement of their house the honour of the Empire, as when they ceded Lorraine to France in return for Tuscany (1735)

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[1] Cf. the Act 25 Henry VIII. c. 22, § 1: "the lawful kings and emperors of this realm."

End of the Holy Roman Empire.

It needed the cataclysm of the French Revolution finally to overthrow the Empire. Throughout the 18th century it lasted, a thing of long-winded protocols and never-ending lawsuits, "neither Holy, nor Roman, nor an Empire." But with Napoleon came its destroyer. As far back as the end of the 13th century, French kings had been scheming to annex the title or at any rate absorb the territories of the Empire: at the beginning of the 19th century the annexation of the title by Napoleon seemed very imminent. Posing as the New Charlemagne ("because, like Charlemagne, I unite the crown of France to that of the Lombards, and my Empire marches with the East"), he resolved in 1806, during the dissolution and recomposition of Germany which followed the peace of Lunéville, to oust Francis II. from his title, and to make the Holy Roman Empire part and parcel of the "Napoleonic idea." He was anticipated, however, by the prompt action of the proud Habsburg, who was equally resolved that no other should wear the crown which he himself was powerless to defend, and accordingly, on the 6th of August 1806, Francis resigned the imperial dignity. So perished the Empire. Out of its ashes sprang the Austrian Empire, for Francis, in 1804, partly to counter Napoleon's assumption of the title of Emperor of the French, partly to prepare for the impending dissolution of the old Empire, had assumed the title of "Hereditary Emperor of Austria." And in yet more recent times the German empire may be regarded, in a still more real sense than Austria, as the descendant and representative of the old Empire of the German nation.

General influence of the Empire.

What had been the results of the Holy Roman Empire, in the course of its long history, upon Germany and upon Europe? It has been a *vexata quaestio* among German historians, whether or no the Empire ruined Germany. Some have argued that it diverted the attention of the German kings from their own country to Italy, and that, by bringing them into conflict with the popes, and by thus strengthening the hands of their rebellious baronage with a papal alliance, it prevented the development of a national German monarchy, such as other sovereigns of western Europe were able to found. Others again have emphasized the racial division of Saxon and Frank, of High German and Low German, as the great cause of the failure of Germany to grow into a united national whole, and have sought to ascribe to the influence of the Empire such unity as was achieved; while they have attributed the learning, the trade, the pre-eminence of medieval Germany to the Italian connexion and the prestige which the Empire brought. It is difficult to pronounce on either side; but one feels that the old localism and individualism which characterized the early German, and had never, on German soil, been combined with and counteracted by a large measure of Roman population and Roman civilization, as they were in Gaul and Spain, would in any case have continued to divide and disturb Germany till late in her history, even if the Empire had never come to reside within her borders Of the larger question of the influence of the Empire on Europe we can here only say that it worked for good. An Empire which represented, as a Holy Empire, the unity of all the faithful as one body in their secular, no less than in their religious life—an Empire which, again, as a Roman Empire, represented with an unbroken continuity the order of Roman administration and law—such an empire could not but make for the betterment of the world. It was not an empire resting on force, a military empire; it was not, as in modern times empires have sometimes been, an autocracy warranted and stamped by the plébiscite of the mob. It was an empire resting neither on the sword nor on the ballot-box, but on two great ideas, taught by the clergy and received by the laity, that all believers in Christ form one body politic, and that the one model and type for the organization of that body is to be found in the past of Rome. It was indeed the weakness of the Empire that its roots were only the thoughts of men; for the lack of material force, from which it always suffered, hindered it from doing work it might well have done—the work, for instance, of international arbitration. Yet, on the other hand, it was the strength and glory of the Empire that it lived, all through the middle ages, an unconquerable idea of the mind of man. Because it was a being of their thought, it stirred men to reflection: the Empire, particularly in its clash with the Papacy, produced a political consciousness and a political speculation reflected for us in the many *libelli de lite imperatorum et pontificum*, and in the pages of Dante and Marsilius of Padua. Roman, it perpetuated the greatest monument of Roman thought—that ordered scheme of law, which either became, as in England, the model for the building of a native system, or, as in Germany from the end of the 15th century onwards, was received in its integrity and administered in the courts. Holy, it fortified and consolidated Christian thought, by giving a visible expression to the kingdom of God upon earth; and not only so, but it maintained, however imperfectly, some idea of international obligation, and some conception of a commonwealth of Europe.[1]

The Holy Roman Empire of western Europe had in its own day a contemporary and a rival—that east Roman empire of which we have already spoken. From Arcadius to John Palaeologus, from A.D. 395 to 1453, the Roman empire was continued at Constantinople—not as a theory and an idea, but as a simple and daily reality of politics and administration. In one sense the East Roman Empire was more lineally and really Roman than the West: it was absolutely continuous from ancient times. In another sense the Western Empire was the most Roman; for its capital—in theory at least—was Rome itself, and the Roman Church stood by its side, while Constantinople was Hellenic and even Oriental. Between the two Empires there was fixed an impassable gulf; and they were divided by deep differences of thought and temper, which appeared most particularly in the sphere of religion, and expressed themselves in the cleavage between the Catholic and the Orthodox Churches. Yet, as when Rome fell, the Catholic Church survived, and ultimately found for itself a new Empire of the West, so, when Constantinople fell, the Orthodox Church continued its life, and found for itself a new Empire of the East—the Empire of Russia. Under Ivan the Great (1462–1505) Moscow became the metropolis of Orthodoxy; Byzantine law influenced his code; and he took for his cognizance the double-headed eagle. Ivan the Terrible, his grandson, finally assumed in 1547 the title of Tsar; and henceforth the Russian emperor is, in theory and very largely in fact, the successor of the old East Roman emperor,[2] the head of the Orthodox Church, with the mission of vengeance on Islam for the fall of Constantinople.

Modern Empires.

In the 19th century the word "empire" has had a large and important bearing in politics. In France it has been the apanage of the Bonapartes, and has meant a centralized system of government by an efficient Caesar, resting immediately on the people, and annihilating the powers of the people's representatives Under Napoleon I. this conception had a Carolingian colour: under Napoleon III. there is less of

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[1] The Papacy, consistent to the last, formally protested at the Congress of Vienna in 1815 against the failure of the Powers to restore the Holy Roman Empire, the "centre of political unity" (Ed.).

[2] The Turks, occupying Constantinople, have also claimed to be the heirs of the old emperors of Constantinople; and their sultans have styled themselves *Keisar-i-Rûm*.

Carolingianism, and more of Caesarism—more of a popular dictatorship. While in modern France Empire has meant autocracy instead of representative government, in Germany it has meant a greater national unity and a federal government in the place of a confederation. The modern German empire is at once like and unlike the old Holy Roman Empire. It is unlike the old medieval Empire; for it has no connexion with the Catholic Church, and no relation to Rome. But it is like the Holy Roman Empire of the 17th and 18th centuries—for it represents a federation, but a more real and more unitary federation, of the several states of Germany. The likeness is perhaps more striking than the dissimilarity; and in virtue of this likeness, and because the memory of the old German *Kaiserzeit* was a driving force in 1870, we may speak of the modern German empire as the successor of the old Holy Roman Empire, if we remember that we are speaking of that Empire in its last two centuries of existence. The modern "Empire of Austria," on the other hand, does not connote an empire in the sense of a federation, but is a convenient designation for the sum of the territories ruled by a single sovereign under various titles (king of Bohemia, archduke of Austria, &c.) and unified in a single political system.[1] The title of Emperor was assumed, as we have seen, through an historical accident; and, though the Habsburgs of to-day are personally the lineal descendants of the old Holy Roman emperors, they do not in any way possess an empire that represents the old Holy Empire. In England, of recent years, the term "Empire" and the conception of imperialism have become prominent and crucial. To Englishmen to-day, as to Germans before 1870, the term and the conception stand for the greater unity and definitely federal government of a number of separate states. For the German, indeed, Empire has meant, in great measure, the strengthening of a loose federal institution by the addition of a common personal superior: to us it means the turning of a loose union of separate states already under a common personal superior—the King—into a federal commonwealth living under some common federal institutions. But the aim is much the same; it is the integration of a people under a single scheme which shall be consistent with a large measure of political autonomy. We speak of imperial federation; and indeed our modern imperialism is closely allied to federalism. Yet we do well to cling to the term empire rather than federation; for the one term emphasizes the whole and its unity, the other the part and its independence. This imperialism, which is federalism viewed as making for a single whole, is very different from that Bonapartist imperialism, which means autocracy; for its essence is free co-ordination, and the self-government of each co-ordinated part. The British Empire (*q.v.*) is, in a sense, an aspiration rather than a reality, a thought rather than a fact; but, just for that reason, it is like the old Empire of which we have spoken; and though it be neither Roman nor Holy, yet it has, like its prototype, one law, if not the law of Rome—one faith, if not in matters of religion, at any rate in the field of political and social ideals.

AUTHORITIES.—See, in the first place, J. Bryce, *Holy Roman Empire* (1904 edition); J. von Döllinger, article on "The Empire of Charles the Great" (in *Essays on Historical and Literary Subjects*, translated by Margaret Warre, 1894); H. Fisher, *The Medieval Empire* (1898); E. Gibbon, *The Decline and Fall of the Roman Empire*, edited by J. B. Bury. It would be impossible to refer to all the books bearing on the article, but one may select (i.) for the period down to 476, Stuart Jones, *The Roman Empire* (1908), an excellent brief sketch; H. Schiller, *Geschichte der römischen Kaiserzeit* (1883–1888); O. Seeck, *Geschichte des Untergangs der antiken Welt* (Band I., Berlin, 1897–1898, Band II., 1901) (a remarkable and stimulating book); and the two excellent articles on "Imperium" and "Princeps" in Smith's *Dictionary of Greek and Roman Antiquities* (1890); (ii.) for the period from 476 down to 888, T. Hodgkin, *Italy and her Invaders* (1880–1900); F. Gregorovius, *Geschichte der Stadt Rom im Mittelalter* (1886–1894; Eng. trans., London, 1894–1900); E. Lavisse, *Histoire de France*, II. i. (1901); J. B. Bury, *History of the Later Roman Empire* (1889); (iii.) for the Holy Roman Empire of the German nation, W. von Giesebrecht, *Geschichte der deutschen Kaiserzeit* (1881–1890); J. Zeller, *Histoire d'Allemagne* (1872–1891); R. L. Poole, *Illustrations of Medieval Thought* (1884); S. Riezler, *Die literarischen Widersacher der Päpste zur Zeit Ludwigs des Baiers* (1874); J. Jannsen, *Geschichte des deutschen Volkes seit dem Ausgang des Mittelalters* (1885–1894); L. von Ranke, *Deutsche Geschichte im Zeitalter der Reformation* (1839–1847), and *Zur deutschen Geschichte. Vom Religionsfrieden bis zum dreissigjährigen Krieg* (1869); and T. Carlyle, *Frederick the Great* (1872–1873). On the fall of the Roman Empire and the transition to the modern German Empire see Sir J. R. Seeley, *Life and Times of Stein* (1878); H. von Treitschke, *Deutsche Geschichte* (1879–1894); and H. von Sybel, *Die Begründung des deutschen Reichs* (1890–1894, Eng. trans., *The Founding of the Germ. Emp.*, New York, 1890–1891). For institutional history, see R. Schröder, *Lehrbuch der deutschen Rechtsgeschichte* (1894). On the influence of the Holy Roman Empire upon the history of Germany, see J. Ficker, *Das deutsche Kaiserreich* (1861), and *Deutsches Königtum und Kaisertum* (1862); and H. von Sybel, *Die deutsche Nation und das Kaiserreich* (1861). (E. BR.)

EMPIRICISM (from Gr. ἔμπειρος, skilled in, from πεῖρα, experiment), in philosophy, the theory that all knowledge is derived from sense-given data. It is opposed to all forms of intuitionalism, and holds that the mind is originally an absolute blank (*tabula rasa*), on which, as it were, sense-given impressions are mechanically recorded, without any action on the part of the mind. The process by which the mind is thus stored consists of an infinity of individual impressions. The frequent or invariable recurrence of similar series of events gives birth in the mind to what are wrongly called "laws"; in fact, these "laws" are merely statements of experience gathered together by association, and have no other kind of validity. In other words from the empirical standpoint the statement of such a "law" does not contain the word "must"; it merely asserts that such and such series have been invariably observed. In this theory there can strictly be no "causation"; one thing is observed to succeed another, but observations cannot assert that it is "caused" by that thing; it is *post hoc*, but not *propter hoc*. The idea of *necessary* connexion is a purely mental idea, an a priori conception, in which observation of empirical data takes no part; empiricism in ethics likewise does away with the idea of the absolute authority of the moral law as conceived by the intuitionalists. The moral law is merely a collection of rules of conduct based on an infinite number of special cases in which the convenience of society or its rulers has subordinated the inclination of individuals. The fundamental objection to empiricism is that it fails to give an accurate explanation of experience; individual impressions as such are momentary, and their connexion into a body of coherent knowledge presupposes mental action distinct from mere receptivity. Empiricism was characteristic of all early speculation in Greece. During the middle ages the empiric spirit was in abeyance, but it revived from the time of Francis Bacon and was systematized especially in the English philosophers, Locke, Hume, the two Mills, Bentham and the associationist school generally.

See ASSOCIATION OF IDEAS; METAPHYSICS; PSYCHOLOGY; LOGIC; besides the biographies of the empirical philosophers.

In medicine, the term is applied to a school of physicians who, in the time of Celsus and Galen, advocated accurate observation of the phenomena of health and disease in the belief that only by the collection of a vast mass of instances would a true science of medicine be attained. This point of view was carried to extremes by those who discarded all real study, and based their treatment on rules of thumb. Hence the modern sense of empirical as applied to the guess work of an untrained quack or charlatan.

EMPLOYERS' LIABILITY, and WORKMEN'S COMPENSATION.[2] The law of England as to the liability of employers in respect of personal injuries to their servants is regulated partly by the common law and partly by statute; but by the Employers' Liability Act 1880, such exceptions have been grafted upon the common law, and by the Workmen's Compensation Act 1906, principles so alien to the common law have been applied to most employments that it is impossible now to present any view of this branch of the law as a logical whole. All that can be done is to state the nature of the liability at common law.

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[1] This does not, of course, apply to Hungary, which since 1867 has not formed part of the Austrian empire and is ruled by the head of the house of Habsburg not as emperor, but as king of Hungary.

[2] "Employ" comes through Fr. from Lat. *implicare*, to enfold. Late Lat. to direct upon something.

the extension of it effected by the Employers' Liability Act 1880, and the new liabilities introduced by later acts.

Common law.

At common law the liability of a master is of a very limited character. There is, of course, nothing to prevent a master and servant from providing by special contract in any way they please for their mutual rights in cases of personal injury to the servant. In such cases the liability will depend upon the terms of the special contract. But apart from any special agreement, it may be broadly stated that a master is liable to his servants only for injuries caused by his own negligence. Injuries to a servant may arise from accident, from the nature of the service, or from negligence; and this negligence may be of the master, of another servant of the master, or of a stranger. If the injury is purely accidental the loss lies where it falls. If it arises from the nature of the service, the servant must bear it himself; he has undertaken a service to which certain risks are necessarily incident; if he is injured thereby, it is the fortune of war, and no one can be made responsible. If the injury is caused by the negligence of a stranger, the servant has his ordinary remedy against the wrong-doer or any one who is responsible as a principal for the conduct of the wrong-doer. If it is caused by the negligence of a fellow-servant, he likewise has his ordinary remedy against the actual wrong-doer; but, by virtue of what is known as the doctrine of common employment, he cannot at common law make the master liable as a principal. The only case (independently of modern legislation: *see below*) in which he can recover damages from the master is where the injury has been caused by negligence of the master himself. A master is negligent if he fails to exercise that skill and care which, in the circumstances of the particular employment, are used by employers of ordinary skill and carefulness. If he himself takes part in the work, he must act with such skill and care as may reasonably be demanded of one who takes upon himself to do work of that kind. If he entrusts the work to other servants, he must be careful in their selection, and must not negligently employ persons who are incompetent. He must take proper care so to arrange the system of work that his servants are not exposed to unnecessary danger. If tools or machinery are used, he must take proper care to provide such as are fit and proper for the work, and must either himself see that they are maintained in a fit condition or employ competent servants to do so for him. If he is bound by statute to take precautions for the safety of his servants, he must himself see that that obligation is discharged. For breach of any of these duties a master is liable to his servant who is injured thereby, but his liability extends no further.

That his obligations to a servant are so much less than to a stranger is chiefly due to the doctrine of common employment.

Common employment.

As a rule a master is responsible for the negligence of his servant acting in the course of his employment; but, from about the middle of the 19th century, it became firmly rooted in the law that this principle did not apply where the person injured was himself a servant of the master and engaged in a common employment with the servant guilty of the negligence. In effect this rule protects a master as against his servant from the consequences of negligence on the part of any other of his servants; to this there is no qualification, except that, for the rule to apply, both the injured and the negligent servant must be acting in pursuance of a common employment. They must both be working for a common object though not necessarily upon the same work.

It is not easy to define precisely what constitutes a common employment in this sense, and there is peculiarly little judicial authority as to the limit at which work for the same employer ceases to be work in a common employment. It does not depend on difference in grade; all engaged in one business, from the manager to the apprentice, are within the rule. It does not depend on difference in work, if the work each is doing is part of one larger operation; all the servants of a railway company, whether employed on the trains, or at the stations, or on the line, are in a common employment. It does not necessarily depend on difference of locality; a servant who packs goods at the factory and a servant who unpacks them in the shop may well be in a common employment. On the other hand, it is not enough that the two servants are working for the same employer, if there is nothing in common between them except that they are making money for the same man; apart from special circumstances, the crews of two ships owned by the same company are probably not in common employment while navigating their respective ships. The test in each case must be derived from the view, invented by the courts, upon which the doctrine was based, namely, that the servant by entering upon the service consented to run all the risks incidental to it, including the risk of negligence on the part of fellow-servants; if the relation between the two servants is such that the safety of the one may, in the ordinary course of things, be affected by the negligence of the other, that negligence must be taken to be one of the risks of the employment assented to by the servant, and both are engaged in a common employment. In ninety-nine cases out of a hundred it will be found that the doctrine is applicable, and the master protected from liability. It is thus seen that, in general, no action will lie against a master at the suit of his servant, unless the servant can prove personal negligence on the part of the master causing injury to the servant. And in such action the master may avail himself of those defences which he has against a stranger. He may rely upon contributory negligence, and show that the servant was himself negligent, and that, notwithstanding the negligence of the master, the injury was proximately caused by the negligence of the servant. Or (except in cases where the injury results from a breach of a statutory duty) he may prove such facts as establish the defence expressed in the maxim, *volenti non fit injuria*; that is, he may prove that the injured servant knew and appreciated the particular risk he was running, and incurred it voluntarily with full understanding of its nature. Mere knowledge on the part of the servant, or even his continuing to work with knowledge, does not necessarily establish this defence; it must be knowledge of such a kind and in such circumstances that it can be inferred that the servant contracted to take the risk upon himself. The action at common law is subject to the general rule that personal actions die with the person; except so far as the remedy for money loss caused by death by negligence has been preserved in favour of a husband or wife and certain near relatives, under Lord Campbell's Act (Fatal Accidents Act 1846).

The act of 1880.

Such was the law up to 1880. So long as industry was conducted on a small scale, and the master worked with his men, or was himself the manager, its hardship was perhaps little felt; his personal negligence could in many cases be established. But with the development of the factory system, and the ever-growing expansion of the scale on which all industries were conducted, it became increasingly difficult to bring home individual responsibility to the employer. As industry passed largely into the control of corporations, difficulty became almost impossibility. The employer was not liable to a servant for the negligence of a fellow-servant, and therefore, in most cases of injury, was not liable at all. It is not surprising that the condition of things thus brought about, partly by the growth of modern industry and partly by the decisions of the courts, caused grave dissatisfaction. The justice of the doctrine of common employment was vigorously called in question. In the result the Employers' Liability Act 1880 was passed. The effect of this act is to destroy the defence of common employment in certain specified cases. It does not abolish the doctrine altogether, nor, on the other hand, does it impose upon the master any new standard of duty which does not exist as regards strangers. All that it does is to place the servant, in certain cases, in the position of a stranger, making the master liable for the negligence of his servants notwithstanding the fact that they are in common employment with the servant injured. It is still necessary under the act, as at common law, to prove negligence, and the master may still rely upon the defences of contributory negligence and *volenti non fit injuria.* But under the act he cannot, as against the workmen who come within it and in the cases to which it applies, set up the defence that the negligence complained of was the negligence of a servant in a common employment. The act does not apply to all servants. It does not apply to domestic or menial servants, or to seamen, or to any except railway servants and "any person who, being a labourer, servant in husbandry, journeyman, artificer, handicraftsman, miner, or otherwise engaged in *manual* labour . . . has entered into or works under a contract with an employer, whether the contract be oral or in writing, and be a contract of service or a contract personally to execute any work or labour." Whether a servant, not being one of those specially named, is within the act depends on whether manual labour is the real and substantial employment, or whether it is merely incidental thereto; thus a carman who handles the goods he carries may be within the act, but a tramcar driver or an omnibus conductor is not. The act does not make the master liable for the negligence of all his servants, but, speaking generally, only for the negligent discharge of their duties by such as are entrusted with the supervision of machinery and plant, or with superintendence, or the power of giving orders, with the addition, in the case of a railway, of the negligence of those who are given the charge or control of signals, points, locomotive engines or trains. The cases dealt with by the act are five in number; in the first and fourth the words are wide enough to include negligence of the employer himself, for which, as has been seen, he is liable at common law. In such instances the workman has an alternative remedy either at common law or under the act, but in all other respects the rights given by the act are new, being limitations upon the defence of common employment, and can be enforced only under the act.

The first case is where the injury is caused by reason of any defect in the condition of the ways, works, machinery or plant connected with or used in the business of the employer, provided that such defect arises from, or has not been discovered or remedied owing to the negligence of the employer, or of some person in the service of the employer and entrusted by him with the duty of seeing that the ways, works, machinery or plant are in proper condition. The second case is where the injury is caused by reason of the negligence of any person in the service of the employer who has any superintendence entrusted to him (that is, a person whose sole or principal duty is that of superintendence, and who is not ordinarily engaged in manual labour) whilst in the exercise of such superintendence. The third case is where the injury is caused by reason of the negligence of any person in the service of the employer to whose orders or directions the workman at the time of the injury is bound to conform and does conform, where such injury results from his so conforming. The fourth case is where the injury is caused by reason of the act or omission of any person in the service of the employer done or made in obedience to the rules or by-laws of the employer, or in obedience to particular instructions given by any person delegated with the authority of the employer in that behalf, provided that the injury results from some impropriety or defect in such rules, by-laws or instructions. The fifth case is where the injury is caused by reason of the negligence of any person in the service of the employer who has the charge or control of any signal, points, locomotive engine or train upon a railway.

In all these cases it is provided that the employer shall not be liable if it can be shown that the workman knew of the defect or negligence which caused his injury, and failed within a reasonable time to give, or cause to be given, information thereof to the employer or some person superior to himself in the service of the employer, unless he was aware that the employer or such superior already knew of the said defect or negligence. It was inevitable that these provisions should call for judicial interpretation, and a considerable body of authority has grown up about the act. Where general words are used, it must always occur that, between the cases which are obviously within and those which are obviously without the words, there are many on the border line. Thus, under the act, the courts have been called upon to determine the precise meaning of "way," "works," "machinery," "plant," and to say what is precisely meant by a "defect" in the condition of each of them. They have had to say what is included in "railway" and in "train," what is meant by having "charge" or "control," and to what extent one whose principal duty is superintendence may participate in manual labour without losing his character of superintendent, and what is the precise meaning of negligence in superintendence. These are only illustrations of many points of detail which, having called for judicial interpretation, will be found fully dealt with in the text-books on the subject. A workman who, being within the act, is injured by such negligence of a fellow-servant as is included in one or other of the five cases mentioned above, has against his employer the remedies which the act gives him. These are not necessarily the same as those which a stranger would have in the like circumstances; the amount of compensation is not left at large for a jury to determine, but is limited to an amount not exceeding such sum as may be found to be equivalent to the estimated earnings, during the three years preceding the injury, of a person in the same grade employed during those years in the like employment and in the district in which the workman is employed at the time of the injury. Moreover, the right to recover is hedged about with technicalities which are unknown at the common law; proceedings must be taken in the county court, within a strictly limited time, and are maintainable only if certain elaborate provisions as to notice of injury have been complied with. Where the injury causes death the action is maintainable for the benefit of the like persons as are entitled under Lord Campbell's act in an action at common law.

The law continued in this condition up to 1897. In the majority of cases of injury to a servant, the doctrine of common employment still protected the master; and where, under the Employers' Liability Act, it failed to do so, the liability was of a limited character and often, owing to technicalities of procedure, difficult to enforce. Moreover, there is nothing in the act to prevent master and servant from entering into any special contract they please; and in many trades it became a common practice for contracts to be made wholly excluding the operation of the act. In 1893 an attempt was made to alter the law by a total abolition of the defence of common employment, so as to make a master as liable to a servant as to a stranger for the negligence of any of his servants acting in the course of their employment, and at the same time to prohibit any agreements to forego the rights so given to the servant. The bill did not become law, and no further change was made until, in 1897, parliament took the first step in what has been a complete revolution in the law of employers' liability. Up to that year, as has been seen, the foundation of a master's liability was negligence, either of the master himself, or, in certain cases, of his servants. But by the Workmen's Compensation Act 1897, a new principle was introduced, whereby certain servants in certain employments were given a right to compensation for injuries, wholly irrespective of any consideration of negligence or contributory negligence. As regards such servants in such employments the master was in effect made an insurer against accidental injuries. The act was confessedly tentative and partial; it dealt only with selected industries, and even within these industries was not of universal application. But where it did apply, it gave a right to a limited compensation in every case of injury by accident arising out of and in the course of the employment, whether that accident had been brought about by negligence or not, and whether the injured servant had or had not contributed to it by his own negligence.

Acts of 1897 to 1906.

The act applied only to employment on, or in, or about certain localities where, at the same time, the employer was what the act called an "undertaker," that is, the person whose business was there being carried on. If we wanted to know whether a workman was within the act, we had to ask, first, was he employed on, or in, or about a railway, or a factory, or a mine, or a quarry, or an engineering shop, or a building of the kind mentioned in the act; secondly, was he employed by one who was, in relation to that railway, &c., the undertaker as defined by the act; and thirdly, was he at the time of the accident at work on, or in, or about that railway, &c. Unless these three conditions were fulfilled the employment was not within the act.

The employments to which the act applied comprised railways, factories (which included docks, warehouses and steam laundries), mines, engineering works and most kinds of buildings. "Workman" included every person engaged in an employment to which the act applied, whether by manual labour or otherwise, and whether his agreement was one of service or apprenticeship or otherwise, expressed or implied, oral or in writing.

By the Workmen's Compensation Act 1900, the benefits of the act of 1897 were extended to agricultural labourers.

The Workmen's Compensation Act 1906 (which came into force on the 1st of July 1907) extended the right of compensation for injuries practically to all persons in service, and also introduced many provisions not contained in the acts of 1897 and 1900 (repealed). It does not apply to persons in the naval or military service of the crown (s. 9), or persons employed otherwise than by way of manual labour whose remuneration exceeds two hundred and fifty pounds a year, or persons whose employment is of a casual nature, and who are employed otherwise than for the purposes of the employer's trade or business, or members of a police force, or out-workers, or members of the employer's family dwelling in his house. But it expressely applies to seamen.

Conditions of claim.

To entitle a workman engaged in an employment to which the act applies to compensation all the following conditions must be fulfilled: (1) There must be personal injury by accident. This will exclude injury wilfully inflicted, unless the injury results in death or serious and permanent disablement, but the act introduces a new provision by making the suspension or disablement from work or death caused by certain industrial diseases "accidents" within the meaning of the act. The industrial diseases specified in the 3rd schedule of the act were anthrax, ankylostomiasis, and lead, mercury, phosphorus and arsenic poisoning or their sequelae. But § 8 of the act authorized the secretary of state to make orders from time to time including other industrial diseases, and such orders have embraced glass workers' cataract, telegraphists' cramp, eczematous ulceration of the skin produced by dust or liquid, ulceration of the mucous membrane of the nose or mouth produced by dust, &c. To render the employer liable the workman must either obtain a certificate of disablement or be suspended or die by reason of the disease. If the disease has been contracted by a gradual process, all the employers who have employed the workman during the previous twelve months in the employment to which the disease was due are liable to contribute a share of the compensation to the employer primarily liable. (2) The accident must arise out of and in the course of the employment. In each case it will have to be determined whether the workman was at the time of the accident in the course of his employment, and whether the accident arose out of the employment. It will have to be considered when and where the particular employment began and ended. Other difficulties have arisen and will frequently arise when the workman at the time of the accident is doing something which is no part of the work he is employed to do So far as the decisions have gone, they indicate that if what the workman is doing is no act of service, but merely for his own pleasure, or if he is improperly meddling with that which is no part of his work, the accident does not arise out of and in the course of his employment; but if, while on his master's work, he upon an emergency acts in his master's interest, though what he does is no part of the work he is employed to do, the accident does arise out of and in the course of his employment. (3) The injury must be such as disables the workman for a period of at least one week from earning full wages at the work at which he was employed. (4) Notice of the accident must be given as soon as practicable after the happening thereof, and before the workman has voluntarily left the employment in which he was injured; and the claim for compensation (by which is meant notice that he claims compensation under the act addressed by the workman to the employer) must be made within six months from the occurrence of the accident or, in case of death, from the time of death. Want of notice of the accident or defects in it are not to be a bar to proceedings, if occasioned by mistake or other reasonable cause, and the employer is not prejudiced thereby. But want of notice of a claim for compensation is a bar to proceedings, unless the employer by his conduct has estopped himself from relying upon it. (5) An injured workman must, if so required by the employer, submit himself to medical examination.

When these conditions are fulfilled, an employer who is within the act has no answer unless he can prove that the injury arose from the serious and wilful misconduct of the workman. The precise effect of these terms is not clear; but mere negligence is not within them.

Where the injury causes death, the right to compensation belongs to the workman's "dependents"; that is, such of the members of the workman's family as were at the time of the death wholly or in part dependent upon the earnings of the workman for their maintenance. "Members of a family" means wife or husband, father, mother, grandfather, grandmother, step-father, step-mother, son, daughter, grandson, granddaughter, step-son, step-daughter, brother, sister, half brother, half-sister. The act of 1906 makes also a very remarkable departure in including illegitimate relations in the direct line among "dependents," for where a workman, being the parent or grandparent of an illegitimate child, leaves such a child dependent upon his earnings, or, being an illegitimate child, leaves a parent or grandparent so dependent upon his earnings, such child or parent is to be included in the "members of a family."

Amount.

Under the act compensation is for loss of wages only, and is, as has been said, based upon the actual previous earnings of the injured workman in the employment of the employers for whom he is working at the time of the injury. In case of death, if the workman leaves dependents who were wholly dependent on his earnings, the amount recovered is a sum equal to his earnings in the employment of the same employer during the three years next preceding the injury, or the sum of £150, whichever is the larger, but not exceeding £300; if the period of his employment by the same employer has been less than three years, then the amount of his earnings during the three years is to be deemed to be 156 times his average weekly earnings during the period of his actual employment under the said employer. If the workman leaves only dependents who were not wholly dependent, the amount recovered is such sum as may be reasonable and proportionate to the injury to them, but not exceeding the amount payable in the previous case. If the workman leaves no dependents, the amount recoverable is the reasonable expenses of his medical attendance and burial, not exceeding £10. In case of total or partial incapacity for work resulting from the injury, what is recovered is a weekly payment during the incapacity after the second week not exceeding 50% of the workman's average weekly earnings during the previous twelve months, if he has been so long employed, but if not, then for any less period during which he has been in the continuous employment of the same employer; such weekly payment is not to exceed £1—and in fixing it regard is to be had to the difference between the amount of his average weekly earnings before the accident and the average amount which he is able to earn after the accident. Any payments, not being wages, made by the employer in respect of the injury must also be taken into account. The weekly payment may from time to time be reviewed at the request of either party, upon evidence of a change in the circumstances since the award was made, and after six months may be redeemed by the employer by payment of a lump sum. A workman is within the act although at the time of the injury he has been in the employment for less than two weeks, and although there are no actual earnings from the same employer upon which a weekly average can be computed. But how are the average weekly earnings which he would have earned from the same employer to be estimated? The question must be determined as one of fact by reference to all the circumstances of the particular case. Suppose the workman to be engaged at six shillings a day and injured on the first day. If it can be inferred that he would have remained in such employment for a whole week, his average weekly earnings from the same employer may be taken at thirty shillings. If it can be inferred that he would have worked one day and no more, his average weekly earnings from the same employer may be taken at six shillings.

All questions as to liability or otherwise under the act, if not settled by agreement, are referred to arbitration in accordance with a scheme prescribed by the act. Contracting out is not permitted, save in one event: where a scheme of compensation, benefit or insurance for the workmen of an employer has been certified by the Registrar of Friendly Societies to be not less favourable to the workmen and their dependents than the provisions of the act, and that where the scheme provides for contributions by the workmen, it confers benefits at least equal to those contributions, in addition to the benefits to which the workmen would have been entitled under the act, and that a majority (to be ascertained by ballot) of the workmen to whom the scheme is applicable are in favour of it, the employer may contract with any of his workmen that the provisions of the scheme shall be substituted for the act; such certificate may not be for more than five years, and may in certain circumstances be revoked. The act does not touch the workman's rights at common law or under the Employers' Liability Act, but the workman, if more than one remedy is open to him, can enforce only one. When the circumstances create a legal liability in some other person, *e.g.* where the injury is caused by the negligence of a sub-contractor or of a stranger, in such cases the employer, if required to pay compensation under the act, is entitled to be indemnified by such other person.

Under the Factory Acts, offences, when they result in death or bodily injury to health, may be punished by fine not exceeding £100, and the whole or any part of such fine may be applied for the benefit of the injured person or his family, or otherwise as the secretary of state determines. Similar provisions occur in the Mines Acts. Any sum so applied must be taken into account in estimating compensation under the Employers' Liability and Workmen's Compensation Acts.

Germany.

Law in Other Countries.—In *Germany* (*q.v.*) there is a system of compulsory state insurance against accidents to workmen. The law dates from 1884, being amended from time to time (1885, 1886, 1887, 1900, 1903) to embrace different classes of employment. Occupations are grouped into (1) industry; (2) agriculture; (3) building; (4) marine, to all of which one general law, with variations necessary to the particular occupation in question, is applicable. There are also special provisions for prisoners and government officials. Practically every kind of working-man is thus included, with the exception of domestic servants and artisans or labourers working on their own account. All workmen and officials whose salary does not exceed £150 a year come within the law. No compensation is payable where an accident is caused through a person's own gross carelessness, and where an accident has been contributed to by a criminal act or intentional wrongdoing the compensation may be refused or only partially allowed. With these exceptions, compensation for injury is payable in case of injury so long as the injured is unfit to work; in case of total incapacity an allowance is made equal to two-thirds of the injured person's annual earnings, in case of partial incapacity, in proportion to the degree that his wage-earning capacity has been affected. In case of death the compensation is either burial money or an allowance to the family varying in amount from 20 to 60% of the annual earnings according to circumstances. The provision of compensation for accidents falls entirely upon employers, and in order to lighten the burden thus falling upon them, and at the same time to guard against the possible insolvency of an individual employer, associations or self-administering bodies of employers have been formed—usually all the employers of each particular branch of industry in a district. These associations fix the amount of compensation after each accident, and at the end of the year assess the amount upon the individual employers. There is an appeal from the association to an arbitration court, and in particularly complicated cases there may be a further appeal to the imperial insurance department. No allowance is paid until after the lapse of thirteen weeks from the accident, and in the meantime the injured person is supported from a sick fund to which the employers contribute one-third, the employee contributing two-thirds. In Germany quite twelve millions of workpeople are insured; in 1905 a sum of nearly eight millions sterling was paid for accidents, and a million and a half to the families of those killed in accidents.

Austria.

In *Austria* the compulsory insurance of workmen was provided for by a law of 1887, with subsequent amendments. Briefly, nearly every class of industrial worker is included under the Austrian law, which is administered by special territorial insurance institutions, each of them embracing particular classes of industries or workers. The institutions are managed by committees, one-third of the members of each committee being chosen by the minister of the interior, one-third by the employers and one-third by the workers. Compensation is payable, in case of accidents, on a scale proportionate to the injured person's wages during the preceding year. In case of death, a certain sum is paid for funeral expenses, an annuity to the widow, if one is left, equal to 20% of the deceased's annual wages—if the widow remarries, she receives a lump sum equal to three annual payments in liquidation of the annuity—an annuity to each legitimate child equal to 15%, or, if the child has no mother, equal to 20% of the father's wages; an annuity to the father or mother, if dependent on the deceased for support, equal to 20% of the annual wages. As in the English act of 1906 illegitimate children are recognized by being granted an annuity in the case of the death of a father equal to 10% of his wages. In no case can the total amount of the annuities exceed 50% of the deceased's annual wages. Where the accident has resulted in total incapacity, the workman receives an annuity equal to 60% of his wages. No allowance is paid until after the fourth week, during which time the injured is supported by the sick-insurance institutions. The provision for the system is raised by contributions to the extent of nine-tenths by the employers and one-tenth by the workers, deducted from their wages. Instead of the German method by which an annual payment equal to the amount disbursed is required from each employer, he is required to provide the full amount necessary for the complete payment of the pension, this amount being placed to the credit of a special insurance fund.

France.

In *France* a system of compulsory state insurance against accidents was created by a law of 1898. The principal feature in the French law is the attempt to meet the possible insolvency of the employer by the establishment of a special guarantee fund, created by a small addition to the "business tax" (*contribution des patentes*), and, in the case of the mining industry, by a small tax on mines.

Norway.

Norway, by a law of 1894, amended in 1897 and 1899, adopted a system of compulsory insurance modelled to a great extent on the German system. Instead, however, of a trade association as in Germany, or a district insurance association as in Austria, there is a government insurance office, in which employers have to insure their workmen.

Denmark.

In *Denmark* a law was passed in 1897 rendering employers personally liable for the amount of compensation for accidents, but employers may relieve themselves of this liability by insuring workmen in an assurance association approved of by the minister of the interior. This course, however, is discretionary with employers.

Italy.

In *Italy*, although many attempts were made between 1889 and 1898 to introduce a system of compulsory insurance, it was not until the latter year that the principle was adopted. There is a National Bank for the Insurance of Working men against Accident (*Cassa Nazionale di Assicurazione per gli infortuni degli operaji sul lavoro*), created under a law of 1883. It has special privileges, such as exemption from taxation and the employment of the branch offices of the state post-office savings bank as local offices. Under the law of 1898 there is a primary obligation on the employer to insure his workmen with the National Bank, but he may, if he prefers, insure with other societies approved by government. Employers employing about five hundred workmen may, instead of insuring, establish a fund for the payment of not less than the statutory compensation, subject to giving adequate security for the sufficiency of the fund. Exemption from compulsory insurance is granted to employers who have established a mutual insurance association, which must comply with certain prescribed conditions. Railway companies, also, are exempt, if they have relief funds which conform with the provisions of the act.

Spain.

In *Spain* an act of the 30th of January 1900, adopted the principle of the personal responsibility of the employer for accidents to workmen other than those due to *vis major*. The act also lays down regulations for preventing accidents in dangerous trades, and releases the employer from personal liability on effecting adequate insurance of his workmen with an approved insurance company.

Holland has adopted the principle of compulsory insurance by a law of the 2nd of January 1901. An employer has to pay the necessary premium to the State Insurance Office, or by depositing adequate security with the State Office he may

Holland.

undertake the payment of the prescribed compensation himself. Or he may transfer his liability to an insurance company, provided the company deposit adequate security with the State Office. The State Insurance Office is under the management of directors appointed by the crown, and decides on all questions as to compensation; there is also a "Supervisory Board" of the State Office with joint representation of employers and workmen. There is an appeal from the State Office to Councils of Appeal, and from them to a National Board of Appeal.

Greece.

Greece has a law of the 21st of February 1901, providing for compensation for accidents causing incapacity of more than four days' duration to workmen in mines, quarries and smelting works. The employer is exclusively liable for such compensation and for medical expenses during the first three months; after that time he is liable for one-half, the other half being borne by a miners' provident fund, supported by certain taxes on the properties affected, fines, &c.

Sweden.

By a law of the 5th of July 1901, *Sweden* adopted the principle of the personal liability of the employer for industrial accidents. The employer can, however, insure himself against liability in the Royal Insurance Institute. Compensation bcomes payable after the expiration of sixty days from the date of the accident.

Russia.

Russia has a law which came into force on the 1st of January 1904. Under this law employers in certain specified industries are bound to indemnify workers for incapacity of more than three days' duration due to injury arising out of their work. Employers are exempt from liability by insuring their workmen in insurance companies whose terms are not less favourable than those laid down by the law.

Belgium.

Belgium passed a law dealing with industrial accidents on the 24th of December 1903. It adopts the principle of the personal liability of the employer in certain specified trades or industries. There is a power of extension to such other undertakings as may be declared dangerous by the Commission on Labour Accidents. Employers may exempt themselves from their liability by contracting for the payment of compensation by an insurance company approved by the government or by the National Savings and Pension Fund. Where an employer does not so contract, he must (with certain exemptions) contribute to a special insurance fund. The law of 1903 also established a permanent Commission on Labour Accidents.

Switzerland.

Switzerland in 1899 adopted a law providing for accident insurance, but it was defeated on referendum in May 1900.

United States.

In the *United States* the law mainly depends on the doctrine of common employment, and the extent to which this doctrine is applied varies considerably in the different states, more particularly as to who are and who are not to be regarded as fellow-servants. The tendency, however, has been to increase the liability of the employer for the negligence of a fellow-servant, and in the case of employment on railways many states have passed laws either modifying or abrogating the doctrine. Colorado, by a law of 1901, has entirely abrogated it; and Alabama, Massachusetts and New York have laws generally similar to the English act of 1880. But the greatest departure, due to the initiative of President Roosevelt, has been the passing by the Federal Congress of the laws of April 22 and May 30, 1908, one giving damages to injured employees of interstate carriers by railroad, and common carriers by railroad in Territories, the District of Columbia, the Canal Zone and other territory governed by Congress, and the other giving regular wages for not more than one year to injured employees of the U.S. government in arsenals, navy yards, construction work on rivers, harbours and fortifications, hazardous work in connexion with the Panama Canal or Reclamation Service, and in government manufacturing establishments. These national laws, which were intended to serve as an example to the states, specifically provided for employers' liability and for the non-recognition of the doctrine of common employment.

British Colonies.

Most of the British colonial states have adopted the principle of the English Workmen's Compensation Act of 1897, and the various colonial acts are closely modelled on the English act, with more or less important variations in detail. The New Zealand Act was passed in 1900, and amended in 1901, 1902, 1903 and 1905. The act of 1905 (No. 50) fixes the minimum compensation for total *or partial* disablement at £1 a week when the worker's previous remuneration was not less than 30s. a week. South Australia passed a Workmen's Compensation Act in 1900 and Western Australia one in 1902. New South Wales passed one in 1905, and British Columbia in 1902.

EMPOLI, a town of Tuscany, Italy, in the province of Florence, from which it is 20 m. W. by S. by rail. Pop. (1901) 7005 (town); 20,301 (commune). It is situated 89 ft. above sea-level, to the S. of the Arno. The principal church, the Collegiata, or Pieve di S. Andrea, founded in 1093, still preserves the lower part of the original arcaded façade in black, white and coloured marble. The works of art which it once contained are most of them preserved in a gallery close by. Some of the other churches contain interesting works of art. The principal square is surrounded by old houses with arcades. The painter Jacopo Chimenti (Jacopo da Empoli), 1554–1640, was born here. Empoli is on the main railway line from Florence to Pisa, and is the point of divergence of a line to Siena.

EMPORIA, a city and the county-seat of Lyon county, Kansas, U.S.A., on the Neosho river, about 60 m. S.W. of Topeka. Pop. (1890) 7551; (1900) 8223, of whom 686 were foreign-born and 663 were negroes; (1910 U.S. census) 9058. It is served by the Atchison, Topeka & Santa Fé, and the Missouri, Kansas & Texas railways. The city has a Carnegie library, and is the seat of the state normal school and of the College of Emporia (Presbyterian; 1883). Emporia's industrial interests are mainly centred in commerce with the surrounding farming region; but there are small flour mills, machine shops, foundries and other manufacturing establishments,—in 1905 the value of the factory product was $571,601. The municipality owns and operates the water-works and the electric-lighting plant. Emporia was settled in 1856 and was chartered as a city in 1870. The Emporia *Gazette*, established in 1890, was purchased in 1894 by William Allen White (b. 1868), a native of Emporia, who took over the editorship and made a great stir in 1896 by his editorial entitled "What's the matter with Kansas?"; he also wrote several volumes of excellent short stories, particularly *The Court of Boyville* (1889), *Stratagems and Spoils* (1901) and *In Our Town* (1906).

EMPORIUM (a Latin adaptation of the Gr. *ἐμπόριον*, from *ἐν*, in, and stem of *πορεύεσθαι*, to travel for purpose of trade) a trade-centre such as a commercial city, to which buyers and dealers resort for transaction of business from all parts of the world. The word is often applied to a large shop.

EMPSON, SIR RICHARD (d. 1510), minister of Henry VII., king of England, was a son of Peter Empson, an influential inhabitant of Towcester. Educated as a lawyer he soon attained considerable success in his profession, and in 1491 was one of the members of parliament for Northamptonshire and speaker of the House of Commons. Early in the reign of Henry VII. he became associated with Edmund Dudley (*q.v.*) in carrying out the king's rigorous and arbitrary system of taxation, and in consequence he became very unpopular. Retaining the royal favour, however, he was made a knight in 1504, and was soon high steward of the university of Cambridge, and chancellor of the duchy of Lancaster; but his official career ended with Henry's death in April 1509. Thrown into prison by order of the new king, Henry VIII., he was charged, like Dudley, with the crime of constructive treason, and was convicted at Northampton in October 1509. His attainder by the parliament followed, and he was beheaded on the 17th or 18th of August 1510. Empson left, so far as is known, a family of two sons and four daughters, and about 1513 his estates were restored to his elder son, Thomas.

See Francis Bacon, *History of Henry VII.* edited by J. R. Lumby (Cambridge, 1881); and J. S. Brewer, *The Reign of Henry VIII.* edited by J. Gairdner (London, 1884).

EMPYEMA (from Gr. ἐν, within, and πῦον, pus), a term in medicine applied to an accumulation of purulent fluid within the cavity of the pleura (see LUNG: *Surgery*).

EMPYREAN (from the Med. Lat. *empyreus*, an adaptation of the Gr. *ἔμπυρος*, in or on the fire, *πῦρ*), the place in the highest heaven, which in ancient cosmologies was supposed to be occupied by the element of fire. It was thus used as a name for the firmament, and in Christian literature for the dwelling-place of God and the blessed, and as the source of light. The word is used both as a substantive and as an adjective. Having the same Greek origin are the scientific words "empyreuma" and "empyreumatic," applied to the characteristic smell of burning or charring vegetable or animal matter.

EMS, a river of Germany, rising on the south slope of the Teutoburger Wald, at an altitude of 358 ft., and flowing generally north-west and north through Westphalia and Hanover to the east side of the Dollart, immediately south of Emden. After passing through the Dollart the navigable stream bifurcates, the eastern Ems going to the east, and the western Ems to the west, of the island of Borkum to the North Sea. Length, 200 m. Between 1892 and 1899 the river was canalized along its right bank for a distance of 43 m. At the same time, and as part of the same general plan, a canal, the DORTMUND-EMS CANAL, was dug to connect the river (from Münster) with Herne in the Westphalian coal-field. At Henrichenburg a branch from Herne (5 m. long) connects with another branch from Dortmund (10½ m. long). Another branch, from Olfen (north of Dortmund), connects with Duisburg, and so with the Rhine. There is, however, a difference in elevation of 46 ft. between the two branches first named, and vessels are transferred from the one to the other by means of a huge lift. The canal, which was constructed to carry small steamers and boats up to 220 ft. in length and 750 tons burden, measures 169 m. in length, of which 108½ m. were actually dug, and cost altogether £3,728,750. The surface width throughout is 98½ ft., the bottom width 59 ft., and the depth 8⅛ ft.

See Victor Kurs, "Die künstlichen Wasserstrassen des deutschen Reichs," in *Geog. Zeitschrift* (1898), pp. 601-617 and 665-694; and *Deutsche Rundschau f. Geog. und Stat.* (1898), pp. 130-131.

EMS, a town and watering-place of Germany, in the Prussian province of Hesse-Nassau, romantically situated on both banks of the Lahn, in a valley surrounded by wooded mountains and vine-clad hills, 11 m. E. from Coblenz on the railway to Cassel and Berlin. Pop. 6500. It has two Evangelical, a Roman Catholic, an English and a Russian church. There is some mining industry (silver and lead). Ems is one of the most delightful and fashionable watering-places of Europe. Its waters—hot alkaline springs about twenty in number—are used both for drinking and bathing, and are efficacious in chronic nervous disorders, feminine complaints and affections of the liver and respiratory organs. On the right bank of the river lies the Kursaal with pretty gardens. A stone let into the promenade close by marks the spot where, on the 13th of July 1870, King William of Prussia had the famous interview with the French ambassador Count Benedetti (*q.v.*) which resulted in the war of 1870–1871. A funicular railway runs up to the Malberg (1000 ft.), where is a sanatorium and whence extensive views are obtained over the Rhine valley. Ems is largely frequented in the summer months by visitors from all parts of the world—the numbers amounting to about 11,000 annually—and many handsome villas have been erected for their accommodation. In August 1786 Ems was the scene of the conference of the delegates of the four German archbishops, known as the congress of Ems, which issued (August 25) in the famous joint pronouncement, known as the Punctation of Ems, against the interference of the papacy in the affairs of the Catholic Church in Germany (see FEBRONIANISM).

See Vogler, *Ems, seine Heilquellen, Kureinrichtungen*, &c. (Ems, 1888); and Hess, *Zur Geschichte der Stadt Ems* (Ems, 1895).

EMSER, JEROME, or HIERONYMUS (1477–1527), antagonist of Luther, was born of a good family at Ulm on the 20th of March 1477. He studied Greek at Tübingen and jurisprudence at Basel, and after acting for three years as chaplain and secretary to Raymond Peraudi, cardinal of Gurk, he began lecturing on classics in 1504 at Erfurt, where Luther may have been among his audience. In the same year he became secretary to Duke George of Albertine Saxony, who, unlike his cousin Frederick the Wise, the elector of Ernestine Saxony, remained the stanchest defender of Roman Catholicism among the princes of northern Germany. Duke George at this time was bent on securing the canonization of Bishop Benno of Meissen, and at his instance Emser travelled through Saxony and Bohemia in search of materials for a life of Benno, which he subsequently published in German and Latin. In pursuit of the same object he made an unsuccessful visit to Rome in 1510. Meanwhile he had also been lecturing on classics at Leipzig, but gradually turned his attention to theology and canon law. A prebend at Dresden (1509) and another at Meissen, which he obtained through Duke George's influence, gave him means and leisure to pursue his studies.

At first Emser was on the side of the reformers, but like his patron he desired a practical reformation of the clergy without any doctrinal breach with the past or the church; and his liberal sympathies were mainly humanistic, like those of Erasmus and others who parted company with Luther after 1519. As late as that year Luther referred to him as "Emser noster," but the disputation at Leipzig in that year completed the breach between them. Emser warned his Bohemian friends against Luther, and Luther retorted with an attack on Emser which outdid in scurrility all his polemical writings. Emser, who was further embittered by an attack of the Leipzig students, imitated Luther's violence, and asserted that Luther's whole crusade originated in nothing more than enmity to the Dominicans. Luther's reply was to burn Emser's books along with Leo X.'s bull of excommunication.

Emser next, in 1521, published an attack on Luther's "Appeal to the German Nobility," and eight works followed from his pen in the controversy, in which he defended the Roman doctrine of the Mass and the primacy of the pope. At Duke George's instance he prepared, in 1523, a German translation of Henry VIII.'s "Assertio Septem Sacramentorum contra Lutherum," and criticized Luther's "New Testament." He also entered into a controversy with Zwingli. He took an active part in organizing a reformed Roman Catholic Church in Germany, and in 1527 published a German version of the New Testament as a counterblast to Luther's. He died on the 8th of November in that year and was buried at Dresden.

Emser was a vigorous controversialist, and next to Eck the most eminent of the German divines who stood by the old church. But he was hardly a great scholar; the errors he detected in Luther's New Testament were for the most part legitimate variations from the Vulgate, and his own version is merely Luther's adapted to Vulgate requirements.

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ENAMEL (formerly "amel," derived through the Fr. *amail*, *esmal*, *esmail*, from a Latin word *smaltum*, first found in a 9th-century life of Leo IV.), a term, strictly speaking, given to the hard vitreous compound, which is "fused" upon the surface of metallic objects either for the purpose of decoration or utility. This compound is a form of glass made of silica, minium and potash, which is stained by the chemical combination of various metallic oxides whilst in a melted condition in the crucible. This strict application of the term was widened to signify the metal object coated with enamel, so that to-day the term "an enamel" generally implies a work of art in enamel upon metal. The composition of the substance enamel which is used upon metal does not vary to any great extent from the enamels employed upon pottery and faience. But they differ in this respect, that the pottery enamel is usually applied to the “biscuit” surface of the ware in a raw state; that is, the compound has not been previously “run down” or vitrified in the crucible by heat, as is the case with enamelling upon metal, although, in most of the enamelled iron advertisement tablets, the enamel is in the raw state and is treated in a similar manner to that employed upon pottery.

Examination of the enamels upon brick of the Assyrians shows that they were applied unvitrified. It was upon pottery and brick that the ancient Egyptians and Assyrians achieved their greatest work in enamelling. For as yet no work of such magnificence as the great enamelled walls of the palace of Rameses III. at Tell el-Yehudia in the Delta of the Nile, or the palace of Nimrod in Babylon, has been discovered upon metal of any kind. But there were gold ornaments and jewelry enamelled of noble design in opaque turquoise, cobalt, emerald green and purple, some of which can be seen at the British Museum and the Louvre. An example is shown in Plate I. fig. 3.

In the subsequent Greek and Roman civilizations enamel was also applied to articles of personal adornment. Many pieces of jewelry, exquisite in workmanship, have been found. But a greater application was made of it by the Greek sculptors in the 4th and 5th centuries B.C. For we find, in many instances, that not only were the eyes made of enamel—which (artistically speaking) is a somewhat doubtful manner of employing it,—as in the fine bronze head found at Anticythera (Cerigotto) in 1902, but in the colossal figure of Zeus for the temple at Olympia made by Pheidias the gold drapery was gorgeously enamelled with figures and flowers. This wonderful work by the greatest sculptor the world has ever seen was destroyed, as so many priceless works of art in enamel have been: doubtless on account of the precious metal upon which they were made. It was in all probability the crowning triumph of a long series of essays in this material. The art of ancient Rome lacked the inspiration of Greece, being mainly confined to copying Greek forms and style, and in the case of enamelling it did not depart from this attitude. But the Roman and Etruscan glass has many beautiful qualities of form and colour that do not seem entirely borrowed, and the enamel work upon them so far as we can discern is of graceful design and rich colour. No doubt, were it not, as has been remarked, for the fact that enamelling was generally done upon gold and silver, there would still be many works to testify to the art of that period. Such as there are, however, show a rare appreciation of enamel as a beautiful material. With the decline of this civilization the art of enamelling probably died out. For it has ever been one of those exquisite arts which exist only under the sunshine of an opulent luxurious time or sheltered from the rude winds of a poorer age by the affluence of patrons. The next time we hear of it is in an oft-quoted passage (*c.* A.D. 240) from the writings of the great sophist Philostratus, who says (*Icones*, i. 28):—“It is said that the barbarians in the ocean pour these colours into bronze moulds, that the colours become as hard as stone, preserving the designs,”—a more or less inaccurate description of the process of *champlevé*. This has been understood (from an interpretation given to a passage in the commentary on it by Olearius) to refer to the Celts of the British Islands. It also goes to prove that enamelling was not practised at this day in Greece. We have no British enamels to show so early as this, but belonging to a later period, from the 6th to the 9th century, a number of the finest gold and bronze ornaments, horse trappings, shields, fibulae and ciboria have been discovered of Celtic and Saxon make. The Saxon work has nothing to show so exquisitely wrought as that found in Ireland, where one or two pieces are to be seen now in the Dublin Museum, notably the Ardagh chalice and some gold brooches. In the chalice the enamel is of a minute inlaid character, and appears to have been made first in the form of a multi-colour bead, which was fused to the surface of its setting, and then polished down. Many of the pieces seem to have been made after this fashion, which does not speak very highly of the technical knowledge of enamelling, but it is none the less true enamelling of an elementary character. The shield at the British Museum has an inlay of red enamel which is remarkable in its quality. For centuries such a fine opaque red has not been discovered. An example of Irish work is shown in Plate II. fig. 10.

From Ireland the art was transferred to Byzantium, which is to be seen by the close resemblance of method, style, design and colour. The style and design changed in course of time, but the craft remained. It was at Byzantium that it flourished for several centuries.

The finest work we know of belonging to this period is the Pala d’Oro at St Mark’s, Venice, believed to have been brought from Constantinople to Venice about 1105. This magnificent altar-piece is in *cloisonné* enamel. A typical example is the ciborium and chalice belonging to the South Kensington loan collection. The design entirely covers the whole of the surface in one rich mass composed of circular or vesica-shaped medallions filled with sacred subjects and foliated scrolls. These are engraved and enamelled, and the metal bands of the scrolls and figures are engraved and gilt. The characteristic quality of the colour scheme is that it is composed almost wholly of primaries. Red, blue and yellow predominate, with a little white and black. Occasionally the secondaries, green and purple, are used, but through the whole period of Byzantine enamelling there is a total absence of what to-day is termed “subtle colouring.” The arrangement of the enamels is also distinct, in that the divisions of the colours are not always made by the cloison, but are frequently laid in side by side without the adjoining colours mingling or running together whilst being melted. For instance, in a leaf pattern or in the drapery, the dress may be cobalt, heightened with turquoise or green. Thus it is interesting to observe that the artist employed the metal dividing lines frequently for the sake of aesthetic result, and was not much hampered by technical difficulties. This was the rule when opaque enamels were used. It is also worthy of remark that these opaque enamels differ from those in common use to-day, in that they are not nearly so opaque. This quality, together with a dull, instead of a highly polished surface, gives a much softer appearance to the enamels. Again, the whole tone of the enamels is darker and richer. Many examples of Byzantine work (see fig. 1.) are to be seen in the public and private art collections throughout Europe. They are principally upon ecclesiastical objects, missal covers, croziers, chalices, ciboria, pyx, candlesticks, crosses and tabernacles. In most instances the enamels are made in separate little plates rudely fastened with nails, screws or rivets to a metal or wooden foundation. Theophilus, a monk of the 13th century, describes the process of enamelling as it was understood by the Byzantines of his time, which probably differed but little from earlier methods. The design and drawing of the figures in Byzantine enamels is similar to the mosaic and carving. The figures are treated entirely as decorations, with scarcely ever the least semblance of expression, although here and there an intention of piety or sorrow is to be descried through the awkward postures in which they

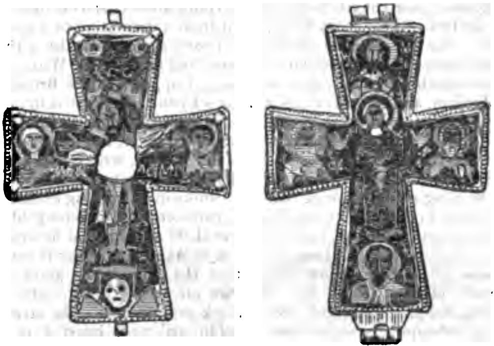

FIG. 1.—Byzantine Cloisonné Cross (*c.* 11th century) (South Kensington Museum).

are placed. In spite of this, the sense of decorative design, the simplicity of conception, the strength of the general character, and the richness of the colour, places this period as one of the finest which the art of enamelling has seen, and it leads us to lay stress upon the principle that the simplest methods in design and manipulation attain a higher end than those which are elaborate and intricate. It might be asserted with truth that this style never arrived at the degree of delicacy and refinement of later styles. But the refinement was often at the expense of higher qualities.

The next great application of these kinds of enamelling was at Cologne, for there we find not only the renowned work of Nicolas of Verdun, the altar front at Klosterneuberg, which consists of fifty plates in *champlevé* enamel, but in that Rhenish province there are many shrines of magnificent conception. From here the secrets of the craft were taken to Limoges, where the greatest activity was displayed, as numerous examples are found throughout England, France and Spain, which no doubt were made there (see Plate I. fig. 6.) But no new method or distinct advance is to be noticed, during these successive revivals at Byzantium, Cologne or Limoges, and it is to early 14th-century Italy that we owe one of the most beautiful developments, that of the process subsequently called *basse-taille*, which signifies a low-cut relief upon which transparent enamel is fused.

In this process enamelling passed from a decorative to a fine art. For it demanded the highest knowledge of an artist with the consummate skill of both sculptor and enameller. Witness the superb gold cup, called the King's Cup, now in the British Museum, and the silver cup at King's Lynn. The first is in an excellent state of preservation, as it is upon gold, but the latter, like most of the ancient enamelling upon silver, has lost most of its enamel. This was due—as the present writer believes after much experiment—to the impurity of the silver employed. The King's Cup is one of the finest works in enamelling extant. It consists of a gold cup and cover, hammered out of pure gold; and around the bowl, base and cover there are bands of figures, illustrating the scenes from the life of St Agnes. The hands and faces are of pale jasper, which over the carved gold gives a beautiful flesh tone. The draperies are in most resplendent ruby, sapphire, emerald, ivory, black and orange. The stem was subsequently altered by an additional piece inserted and enamelled with Tudor roses. It is a work of the 13th century, and belonged to Jean, duc de Berry, who gave it to his nephew, Charles VI. of France, in 1391. It afterwards came into the possession of the kings of England, from Henry VI. to James I., who gave it to Don Juan Velasco, constable of Castile. It was purchased by subscription with the aid of the treasury for the British Museum.

Other well-known pieces are the silver horn in the possession of the marquess of Aylesbury, and the crozier of William of Wykeham at New College, Oxford. The discovery about the same time of the process called *plique-à-jour* forms another most interesting and beautiful development. Owing to the difficulty of its manufacture and its extreme fragility there are very few examples left. One of the finest specimens is now at the Victoria and Albert Museum, South Kensington. It is in the form of two bands of emerald green enamel which decorate a silver beaker. They are in the form of little stained glass windows, the cloisons forming (as it were) the leads. These fine cloisons and shapes are most correct in form, and the whole piece shows a perfection of craftsmanship rarely equalled.

The end of the 15th century saw a development in enamelling which was not only remarkable, but revolutionary in its method. For until then the whole theory of enamelling had been that it relied upon the enclosing edges of the metal or the cloison to hold it to the metal ground and in part to preserve it in the shape of the pattern, much in the same way as a setting holds a stone or a jewel. All the enamel before this date had been sunk into cells or cloisons. Two discoveries were made; first, that enamels could be made which require no enclosing ribbon of metal, but that merely the enamel should be fused on both sides of the metal object; secondly, that after an enamel had been fused to a surface of metal, another could be superimposed and fused to the first layer without any danger of separation from each or from the metal ground. It is true that such processes had been employed upon glass on which enamel had been applied, as well as upon pottery; and it is probably due to the influence of a knowledge of both enamelling upon metal and upon glass or pottery that the discovery was made.

In most of these enamel paintings the subject was laid on with a white enamel upon a dark ground. The white was modulated; so that possessing a slight degree of translucency, it was grey in the thin parts and white in the thick. Thus was obtained a certain amount of light and shade. This gave the process called *grisaille*. But strange to say, it was not until a later period that this was practised alone, and then the modelling of the figures and draperies became very elaborate. At first it was only done in a slight degree, just sufficiently to give expression and to add to the richness of the form. For the enamellers were thinking of a plate upon which to put their wonderful colours, and not only of form. The painting in white was therefore invariably coloured with enamels. Probably the earliest painter in enamel was Nardon Pénicaud, many of whose works (one of them, dated 1503, is in the Cluny Museum) have been preserved with great care. He had many followers, the most distinguished of whom was Léonard Limosin (*i.e.* of Limoges). He excelled in portraiture. Examples of his work (between 1532 and 1574) are to be found in most of the larger public and private collections. Léonard Limosin and his Limoges contemporaries were very largely addicted to the employment of foil, which became too largely used, thus spoiling their otherwise fine serious work.

The family of Jean Pénicaud, Jean Court de Vigier, Pierre Raymond and Pierre Courteys were all great names of artists who excelled in the *grisaille* process. *Grisaille* is similar to *pâte-sur-pâte* in pottery, and depends for its attractive quality entirely upon form and composition. No comparison should be made with enamels in colour, for they occupy a different category—similar to cameo.

The casket shown in Plate II. fig. 9 is by Jean Pénicaud. It is a fine example of the enamelling in this style, very beautiful in colour. The hands and faces are in opaque white enamel; the draperies, garlands and flowers are in transparent green, turquoise blue, purple and cobalt over foil. The background is in transparent violet over white enamel ground, which is *semé* with gold stars. The draperies are also heightened with gold.

One of the most marvellous pieces of brilliant craft is the missal cover (Plate I. fig. 5) at the South Kensington Museum, said to have belonged to Henrietta Maria, queen of Charles I. The subjects are the "Creation of Adam and Eve" and the "Fountain of Youth." It is about 4 in. by 7 when opened out. The enamel is encrusted upon the figures, ornament and flowers which are beaten up in pure gold into high relief. The extraordinary minuteness and skill of handling, and the extreme brilliancy of the enamels, which are as brilliant to-day as on the day they were made, together form one of the unique specimens of art craftsmanship of the world. To the subdued taste of to-day, however, the effect is tawdry. The conception and design are also alike unworthy of the execution.

Since the Assyrian and Egyptian civilizations, there has been a succession of luxurious developments followed by lapses into the decline and death of the art of enamelling upon metals. In each revival there has been something added to that which was known and practised before. The last revival took place five hundred years ago, accompanying the rebirth of learning and the arts; but after flourishing for over a century, the art gradually fell into disuse, and remained so until the recent revival and further development. The development consists, first, in the more complete knowledge of the technical processes, following upon the great advances which science has made; and secondly, in a finer and more subtly artistic treatment of them. The advance in technical knowledge comprises greater facility and perfection in the production of the substance enamel.

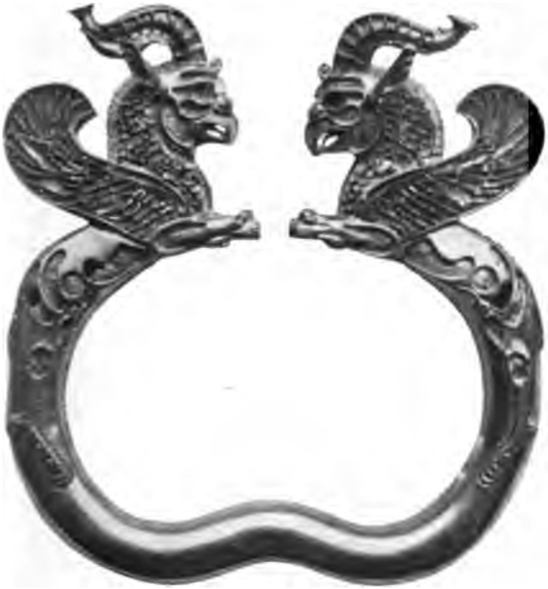

Fig. 3.—Graeco-Bactrian Gold Amulet, showing the gold strip for setting stones, which exemplifies the manner in which the cloisons are soldered for cloisonné.

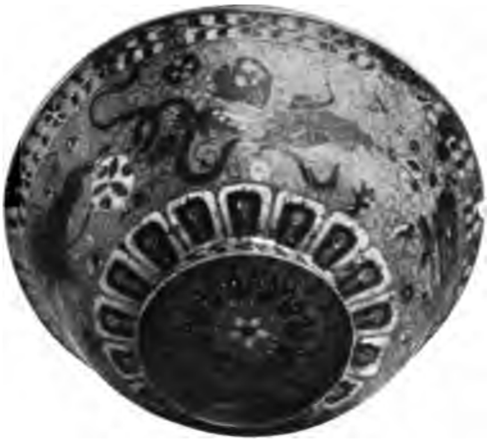

Fig. 4.—Chinese Cloisonné Bowl.

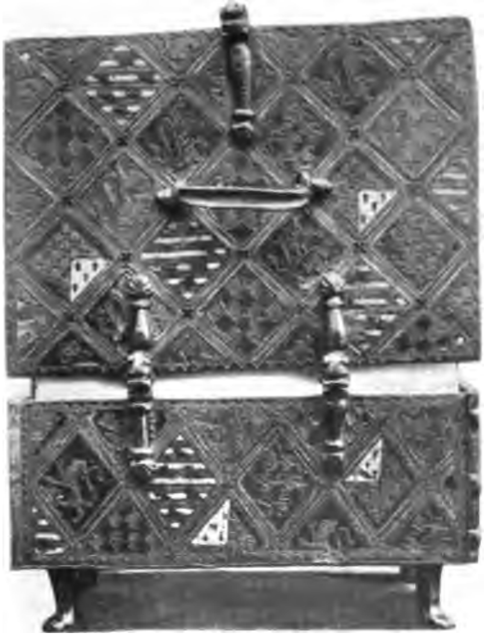

Fig. 6.—Box in Copper Partly Enamelled in Opaque Enamels Champlevé with Coats of Arms. (13th century, English or German. South Kensington Museum.)

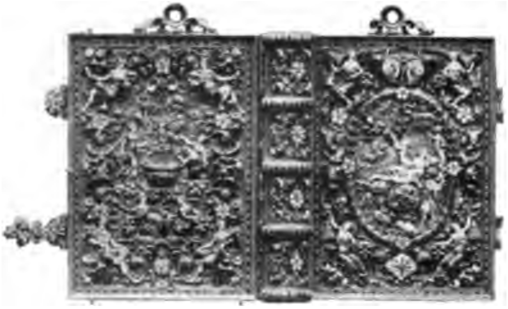

Fig. 5.—Missal Cover, encrusted Enamel. (French, 17th century. Debased style.)

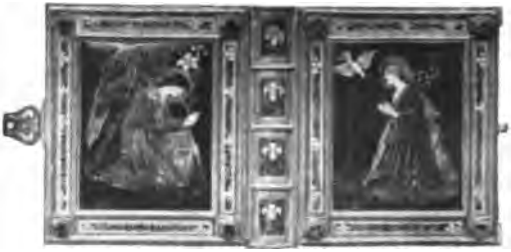

Fig. 7.—Prayer-Book Cover in Enamel and Silver Gilt, set with Rubies and Emeralds, by Alexander Fisher. (Size, closed, 4x3 in.)

ENAMELS

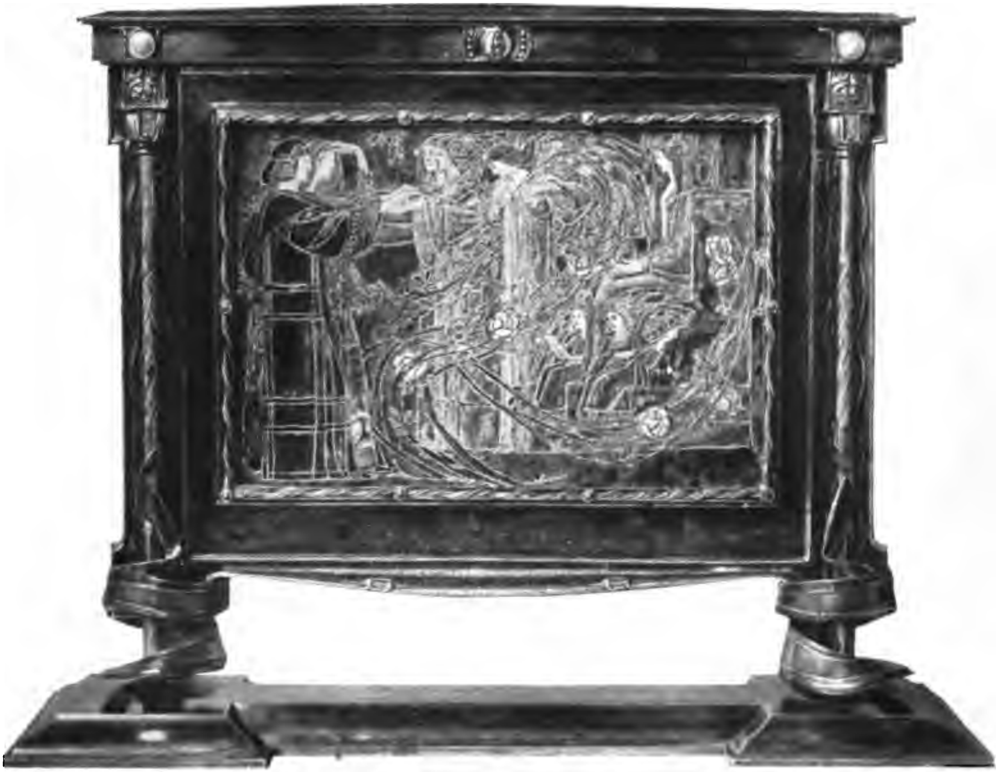

Fig. 8.—Overmantel (24x18½ in.) in Champlevé Enamel on Silver. Subject: The Garden of the Soul by Alexander Fisher.

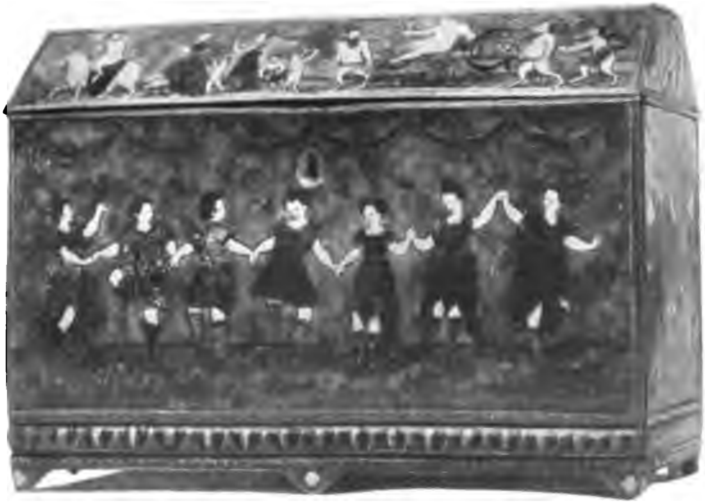

Fig. 9.—Painted Enamel Casket by Jean Pénicaud. (16th century.)

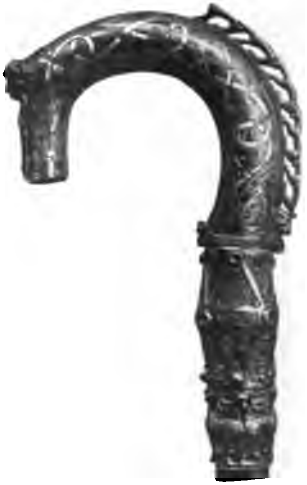

Fig. 10.—Celtic Champlevé Enamelled Crozier. (Irish, 9th century.)

and its subsequent application to metal surfaces; more intimate knowledge of metals and their alloys to which it is applied, and greater ease in obtaining them from the metalliferous ores and reducing them to suitable dimensions and surfaces. For instance, it is now a simple matter to obtain perfectly pure copper by means of electricity. Again, formerly a flat sheet of metal was obtained by hammering, which involved an infinite amount of hard labour, whereas it is accomplished to-day with ease by means of flatting and rolling mills: *i.e.* after the metal has been obtained from the ore in the form of an ingot, it is stretched equally to any degree of thinness by steel rollers. Further, the furnaces have been greatly improved by the introduction of gas and electricity as the heating power, instead of the wood or charcoal employed.

In the manufacture of the substance enamel a much greater advance has been made, for whereas the colours, and consequently the schemes of colour, were extremely limited, we now possess an infinite gradation in the colours, as well as the transparency and opacity, the hardness and softness of enamels. There are only two colours which cannot yet be obtained; these are opaque vermilion and lemon yellow in a vitrified state. Many of the colours we now employ were not known by enamellers such as Léonard Limosin. Our enamels are also perfect in purity, brilliancy and durability, qualities which are largely due to the perfect knowledge of the proportion of parts composing an enamel and their complete combination. It is this complete combination, together with the absence of any destructible matter, which gives the enamel its lasting quality.

The base of enamel is a clear, colourless, transparent vitreous compound called flux, which is composed of silica, minium and potash. This flux or base—termed *fondant* in France—is coloured by the addition of oxides of metals while in a state of fusion, which stain the flux throughout its mass. Enamels are either hard or soft, according to the proportion of the silica to the other parts in its composition. They are termed hard when the temperature required to fuse them is very high. The harder the enamel the less liable is it to be affected by atmospheric agencies, which in soft enamels produce a decomposition of the surface first and ultimately of the whole enamel. It is therefore advisable to use hard enamels in all cases. This involves the employment of pure—or almost pure—metals for the plates, which are in most respects the best to receive and retain the enamel. For if there is an excess of alloy, either the metal will possibly melt before the enamel is fused or afterwards they will part company. To the inferior quality of old silver may be attributed the fact that in all cases the enamel has flown off it; if it has not yet wholly disappeared it will scale off in time. It is therefore essential that metals should be pure and the enamels hard. It is also noteworthy that enamels composed of a great amount of soda or potash, as compared with those wherein red lead is in greater proportion, are more liable to crack and have less cohesion to the metals. It is better not to use silver as a base, although it is capable of reflecting a higher and more brilliant white light than any other metal. Fine gold and pure copper as thin as possible are the best metals upon which to enamel. If silver is to be used, it should be fine silver, treated in the methods called *champlevé* and *cloisonné*.

The brilliancy of the substance enamel depends upon the perfect combination and proportion of its component parts. The intimacy of the combination depends upon an equal temperature being maintained throughout its fusion in the crucible. For this purpose it is better to obtain a flux which has been already fused and most carefully prepared, and afterwards to add the colouring oxides, which stain it dark or light according to the amount of oxide introduced. Many of the enamels are changed in colour by the difference of the proportion of the parts composing the flux, rather than by the change of the oxides. For instance, turquoise blue is obtained from the black oxide of copper by using a comparatively large proportion of carbonate of soda, and a yellow green from the same oxide by increasing the proportionate amount of the red lead. All transparent enamels are made opaque by the addition of calx, which is a mixture of tin and lead calcined. White enamel is made by the addition of stannic and arsenious acids to the flux. The amount of acid regulates the density or opacity of the enamel.

To elucidate the development which has occurred, it will be necessary to describe some of the processes. After the enamel has been procured in the lump, the next stage in the process, common to all methods of enamelling, is to pulverize it. To do this properly the enamel must first be placed in an agate mortar and covered with water; next, with a wooden mallet a number of sharp blows must be given to a pestle held vertically over the enamel, to break it; then holding the mortar firmly in the left hand, the pestle must be rotated with the right, with as much pressure as possible on the enamel, grinding it until the particles are reduced to a fine grain. The powder is then subjected to a series of washings in distilled water, until all the floury particles are removed. After this the metal is cleaned by immersion in acid and water. For copper, nitric acid is used; for silver, sulphuric, and for gold hydrochloric acid. All trace of acid is then removed, first by scratching with a brush and water, and finally by drying in warm oak sawdust. After this the pulverized enamel is carefully and evenly spread over those parts of the metal designed to receive it, in sufficient thickness just to cover them and no more. The piece is then dried in front of the furnace, and when dry is placed gently on a fire-clay or iron *planche*, and introduced carefully into the muffle of the furnace, which is heated to a bright pale red. It is now attentively watched until the enamel shines all over, when it is withdrawn from the furnace. The firing of enamel, unlike that of glass or pottery, takes only a few minutes, and in nearly all processes no annealing is required.

The following are the different modes of enamelling: *champlevé, cloisonné, basse-taille, plique-à-jour, painted enamel, encrusted,* and *miniature-painted.* These processes were known at successive periods of ancient art in the order in which they are named. To-day they are known in their entirety. Each has been largely developed and improved. No new method has been discovered, although variations have been introduced into all. The most important are those connected with painted enamels, encrusted enamels and *plique-à-jour.*

Champlevé enamelling is done by cutting away troughs or cells in the plate, leaving a metal line raised between them, which forms the outline of the design. In these cells the pulverized enamel is laid and then fused; afterwards it is filed with a corundum file; then smoothed with a pumice stone and polished by means of crocus powder and rouge. An example is shown in Plate II. fig. 8.

In *cloisonné enamel*, upon a metal plate or shape, thin metal strips are bent to the outline of the pattern, then fixed by silver solder or by the enamel itself. These strips form a raised outline, giving cells as in the case of *champlevé*. The rest of the process is identical with that of *champlevé* enamelling. An example is shown in Plate I. fig. 4.

The *basse-taille* process is also a combination of metal work in the form of engraving, carving and enamelling. The metal, either silver or gold, is engraved with a design, and then carved into a bas-relief (below the general surface of the metal like an Egyptian bas-relief) so that when the enamel is fused it is level with the uncarved parts of the design enamel, and the design shows through the transparent enamel.

Painted enamels are different from any of these processes both in method and in result. The metal in this case is either copper, silver or gold, but usually copper. It is cut with shears into a plate of the size required, and slightly domed with a burnisher or hammer, after which it is cleaned by acid and water. Then the enamel is laid equally over the whole surface both back and front, and afterwards "fired." The first coat of enamel being fixed, the design is carried out, first by laying it in white enamel or any other which is opaque and most advantageous for subsequent coloration.

In the case of a *grisaille painted enamel* the white is mixed with water or turpentine, or spike oil of lavender, or essential oil of petroleum (according to the taste of the artist) and the white is painted thickly in the light parts and thinly in the grey ones, whereby a slight sense of relief is obtained and a great degree of light and shade.

In *coloured painted enamels* the white is coloured by transparent enamels spread over the *grisaille* treatment, parts of which when fired are heightened by touches of gold, usually painted in lines. Other parts can be made more brilliant by the use of foil, over which the transparent enamels are placed and then fired. An example is shown in Plate I. fig. 7.

Enamels by the *plique-à-jour* method might be best described as *translucent cloisonné* enamels; for they are similar to *cloisonné*, except that the ground upon which they are fired is removed, thus making them transparent like stained glass.

Two new processes have been the subject of the present writer's study and experiment for several years, which he has lately brought to fruition. The first is an inlay of transparent enamels similar to *plique-à-jour* without cloisons to divide the colours. For if enamels do not run together whilst in a melted state, as is seen in the case of painted and *basse-taille* enamels, there should be no necessity for it in this process. The result is a clear transparent subject in colour. The other process consists of a coloured enamel relief. It resembles the della Robbia relief, with this important difference, that the colour of the enamel by its nature permeates the whole depth of the relief, whereas in the della Robbia ware it is only on the surface. It also has a fresco surface, instead of one highly glazed. The quality of the enamel is as rare and unlike anything else as it is beautiful. It is in point of fact the only coloured sculpture in which the whole of its parts are one solid homogeneous mass, and through which the colour is one with the substance and is not applied. The process consists of the shapes of the various parts of the relief being selected for the different enamels, and these enamels melted together, in the mould of the relief, which is finished with lapidary's tools.

Miniature enamel painting is not true enamelling, for after the white enamel is fired upon the gold plate, the colours used are not vitreous compounds—not enamels in fact—as is the case in any other form of metal enamelling; but they are either raw oxides or other forms of metal, with a little flux added, not combined. These colours are painted on the white enamel, and afterwards made to adhere to the surface by partially fusing the enamel, which when in a state of partial fusion becomes viscous.

There are many of these so-called enamels to-day, which are much easier of accomplishment than the true enamel, but they possess none of the beautiful quality of the latter. It is most apparent when parts of a work are true enamels and parts are done in the manner described above. These enamel paintings on enamel are afterwards coated over with a transparent flux, which gives them a surface of enamel. Many are done in this way for the market.

All these methods were used formerly, before the present revival; but they were not so completely understood or carried so far as they are to-day. Nor were the whole methods practised by any artist as they are now. The greatest advance has been in painted enamels. This process requires that both sides of the metal plate shall be covered with enamel; for this reason the plate is made convex on the top, so that the concave side does not touch the *planche* on which it is supported for firing, but rests on its edges throughout. There are several reasons why these plates are *bombé*, the principal one being that in the firing they resist the tendency to warp and curl up at the edges as a flat thin plate would do. Further, the enamel having been fused to both sides is not so liable to crack or to splint in subsequent firings. This is most important, for otherwise the white which is placed on afterwards would be a network of cracks. The manner of firing has also to do with this, but not nearly so much as the preliminary care and mechanical perfection with which a plate is prepared. Nearly all the old enamels are seen to be cracked in the white if minutely examined. To obviate this the following points must be observed: The plate must be of an excellent quality of metal, equal in thickness throughout, and perfectly regular in shape. It must be arched equally from end to end. The first coat of enamel must be of a perfectly regular equal thickness on both sides, entirely covering the plate. Whatever the medium employed in painting the white on to the enamel, it must be completely evaporated before the plate is placed in the furnace. The furnace must be heated to a bright red heat, and the *planche* must be red-hot before being taken out for the enamel to be placed upon it, and then quickly returned to the furnace and the muffle door shut tight so as to allow no draught of cool air to enter it. Then as soon as it has begun to fuse, which if a small piece, it would do in a minute or so, the muffle door is slightly opened to afford a view of it. As soon as it shines all over its surface, it is withdrawn from the muffle.

The method of laying a white upon the enamel ground is a matter of individual taste, so far as the medium is concerned. By some, pure distilled water is preferred to any other liquid for mixing the enamel. Otherwise, turpentine and the fat oil of turpentine, as well as spike oil of lavender. The oil mixture takes longer to dry, and thus gives a greater chance for modelling into fine shades than the water. But it has several drawbacks. Firstly, there is the difficulty of drying the oil out—a process which takes some time and increases the risk of cracking in the drying process; and secondly, the enamel is not so fresh and clear after it is fired as when pure water has been employed. Besides there is a great difference in the result; the water involves a quick, decided, direct touch and method, which carries with it its own charm. The oil medium, besides giving an effect of laborious rounded stippled surfaces, is apt partly to reduce the enamel, thus giving it a dull surface. The coloration of the white is comparatively simple and is done by transparent enamels finely ground and evenly spread over the white after the latter has been fused. The only danger to be avoided is that of over-firing, which is produced by too great heat of a prolonged duration of firing, which causes the stannic and arsenious acids in the white to volatilize.

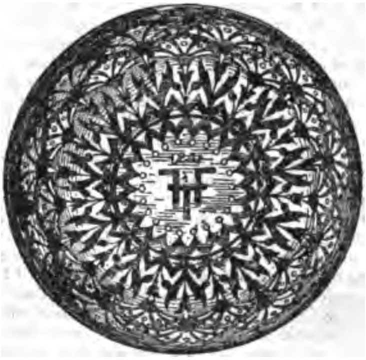

FIG. 2.—Modern French plique-à-jour bowl, by Fernand Thesmar.

Plique-à-jour enamelling is done in the same way as *cloisonné* enamelling, except that the wires or strips of metal which enclose the enamel are not soldered to the metal base, but are soldered to each other only. Then these are simply placed upon a sheet of platinum, copper, silver, gold or hard brass, which, after the enamel is fused and sufficiently annealed and cooled, is easily removed. For small pieces of *plique-à-jour* there is no necessity to apply any metallic base, as the particles of enamel quickly fuse, become viscous, and when drawn out set quite hard. Neither is there any need for annealing, as would be the case in larger work. For an example, see fig. 2.

Commercially there has lately been an activity in enamels such as has never before occurred. This has been the case throughout Europe, Japan and the United States of America. In London there has been a demand for a cheap form of gaudy coloured enamel, fused into sunk spaces of metal obtained by stamping with a steel die; this has been applied to small objects of cheap jewelry, in the form of brooches, bracelets and the like. There has also been a great demand for enamel watch-cases and small pendants, done mainly by hand, of a better class of work. Many of these have been produced in Birmingham, Berlin, Paris and London. In Paris copies of pictures in black and white enamel, with a little gold paint in the draperies and background, have been manufactured in very large quantities and sometimes of great dimensions. Another curious demand, followed by as astonishing a production, is that of the imitations (a harder name for which is "forgeries") of old enamels, made with much skill, giving all the technical excellence of the originals, even to the cracks and scratches incidental to age. These are duly signed, and will deceive the most expert. They are copies of enamels by Nardon and Jean Pénicaud, Léonard Limosin, Pierre Raymond, Courtois and others. The same artificers also produce copies of old Chinese *cloisonné* and *champlevé* enamels, as well as old Battersea enamel snuff-boxes, patch-boxes, and indeed every kind of enamelling formerly practised. It is advisable for the collector never to purchase any piece of enamelling as the work of an old master without having a pedigree extending at least over forty years. From Japan there has been a continuous flow of *cloisonné* enamelled vases, boxes and plates, either entirely covered with enamel or applied in parts. Compared with this enormous output, only a few small pieces of jewelry have come from Jaipur and other towns in India. There has also been a great quantity of *plique-à-jour* enamelling manufactured in Russia, Norway and Sweden. And finally, it has been used in an unprecedented manner in large pieces upon iron and copper for purposes of advertisement.

Amongst the chief workers in the modern revival of this art are Claudius Popelin, Alfred Meyer, Paul Grandhomme, Fernand Thesmar, Hubert von Herkomer and Alexander Fisher. The work of Claudius Popelin is characterized by good technical skill, correctness, and a careful copying of the work of the old masters. Consequently it suffers from a lack of invention and individuality. His work was devoted to the rendering of mythological subjects and fanciful portraits of historical people. Alfred Meyer and Grandhomme are both accomplished and careful enamellers; the former is a painter enameller and the author of a book dealing technically with enamelling. Grandhomme paints mythological subjects and portraits in a very tender manner, with considerably more artistic feeling than either Meyer or Popelin. There is a specimen of his work in the Luxemburg Museum. Fernand Thesmar is the great reviver of *plique-à-jour* enamelling in France. Specimens of his work are possessed by the art museums throughout Europe, and one is to be seen in the Victoria and Albert Museum, London. They are principally valued on account of their perfect technical achievement. Lucien Falize was an employer of artists and craftsmen, and to him we are indebted for the production of specimens of *basse-taille* enamel upon silver and gold, as well as for a book reviewing the revival of the art in France, bearing particularly on the work of Claudius Popelin. Until within recent years there was a clear division between the art and the crafts in the system of producing art objects. The artist was one person and the workman another. It is now acknowledged that the artist must also be the craftsman, especially in the higher branches of enamelling. M. Falize initiated the production of a gold cup which was enamelled in the *basse-taille* manner. The band of figures was designed by Olivier Merson, the painter, and carved by a metal carver and enamelled by an enameller, both able craftsmen employed by M. Falize. Other pieces of enamelling in *champlevé* and *cloisonné* were also produced under his supervision and on this system, therefore lacking the one quality which would make them complete as an expression of artistic emotion by the artist's own hands. M. René Lalique is among the jewellers who have applied enamelling to their work in a peculiarly technically perfect manner. In England, Professor Hubert von Herkomer has produced painted enamels of considerable dimensions, aiming at the execution of pictures in enamel, such as have been generally regarded as peculiar to the province of oil or water-colour painting. Among numerous works is a large shield, into which plaques of enamel are inserted, as well as several portraits, one of which, made in several pieces, is 6 ft. high—a portrait of the emperor William II. of Germany. The present writer rediscovered the making of many enamels, the secrets of which had been jealously guarded. He has worked in all these processes, developing them from the art side, and helping to make enamelling not only a decorative adjunct to metal-work, but raising it to a fine art. His work may be seen in the Victoria and Albert Museum, and Brussels Museum. Others who have been enamelling with success in various branches, and who have shown individuality in their work, are Mr John Eyre, Mrs Nelson Dawson, Miss Hart.

Literature.—Among older books on enamelling, apart from the works of Neri and Benvenuto Cellini, are J.-P. Ferrand, *L'Art du feu, ou de peindre en émail* (1721); Labarte, *Recherches sur la peinture en émail* (Paris, 1856); Marquis de Laborde, *Notice des émaux du Louvre* (Paris, 1852); Reboulleau, *Nouveau manuel complet de la peinture en verre, sur porcelaine et sur émail* (ed. by Magnier, Paris, 1866); Claudius Popelin, *L'Émail des peintres* (Paris, 1866); Emil Molinier, *Dictionnaire des émailleurs* (1885). Among useful recent books are H. Cunynghame's *Art of Enamelling on Metals* (1906); L. Falize, *Claudius Popelin et la renaissance des émaux peints*; L. Dalpayrat, *Limoges Enamels*; Alexander Fisher, *The Art of Enamelling upon Metal* (1906, "The Studio," London). (A. Fi.*).

ENCAENIA, a festival commemorating a dedication, in Greek τὰ ἐγκαίνια (καινός, new), particularly used of the anniversary of the dedication of a church (see Dedication). The term is also used at the university of Oxford of the annual Commemoration, held in June, of founders and benefactors (see Oxford)

ENCAUSTIC PAINTING. The name *encaustic* (from the Greek for "burnt in") is applied to paintings executed with vehicles in which wax is the chief ingredient. The term was appropriately applied to the ancient methods of painting in wax, because these required heat to effect them. Wax may be used as a vehicle for painting without heat being requisite; nevertheless the ancient term *encaustic* has been retained, and is indiscriminately applied to all methods of painting in wax. The durability of wax, and its power of resisting the effects of the atmosphere, were well known to the Greeks, who used it for the protection of their sculptures. As a vehicle for painting it was commonly employed by them and by the Romans and Egyptians; but in recent times it has met with only a limited application. Of modern encaustic paintings those by Schnorr in the Residenz at Munich are the most important. Modern paintings in wax, in their chromatic range and in their general effect, occupy a middle place between those executed in oil and in fresco. Wax painting is not so easy as oil, but presents fewer technical difficulties than fresco.

Ancient authors often make mention of *encaustic*, which, if it had been described by the word *inurere*, to burn in, one might have supposed to have been a species of enamel painting. But the expressions "incausto pingere," "pictura encaustica," "ceris pingere," "pictura inurere," used by Pliny and other ancient writers, make it clear that some other species of painting is meant. Pliny distinguishes three species of encaustic painting. In the first they used a stylus, and painted either on ivory or on polished wood, previously saturated with some certain colour; the point of the stylus or stigma served for this operation, and its broad or blade end cleared off the small filaments which arose from the outlines made by the stylus in the wax preparation. In the second method it appears that the wax colours, being prepared beforehand, and formed into small cylinders for use, were smoothly spread by the spatula after the outlines were determined, and thus the picture was proceeded with and finished. By the side of the painter stood a brazier which was used to heat the spatula and probably the prepared colours. This is the method which was probably used by the painters who decorated the houses of Herculaneum and of Pompeii, as artists practising this method of painting are depicted in the decorations. The third method was by painting by a brush dipped into wax liquefied by heat; the colours so applied attained considerable hardness, and could not be damaged either by the heat of the sun or by the effects of sea-water. It was thus that ships were decorated; and this kind of encaustic was therefore styled "ship-painting."

About the year 1749 Count Caylus and J. J. Bachelier, a painter, made some experiments in encaustic painting, and the count undertook to explain an obscure passage in Pliny, supposed to be the following (xxxv. 39):—"Ceris pingere ac picturam inurere quis primus excogitaverit non constat. Quidam Aristidis inventum putant, postea consummatum a Praxitele; sed aliquanto vetustiores encausticae picturae exstitere, ut Polygnoti et Nicanoris et Arcesilai Pariorum. Lysippus quoque Aeginae picturae suae inscripsit ἐνέκαυσεν, quod profecto non fecisset nisi encaustica inventa." There are other passages in Pliny bearing upon this subject, in one of which (xxi. 49) he gives an account of the preparation of "Punica cera." The nature of this Punic wax, which was the essential ingredient of the ancient painting in encaustic, has not been definitely ascertained. The chevalier Lorgna, who investigated the subject in a small but valuable tract, asserts that the *nitron* which Pliny mentions is not the nitre of the moderns, but the *natron* of the ancients, viz. the native salt which is found crystallized in Egypt and other hot countries in sands surrounding lakes of salt water. This substance the Carthaginians, according to Pliny, used in preparing their wax, and hence the name Punic seems to be derived. Lorgna made a number of experiments with this salt, using from three to twenty parts of white melted wax with one of natron. He held the mixture in an iron vessel over a slow fire, stirring it gently with a wooden spatula, till the mass assumed the consistency of butter and the colour of milk. He then removed it from the fire, and put it in the shade in the open air to harden. The wax being cooled liquefied in water, and a milky emulsion resulted from it like that which could be made with the best Venetian soap.

Experiments, it is said, were made with this wax in painting in encaustic in the apartments of the Count Giovanni Battista Gasola by the Italian painter Antonio Paccheri, who dissolved the Punic wax when it was not so much hardened as to require to be "igni resoluta," as expressed by Pliny, with pure water slightly infused with gum-arabic, instead of sarcocolla, mentioned by Pliny. He afterwards mixed the colours with this wax so liquefied as he would have done with oil, and proceeded to paint in the same manner; nor were the colours seen to run or alter in the least; and the mixture was so flexible that the pencil ran smoother than it would have done with oil. The painting being dry, he treated it with caustic, and rubbed it with linen cloths, by which the colours acquired peculiar vivacity and brightness.

About the year 1755 further experiments were made by Count Caylus and several French artists. One method was to melt wax with oil of turpentine as a vehicle for the colours. It is well known that wax may be dissolved in spirit and used as a medium, but it dries too quickly to allow of perfect blending, and would by the evaporation of the spirit be prejudicial to the artist's health. Another method suggested about this time, and one which seems to tally very well with Pliny's description, is the following. Melt the wax with strong solution of salt of tartar, and let the colours be ground up in it. Place the picture when finished before the fire till by degrees the wax melts, swells, and is bloated up upon the picture; the picture is then gradually removed from the fire, and the colours, without being injuriously affected by the operation of the fire, become unalterable, spirits of wine having been burnt upon them without doing the least harm. Count Caylus's method was different, and much simpler: (1) the cloth or wood designed for the picture is waxed over, by rubbing it simply with a piece of beeswax; (2) the colours are mixed up with pure water; but as these colours will not adhere to the wax, the whole ground must be rubbed over with chalk or whiting before the colour is applied; and (3) when the picture is dry it is put near the fire, whereby the wax is melted and absorbs the colours. It must be allowed that nothing could well be simpler than this process, and it was thought that this kind of painting would be capable of withstanding the weather and of lasting longer than oil painting. This kind of painting has not the gloss of oil painting, so that the picture may be seen in any light, a quality of the very first importance in all methods of mural painting. The colours too, when so secured, are firm, and will bear washing, and have a property which is perhaps more important still, viz. that exposure to smoke and foul vapours merely leaves a deposit on the surface without injuring the work. The "encausto pingendi" of the ancients could not have been enamelling, as the word "inurere," taken in its rigorous sense, might at first lead one to suppose, nor could it have been painting produced in the same manner as encaustic tiles or encaustic tesserae; but that it must have been something akin to the count's process would appear from the words of Pliny already quoted, "Ceris pingere ac picturam inurere."

Werner of Neustadt found the following process very effectual in making wax soluble in water. For each pound of white wax he took twenty-four ounces of potash, which he dissolved in two pints of water, warming it gently. In this ley he boiled the wax, cut into litle bits, for half an hour, after which he removed it from the fire and allowed it to cool. The wax floated on the surface of the liquor in the form of a white saponaceous matter; and this being triturated with water produced a sort of emulsion, which he called wax milk, or encaustic wax. This preparation may be mixed with all kinds of colours, and consequently can be applied in a single operation.

Mrs Hooker of Rottingdean, at the end of the 18th century, made many experiments to establish a method of painting in wax, and received a gold palette from the Society of Arts for her investigations in this branch of art. Her account is printed in the tenth volume of the Society's Transactions (1792), under the name of Miss Emma Jane Greenland.

See also Lorgna, *Un Discorso sulla cera punica*; Pittore Vicenzo Requeno, *Saggi sul ristabilimento dell' antica arte de' Greci e Romani* (Parma, 1787); *Phil. Trans.* vol. xlix. part 2; Muntz on *Encaustic Painting*; W. Cave Thomas, *Methods of Mural Decoration* (London, 1869); Cros and Henry, *L'Encaustique*, &c. (1884); Donner von Richter, *Über Technisches in der Malerei der Alten* (1885).

(W. C. T.)

ENCEINTE (Lat. *in*, within, *cinctus*, girdled; to be distinguished from the word meaning "pregnant," from *in*, not, and *cinctus*, *i.e.* with girdle loosened), a French term used technically in fortification for the inner ring of fortifications surrounding a town. Strictly the term was applied to the continuous line of bastions and curtains forming the "body of the place," this last expression being often used as synonymous with *enceinte*. The outworks, however, close to the enceinte were not considered as forming part of it. In modern fortification the enceinte is usually simply the innermost continuous line of fortifications. In architecture generally an enceinte is the close or precinct of a cathedral, abbey, castle, &c.

ENCINA, JUAN DEL (1469–*c.*1533), often called the founder of the Spanish drama, was born in 1469 near Salamanca probably at Encinas. On leaving the university of Salamanca he became a member of the household of the second duke of Alva. In 1492 the poet entertained his patron with a dramatic piece, the *Triunfo de la fama*, written to commemorate the fall of Granada. In 1496 he published his *Cancionero*, a collection of dramatic and lyrical poems. Some years afterwards he visited Rome, attracted the attention of Alexander VI. by his skill in music, and was appointed choirmaster. About 1518 Encina took orders, and made a pilgrimage to Jerusalem, where he said his first mass. Since 1509 he had held a lay canonry at Malaga; in 1519 he was appointed prior of Leon and is said to have died at Salamanca about 1533. His *Cancionero* is preceded by a prose treatise (*Arte de trobar*) on the condition of the poetic art in Spain. His fourteen dramatic pieces mark the transition from the purely ecclesiastical to the secular stage. The *Aucto del Repelón* and the *Égloga de Fileno* dramatize the adventures of shepherds; the latter, like *Plácida y Vitoriano*, is strongly influenced by the *Celestina*. The intrinsic interest of Encina's plays is slight, but they are important from the historical point of view, for the lay pieces form a new departure, and the devout eclogues prepare the way for the *autos* of the 17th century. Moreover, Encina's lyrical poems are remarkable for their intense sincerity and devout grace.

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ENCKE, JOHANN FRANZ (1791–1865), German astronomer, was born at Hamburg on the 23rd of September 1791. Matriculating at the university of Gottingen in 1811, he began by devoting himself to astronomy under Carl Friedrich Gauss; but he enlisted in the Hanseatic Legion for the campaign of 1813–14, and became lieutenant of artillery in the Prussian service in 1815. Having returned to Göttingen in 1816, he was at once appointed by Benhardt von Lindenau his assistant in the observatory of Seeberg near Gotha. There he completed his investigation of the comet of 1680, for which the Cotta prize was awarded to him in 1817; he correctly assigned a period of 71 years to the comet of 1812; and discovered the swift circulation of the remarkable comet which bears his name (see COMET). Eight masterly treatises on its movements were published by him in the Berlin *Abhandlungen* (1829–1859). From a fresh discussion of the transits of Venus in 1761 and 1769 he deduced (1822–1824) a solar parallax of 8″·57, long accepted as authoritative. In 1822 he became director of the Seeberg observatory, and in 1825 was promoted to a corresponding position at Berlin, where a new observatory, built under his superintendence, was inaugurated in 1835. He directed the preparation of the star-maps of the Berlin academy 1830–1859, edited from 1830 and greatly improved the *Astronomisches Jahrbuch*, and issued four volumes of the *Astronomische Beobachtungen* of the Berlin observatory (1840–1857). Much labour was bestowed by him upon facilitating the computation of the movements of the asteroids. With this end in view he expounded to the Berlin academy in 1849 a mode of determining an elliptic orbit from three observations, and communicated to that body in 1851 a new method of calculating planetary perturbations by means of rectangular coordinates (republished in W. Ostwald's *Klassiker der exacten Wissenschaften*, No. 141, 1903). Encke visited England in 1840. Incipient brain-disease compelled him to withdraw from official life in November 1863, and he died at Spandau on the 26th of August 1865. He contributed extensively to the periodical literature of astronomy, and was twice, in 1823 and 1830, the recipient of the Royal Astronomical Society's gold medal.

See *Johann Franz Encke, sein Leben und Wirken*, von Dr C. Bruhns (Leipzig, 1869), to which a list of his writings is appended. Also, *Month. Notices Roy. Astr. Society*, xxvi. 129; *V.J.S. Astr. Gesellschaft*, iv. 227; *Berlin. Abhandlungen* (1866), i., G. Hagen; *Sitzungsberichte*, Munich Acad. (1866), i. p. 395, &c. (A. M. C.)

ENCLAVE (a French word from *enclaver*, to enclose), a term signifying a country or, more commonly, an outlying portion of a country, entirely surrounded by the territories of a foreign or other power, such as the detached portions of Prussia, Saxony, &c., enclosed in the Thuringian States. (From the point of view of the states possessing such detached portions of territory these become "exclaves.") "Enclave" is, however, generally used in a looser sense to describe a colony or other territory of a state, which, while possessing a seaboard, is entirely surrounded landward by the possession of some other power; or, if inland territory, nearly though not entirely so enclosed, *e.g.* the Lado Enclave in equatorial Africa.

ENCOIGNURE, in furniture, literally the angle, or return, formed by the junction of two walls. The word is now chiefly used to designate a small armoire, commode, cabinet or cupboard made to fit a corner; a *chaise encoignure* is called in English a three-cornered chair. In its origin the thing, like the word, is French, and the delightful Louis Quinze or Louis Seize *encoignure* in lacquer or in mahogany elaborately mounted in gilded bronze is not the least alluring piece of the great period of French furniture. It was made in a vast variety of forms so far as the front was concerned; in other respects it was strictly limited by its destination. As a rule these delicate and dainty receptacles were in pairs and placed in opposite angles; more often than not the top was formed of a slab of coloured marble.

ENCYCLICAL (from Late Lat. *encyclicus*, for *encyclius* = Gr. *ἐγκύκλιος*, from *ἐν* and *κύκλος*, "a circle"), an ecclesiastical epistle intended for general circulation, now almost exclusively used of such letters issued by the pope. The forms *encyclica* and *encyclic* are sometimes, but more rarely, used. The old adjectival use of the word in the sense of "general" (encircling) is now obsolete, though it survives in the term "encyclopaedia."

ENCYCLOPAEDIA. The Greeks seem to have understood by encyclopaedia (*ἐγκυκλοπαιδεία*, or *ἐγκύκλιος παιδεία*) instruction in the whole circle (*ἐν κυκλῷ*) or complete system of learning—education in arts and sciences. Thus Pliny, in the preface to his *Natural History*, says that his book treated of all the subjects of the encyclopaedia of the Greeks, "Jam omnia attingenda quae Graeci *τῆς ἐγκυκλοπαιδείας* vocant." Quintilian (*Inst. Orat.* i. 10) directs that before boys are placed under the rhetorician they should be instructed in the other arts, "ut efficiatur orbis ille doctrinae quam Graeci *ἐγκυκλοπαιδείαν* vocant." Galen (*De victus ratione in morbis acutis*, c. 11) speaks of those who are not educated *ἐν τῇ ἐγκυκλοπαιδείᾳ*. In these passages of Pliny and Quintilian, however, from one or both of which the modern use of the word seems to have been taken, *ἐγκύκλιος παιδεία* is now read, and this seems to have been the usual expression. Vitruvius (lib. vi. praef.) calls the encyclios or *ἐγκύκλιος παιδεία* of the Greeks "doctrinarum omnium disciplina," instruction in all branches of learning. Strabo (lib. iv. cap. 10) speaks of philosophy *καὶ τὴν ἄλλην παιδείαν ἐγκύκλιον*. Tzetzes (*Chiliades*, xi. 527), quoting from Porphyry's *Lives of the Philosophers*, says that *ἐγκύκλια μαθήματα* was the circle of grammar, rhetoric, philosophy and the four arts under it, arithmetic, music, geometry and astronomy. Zonaras explains it as grammar, poetry, rhetoric, philosophy, mathematics and simply every art and science (*ἁπλῶς πᾶσα τέχνη καὶ ἐπιστήμη*), because sophists go through them as through a circle. The idea seems to be a complete course of instruction in all parts of knowledge. An epic poem was called cyclic when it contained the whole mythology; and among physicians *κύκλῳ θεραπεύειν*, *cyclo curare* (Vegetius, *De arte veterinaria*, ii. 5, 6), meant a cure effected by a regular and prescribed course of diet and medicine (see Wower, *De polymathia*, c. 24, § 14).

The word encyclopaedia was probably first used in English by Sir Thomas Elyot. "In an oratour is required to be a heape of all maner of lernyng: whiche of some is called the worlde of science, of other the circle of doctrine, whiche is in one worde of greke Encyclopedia" (*The Governour*, bk. i. chap. xiii.). In his Latin dictionary, 1538, he explains "Encyclios et Encyclia, the cykle or course of all doctrines," and "Encyclopedia, that lernynge whiche comprehendeth all lyberall science and studies." The term does not seem to have been used as the title of a book by the ancients or in the middle ages. The edition of the works of Joachimus Fortius Ringelbergius, printed at Basel in 1541, is called on the title-page *Lucubrationes vel potius absolutissima κυκλοπαιδεια*. Paulus Scalichius de Lika, an Hungarian count, wrote *Encyclopaediae seu orbis disciplinarum epistemon* (Basileae, 1599, 4to). Alsted published in 1608 *Encyclopaedia cursus philosophici*, and afterwards expanded this into his great work, noticed below, calling it without any limitation *Encyclopaedia*, because it treats of everything that can be learned by man in this life. This is now the most usual sense in which the word encyclopaedia is used—a book treating of all the various kinds of knowledge. The form "cyclopaedia" is not merely without any appearance of classical authority, but is etymologically less definite, complete and correct. For as Cyropaedia means "the instruction of Cyrus," so cyclopaedia may mean "instruction of a circle." Vossius says, "Cyclopaedia is sometimes found, but the best writers say encyclopaedia" (*De vitiis sermonis*, 1645, p. 402). Gesner says, "*κύκλος* est *circulus*, quae figura est simplicissima et perfectissima simul nam incipi potest ubicunque in illa et ubicunque cohaeret. *Cyclopaedia* itaque significat omnem doctrinarum scientiam inter se cohaerere; *Encyclopaedia* est institutio in illo circulo." (*Isagoge*, 1774, i. 40).

In a more restricted sense, encyclopaedia means a system or classification of the various branches of knowledge, a subject on which many books have been published, especially in Germany, as Schmid's *Allgemeine Encyklopädie und Methodologie der Wissenschaften* (Jena, 1810, 4to, 241 pages). In this sense the *Novum Organum* of Bacon has often been called an encyclopaedia. But it is " a grammar only of the sciences: a cyclopaedia is not a grammar, but a dictionary; and to confuse the meanings of grammar and dictionary is to lose the benefit of a distinction which it is fortunate that terms have been coined to convey " (*Quarterly Review*, cxiii. 354). Fortunius Licetus, an Italian physician, entitled several of his dissertations on Roman altars and other antiquities encyclopaedias (as, for instance, *Encyclopaedia ad Aram mysticam Nonarii*, Pataviae, 1631, 4to), because in composing them he borrowed the aid of all the sciences. The *Encyclopaedia moralis* of Marcellinus de Pise (Paris, 1646, fol., 4 vols.) is a series of sermons. Encyclopaedia is often used to mean a book which is, or professes to be, a complete or very full collection or treatise relating to some particular subject, as Blaine's work, *The Encyclopaedia of Rural Sports* (London, 1852); *The Encyclopaedia of Wit* (London, 1803); *The Vocal Encyclopaedia* (London, 1807, 16mo), a collection of songs, catches, &c. The word is frequently used for an alphabetical dictionary treating fully of some science or subject, as Murray, *Encyclopaedia of Geography* (London, 1834); Lefebvre Laboulaye, *Encyclopédie technologique: Dictionnaire des arts et manufactures* (Paris, 1845–1847). Whether under the name of " dictionary " or " encyclopaedia " large numbers of this class of reference-work have been published. These are essentially encyclopaedic, being *subject books* and not *word-books*. The important books of this character are referred to in the articles dealing with the respective subjects, but the following may be mentioned here: the *Jewish Encyclopedia*, in 12 vols. (1901), a descriptive record of the history, religion, literature and customs of the Jewish people from the earliest times; the *Encyclopaedia of Sport*, 2 vols. (1897–1898); Holtzendorff's *Encyklopädie der Rechtswissenschaft* (1870; an edition in 2 vols., 1904); the *Dictionary of Political Economy*, edited by R. H. Inglis Palgrave, 3 vols. (1894; reprinted 1901); the *Encyclopaedia Biblica*, edited by T. K. Cheyne and J. Sutherland Black, 4 vols. (1899–1903); the *Dictionary of the Bible*, edited by James Hastings, 4 vols., with a supplementary volume (1904); an interesting series is the *Répertoire général du commerce*, dealing with the foreign trade of France, of which one part, the *Encyclopaedia of Trade between the United States of America and France*, with a preface by M. Gabriel Hanotaux, appeared, in French and English, in 1904.

The great Chinese encyclopaedias are referred to in the article on CHINESE LITERATURE. It will be sufficient to mention here the *Wên hien t'ung k'ao*, compiled by Ma Twa-lin in the 14th century, the encyclopaedia ordered to be compiled by the Emperor Yung-loh in the 15th century and the *Ku Kin t'u shu thi ch'êng* prepared for the Emperor K'ang-hi (d. 1721), in 5020 volumes. A copy of this enormous work, bound in some 700 volumes, is in the British Museum.

The most ancient encyclopaedia extant is Pliny's *Natural History* in 37 books (including the preface) and 2493 chapters, which may be thus described generally:—book 1, preface; book 2, cosmography, astronomy and meteorology; books 3 to 6, geography; books 7 to 11, zoology, including man, and the invention of the arts; books 12 to 19, botany; books 20 to 32, medicines, vegetable and animal remedies, medical authors and magic; books 33 to 37, metals, fine arts, mineralogy and mineral remedies. Pliny, who died A.D. 79, was not a naturalist, a physician or an artist, and collected his work in his leisure intervals while engaged in public affairs. He says it contains 20,000 facts (too small a number by half, says Lemaire), collected from 2000 books by 100 authors. Hardouin has given a list of 464 authors quoted by him. His work was a very high authority in the middle ages, and 43 editions of it were printed before 1536.

Martianus Minneus Felix Capella, an African, wrote (early in the 5th cent.), in verse and prose, a sort of encyclopaedia, which is important from having been regarded in the middle ages as a model storehouse of learning, and used in the schools, where the scholars had to learn the verses by heart, as a text-book of high-class education in the arts. It is sometimes entitled *Satyra*, or *Satyricon*, but is usually known as *De nuptiis Philologiae et Mercurii*, though this title is sometimes confined to the first two books, a rather confused allegory ending with the apotheosis of Philologia and the celebration of her marriage in the milky way, where Apollo presents to her the seven liberal arts, who, in the succeeding seven books, describe their respective branches of knowledge, namely, grammar, dialectics (divided into metaphysics and logic), rhetoric, geometry (geography, with some single geometrical propositions), arithmetic (chiefly the properties of numbers), astronomy and music (including poetry). The style is that of an African of the 5th century, full of grandiloquence, metaphors and strange words. He seldom mentions his authorities, and sometimes quotes authors whom he does not even seem to have read. His work was frequently copied in the middle ages by ignorant transcribers, and was eight times printed from 1499 to 1599. The best annotated edition is by Kopp (Frankfort, 1836, 4to), and the most convenient and the best text is that of Eysserhardt (Lipsiae, 1866, 8vo).

Isidore, bishop of Seville from 600 to 630, wrote *Etymologiarum libri XX.* (often also entitled his *Origines*) at the request of his friend Braulio, bishop of Saragossa, who after Isidore's death divided the work into books, as it was left unfinished, and divided only into titles.

The tenth book is an alphabet of 625 Latin words, not belonging to his other subjects, with their explanations as known to him, and often with their etymologies, frequently very absurd. The other books contain 448 chapters, and are:—1, grammar (Latin); 2, rhetoric and dialectics; 3, the four mathematical disciplines—arithmetic, geometry, music and astronomy; 4, medicine; 5, laws and times (chronology), with a short chronicle ending in 627; 6, ecclesiastical books and offices; 7, God, angels and the orders of the faithful; 8, the church and sects; 9, languages, society and relationships; 11, man and portents; 12, animals, in eight classes, namely, pecora et jumenta, beasts, small animals (including spiders, crickets and ants), serpents, worms, fishes, birds and small winged creatures, chiefly insects; 13, the world and its parts; 14, the earth and its parts, containing chapters on Asia, Europe and Libya, that is, Africa; 15, buildings, fields and their measures; 16, stones (of which one is echo) and metals; 17, de rebus rusticis; 18, war and games; 19, ships, buildings and garments; 20, provisions, domestic and rustic instruments.

Isidore appears to have known Hebrew and Greek, and to have been familiar with the Latin classical poets, but he is a mere collector, and his derivations given all through the work are not unfrequently absurd, and, unless when very obvious, will not bear criticism. He seldom mentions his authorities except when he quotes the poets or historians. Yet his work was a great one for the time, and for many centuries was a much valued authority and a rich source of material for other works, and he had a high reputation for learning both in his own time and in subsequent ages. His *Etymologies* were often imitated, quoted and copied. MSS. are very numerous: Antonio (whose editor, Bayer, saw nearly 40) says, " plures passimque reperiuntur in bibliothecarum angulis." This work was printed nine times before 1529.

Hrabanus Maurus, whose family name was Magnentius, was educated in the abbey of Fulda, ordained deacon in 802 (" Annales Francorum " in Bouquet, *Historiens de la France*, v. 66), sent to the school of St Martin of Tours, then directed by Alcuin, where he seems to have learned Greek, and is said by Trithemius to have been taught Hebrew, Syriac and Chaldee by Theophilus an Ephesian. In his *Commentaries on Joshua* (lib. ii. c. 5) he speaks of having resided at Sidon. He returned to Fulda and taught the school there. He became abbot of Fulda in 822, resigned in April 842, was ordained archbishop of Mainz on the 26th of July 847, and died on the 4th of February 856. He compiled an encyclopaedia *De universo* (also called in some MSS. *De universali natura*, *De natura rerum*, and *De origine rerum*) in 22 books and 325 chapters. It is chiefly a rearrangement of

Isidore's *Etymologies*, omitting the first four books, half of the fifth and the tenth (the seven liberal arts, law, medicine and the alphabet of words), and copying the rest, beginning with the seventh book, verbally, though with great omissions, and adding (according to Ritter, *Geschichte der Philosophie*, vii. 193, from Alcuin, Augustine or some other accessible source) the meanings given in the Bible to the subject matter of the chapter; while things not mentioned in Scripture, especially such as belong to classical antiquity, are omitted, so that his work seems to be formed of two alternating parts. His arrangement of beginning with God and the angels long prevailed in methodical encyclopaedias. His last six books follow very closely the order of the last five of Isidore, from which they are taken. His omissions are characteristic of the diminished literary activity and more contracted knowledge of his time. His work was presented to Louis the German, king of Bavaria, at Hersfeld in October 847, and was printed in 1473, fol., probably at Venice, and again at Strassburg by Mentelin about 1472–1475, fol., 334 pages.

Michael Constantine Psellus, the younger, wrote *Διδασκαλία παντοδαπή*, dedicated to the emperor Michael Ducas, who reigned 1071–1078. It was printed by Fabricius in his *Bibliotheca Graeca* (1712), vol. v., in 186 pages 4to and 193 chapters, each containing a question and answer. Beginning with divinity, it goes on through natural history and astronomy, and ends with chapters on excessive hunger, and why flesh hung from a fig-tree becomes tender. As collation with a Turin MS. showed that 35 chapters were wanting, Harles has omitted the text in his edition of Fabricius, and gives only the titles of the chapters (x. 84–88).

The author of the most famous encyclopaedia of the middle ages was Vincent (*q.v.*) of Beauvais (*c.* 1190–*c.* 1264), whose work *Bibliotheca mundi* or *Speculum majus*—divided, as we have it, into four parts, *Speculum naturale*, *Speculum doctrinale*, *Speculum morale* (this part should be ascribed to a later hand), and *Speculum historiale*—was the great compendium of mid-13th century knowledge. Vincent of Beauvais preserved several works of the middle ages and gives extracts from many lost classics and valuable readings of others, and did more than any other medieval writer to awaken a taste for classical literature. Fabricius (*Bibl. Graeca*, 1728, xiv. pp. 107-125) has given a list of 328 authors, Hebrew, Arabic, Greek and Latin, quoted in the *Speculum naturale*. To these should be added about 100 more for the *doctrinale* and *historiale*. As Vincent did not know Greek or Arabic, he used Latin translations. This work is dealt with separately in the article on VINCENT OF BEAUVAIS.

Brunetto Latini of Florence (born 1230, died 1294), the master of Dante and Guido Cavalcanti, while an exile in France between 1260 and 1267, wrote in French *Li Livres dou Tresor*, in 3 books and 413 chapters. Book i. contains the origin of the world, the history of the Bible and of the foundation of governments, astronomy, geography, and lastly natural history, taken from Aristotle, Pliny, and the old French Bestiaries. The first part of Book ii., on morality, is from the *Ethics* of Aristotle, which Brunetto had translated into Italian. The second part is little more than a copy of the well-known collection of extracts from ancient and modern moralists, called the *Moralities of the Philosophers*, of which there are many MSS. in prose and verse. Book iii., on politics, begins with a treatise on rhetoric, chiefly from Cicero *De inventione*, with many extracts from other writers and Brunetto's remarks. The last part, the most original and interesting of all, treats of the government of the Italian republics of the time. Like many of his contemporaries, Brunetto revised his work, so that there are two editions, the second made after his return from exile. MSS. are singularly numerous, and exist in all the dialects then used in France. Others were written in Italy. It was translated into Italian in the latter part of the 13th century by Bono Giamboni, and was printed at Trevigi, 1474, fol., Venice, 1528 and 1533. The *Tesoro* of Brunetto must not be confounded with his *Tesoretto*, an Italian poem of 2937 short lines. Napoleon I. had intended to have the French text of the *Tesoro* printed with commentaries, and appointed a commission for the purpose. It was at last published in the *Collection des documents inédits* (Paris, 1863, 4to, 772 pages), edited by Chabaille from 42 MSS.

Bartholomew de Glanville, an English Franciscan friar, wrote about 1360 a most popular work, *De proprietatibus rerum*, in 19 books and 1230 chapters.

Book 1 relates to God; 2, angels; 3, the soul; 4, the substance of the body; 5, anatomy; 6, ages; 7, diseases; 8, the heavens (astronomy and astrology); 9, time; 10, matter and form; 11, air; 12, birds (including insects, 38 names, Aquila to Vespertilio); 13, water (with fishes); 14, the earth (42 mountains, Ararath to Ziph); 15, provinces (171 countries, Asia to Zeugia); 16, precious stones (including coral, pearl, salt, 104 names, Arena to Zinguttes): 17, trees and herbs (197, Arbor to Zucarum); 18, animals (114, Aries to Vipera); 19, colours, scents, flavours and liquors, with a list of 36 eggs (Aspis to Vultur). Some editions add book 20, accidents of things, that is, numbers, measures, weights and sounds. The Paris edition of 1574 has a book on bees.

There were 15 editions before 1500. An English translation was completed 11th February 1398 by John Trevisa, and printed by Wynkyn de Worde; Westminster, 1495? fol.; London, 1533, fol.; and with considerable additions by Stephen Batman, a physician, London, 1582, fol. It was translated into French by Jehan Corbichon at the command of Charles V. of France, and printed 14 times from 1482 to 1556. A Dutch translation was printed in 1479, and again at Haarlem, 1485, fol.; and a Spanish translation by Padre Vincente de Burgos, Tholosa, 1494, fol.

Pierre Bersuire (Berchorius), a Benedictine, prior of the abbey of St Eloi in Paris, where he died in 1362, wrote a kind of encyclopaedia, chiefly relating to divinity, in three parts:—*Reductorium morale super totam Bibliam*, 428 *moralitates* in 34 books on the Bible from Genesis to Apocalypse; *Reductorium morale de proprietatibus rerum*, in 14 books and 958 chapters, a methodical encyclopaedia or system of nature on the plan of Bartholomew de Glanville, and chiefly taken from him (Berchorius places animals next after fishes in books 9 and 10, and adopts as natural classes *volatilia*, *natatilia* and *gressibilia*); *Dictionarius*, an alphabetical dictionary of 3514 words used in the Bible with moral expositions, occupying in the last edition 1558 folio pages. The first part was printed 11 times from 1474 to 1515, and the third 4 times. The three parts were printed together as *Petri Berchorii opera omnia* (an incorrect title, for he wrote much besides), Moguntiae, 1609, fol., 3 vols., 2719 pages; Coloniae Agrippinae, 1631, fol., 3 vols.; *ib.* 1730–1731, fol., 6 vols., 2570 pages.

A very popular small encyclopaedia, *Margarita philosophica*, in 12 books, divided into 26 tractates and 573 chapters, was written by Georg Reisch, a German, prior of the Carthusians of Freiburg, and confessor of the emperor Maximilian I. Books 1-7 treat of the seven liberal arts; 8, 9, principles and origin of natural things; 10, 11, the soul, vegetative, sensitive and intellectual; 12, moral philosophy. The first edition, Heidelberg, 1496, 4to, was followed by 8 others to 1535. An Italian translation by the astronomer Giovanno Paolo Gallucci was published at Venice in 1594, 1138 small quarto pages, of which 343 consist of additional tracts appended by the translator.

Raphael Maffei, called Volaterranus, being a native of Volterra, where he was born in 1451 and died 5th January 1522, wrote *Commentarii Urbani* (Rome, 1506, fol., in 38 books), so called because written at Rome. This encyclopaedia, printed eight times up to 1603, is remarkable for the great importance given to geography, and also to biography, a subject not included in previous encyclopaedias. Indeed, the book is formed of three nearly equal parts,—geographia, 11 books; anthropologia (biography), 11 books; and philologia, 15 books. The books are not divided into short chapters in the ancient manner, like those of its predecessors. The edition of 1603 contains 814 folio pages. The first book consists of the table of contents and a classed index; books 2-12, geography; 13-23, lives of illustrious men, the popes occupying book 22, and the emperors book 23; 24-27, animals and plants; 28, metals, gems, stones, houses and other inanimate things; 34, de scientiis cyclicis (grammar and rhetoric); 35, de scientiis mathematicis arithmetic, geometry, optica, catoptrica, astronomy and astrology; 36-38, Aristotelica (on the works of Aristotle).

Giorgio Valla, born about 1430 at Placentia, and therefore called Placentinus, died at Venice in 1499 while lecturing on the immortality of the soul. Aldus published his work, edited by his son Giovanni Pietro Valla, *De expetendis et fugiendis rebus*, Venetiis, 1501, fol. 2 vols.

It contains 49 books and 2119 chapters. Book 1 is introductory, on knowledge, philosophy and mathematics, considered generally (he divides everything to be sought or avoided into three kinds—those which are in the mind, in the body by nature or habit, and thirdly, external, coming from without); books 2-4, arithmetic; 5-9, music; 10-15, geometry, including Euclid and mechanics—book 15 being in three long chapters—de spiritualibus, that is, pneumatics and hydraulics, de catoptricis, and de optice; 16-19, astrology (with the structure and use of the astrolabe); 20-23, physics (including metaphysics); 24-30, medicine; 31-34, grammar; 35-37, dialectics; 38, poetry; 39, 40, rhetoric; 41, moral philosophy; 42-44, economics; 45, politics; 46-48, de corporis commodis et incommodis, on the good and evil of the body (and soul); 49, de rebus externis, as glory, grandeur, &c.

Antonio Zara, born 1574, made bishop of Petina in Istria 1600, finished on the 17th of January 1614 a work published as *Anatomia ingeniorum et scientiarum*, Venetiis, 1615, 4to, 664 pages, in four sections and 54 membra. The first section, on the dignity and excellence of man, in 16 membra, considers him in all his bodily and mental aspects. The first membrum describes his structure and his soul, and in the latter part contains the author's preface, the deeds of his ancestors, an account of himself, and the dedication of his book to Ferdinand, archduke of Austria. Four membra treat of the discovery of character by chiromancy, physiognomy, dreams and astrology. The second section treats of 16 sciences of the imagination—writing, magic, poetry, oratory, courtiership (aulicitas), theoretical and mystic arithmetic, geometry, architecture, optics, cosmography, astrology, practical medicine, war, government. The third section treats of 8 sciences of intellect—logic, physics, metaphysics, theoretical medicine, ethics, practical jurisprudence, judicature, theoretical theology. The fourth section treats of 12 sciences of memory—grammar, practical arithmetic, human history, sacred canons, practical theology, sacred history, and lastly the creation and the final catastrophe. The book, now very rare, is well arranged, with a copious index, and is full of curious learning.

Johann Heinrich Alsted, born 1588, died 1638, published *Encyclopaedia septem tomis distincta*, Herbornae Nassoviorum, 1630, fol. 7 vols., 2543 pages of very small type. It is in 35 books, divided into 7 classes, preceded by 48 synoptical tables of the whole, and followed by an index of 119 pages.

I. Praecognita disciplinarum, 4 books, hexilogia, technologia, archelogia, didactica, that is, on intellectual habits and on the classification, origin and study of the arts. II. Philology, 6 books, lexica, grammar, rhetoric, logic, oratory and poetry; book 5, lexica, contains dictionaries explained in Latin of 1076 Hebrew, 842 Syriac, 1934 Arabic, 1923 Greek and 2092 Latin words, and also nomenclator technologiae, &c., a classified vocabulary of terms used in the arts and sciences, in Latin, Greek and Hebrew, filling 34 pages; book 6 contains Hebrew, Aramaic, Greek, Latin and German grammars; book 10, poetica, contains a list of 61 Rotwelsch words. III. Theoretic philosophy, 10 books:—book 11, metaphysics; 12, pneumatics (on spirits); 13, physics; 14, arithmetic; 15, geometry; 16, cosmography; 17, uranometria (astronomy and astrology); 18, geography (with maps of the Old World, eastern Mediterranean, and Palestine under the Old and New Testaments, and a plate of Noah's ark); 19, optics; 20, music. IV. Practical philosophy, 4 books:—21, ethics; 22, economics (on relationships); 23, politics, with florilegium politicum, 119 pages of extracts from historians, philosophers and orators; 24, scholastics (on education, with a florilegium of 25 pages). V. The three superior faculties:—25, theology; 26, jurisprudence; 27, medicine (ending with the rules of the Salernian school). VI. Mechanical arts in general:—book 28, mathematical mechanical arts; book 29, agriculture, gardening, care of animals, baking, brewing, preparing medicines, metallurgy (with mining); book 30, physical mechanical arts—printing, dialling, &c. Under paedutica (games) is Vida's Latin poem on chess, and one by Leuschner on the ludus Lorzius. VII. Farragines disciplinarum, 5 books:—31, mnemonics; 32, history; 33, chronology; 34, architecture; 35, quodlibetica, miscellaneous arts, as magic, cabbala, alchemy, magnetism, &c., with others apparently distinguished and named by himself, as, paradoxologia, the art of explaining paradoxes; dipnosophistica, the art of philosophizing while feasting; cyclognomica, the art of conversing well de quovis scibili; tabacologia, the nature, use and abuse of tobacco, &c.—in all 35 articles in this book.

Alsted's encyclopaedia was received with very great applause, and was highly valued. Lami (*Entretiens*, 1684, p. 188) thought it almost the only encyclopaedia which did not deserve to be despised. Alsted's learning was very various, and his reading was very extensive and diversified. He gives few references, and Thomasius charges him with plagiarism, as he often copies literally without any acknowledgment. He wrote not long before the appearance of encyclopaedias in modern languages superseded his own and other Latin books, and but a short time before the alphabetical arrangement began to prevail over the methodical. His book was reprinted, Lugduni, 1649, fol. 4 vols., 2608 pages.

Jean de Magnon, historiographer to the king of France, undertook to write an encyclopaedia in French heroic verse, which was to fill ten volumes of 20,000 lines each, and to render libraries merely a useless ornament. But he did not live to finish it, as he was killed at night by robbers on the Pont Neuf in Paris, in April 1662. The part he left was printed as *La Science universelle*, Paris, 1663, fol., 348 pages,—10 books containing about 11,000 lines. They begin with the nature of God, and end with the history of the fall of man. His verses, say Chaudon and Delandine, are perhaps the most nerveless, incorrect, obscure and flat in French poetry; yet the author had been the friend of Molière, and had acted with him in comedy.

Louis Moréri (born on the 25th of March 1643 at Bargemont, in the diocese of Fréjus, died on the 10th of July 1680 at Paris) wrote a dictionary of history, genealogy and biography, *Le Grand Dictionnaire historique, ou le mélange curieux de l'histoire sacrée et profane*, Lyons, 1674, fol. He began a second edition on a larger scale, published at Lyons in 1681, in two volumes folio; the sixth edition was edited by Jean le Clerc, Amsterdam, 1691, fol. 4 vols.; the twentieth and last edition, Paris, 1759, fol. 10 vols. Moréri's dictionary, still very useful, was of great value and importance, although not the first of the kind. It superseded the very inferior compilation of Juigné-Broissinière, *Dictionnaire théologique, historique, poëtique, cosmographique, et chronologique*, Paris, 1644, 4to; Rouen, 1668, &c.,—a translation, with additions, of the *Dictionarium historicum, geographicum, et poëticum* of Charles Estienne, published in 1553, 4to, and often afterwards. As such a work was much wanted, Juigné's book went through twelve editions in less than thirty years, notwithstanding its want of criticism, errors, anachronisms, defects and inferior style.

Johann Jacob Hofmann (born on the 11th of September 1635, died on the 10th of March 1706), son of a schoolmaster at Basel, which he is said never to have left, and where he was professor of Greek and History, wrote *Lexicon universale historico-geographico-chronologico-poëtico-philologicum*, Basileae, 1677, fol. 2 vols., 1823 pages, a dictionary of history, biography, geography, genealogies of princely families, chronology, mythology and philology. At the end is Nomenclator *Μιξόγλωττος*, an index of names of places, people, &c., in many languages, carefully collected, and explained in Latin, filling 110 pages; with an index of subjects not forming separate articles, occupying 34 pages. In 1683 he published a continuation in 2 vols. fol., 2293 pages, containing, besides additions to the subjects given in his lexicon, the history of animals, plants, stones, metals, elements, stars, and especially of man and his affairs, arts, honours, laws, magic, music, rites and a vast number of other subjects. In 1698 he published a second edition, Lugduni Batavorum, fol. 4 vols., 3742 pages, incorporating the continuation with additions. From the great extent of his plan, many articles, especially in history, are superficial and faulty.

Étienne Chauvin was born at Nismes on the 18th of April 1640. He fled to Rotterdam on the revocation of the edict of Nantes, and in 1688 supplied Bayle's place in his lectures on philosophy. In 1695 he was invited by the elector of Brandenburg to go as professor of philosophy to Berlin, where he became the representative of the Cartesian philosophy, and died on the

6th of April 1725. He wrote *Lexicon rationale, sive thesaurus philosophicus ordine alphabetico digestus*, Rotterdami, 1692, fol., 746 pages and 30 plates. An improved and enlarged edition was printed as *Lexicon philosophicum secundis curis*, Leovardiae, 1713, large folio; 725 pages and 30 plates. This great work may be considered as a dictionary of the Cartesian philosophy, and was very much used by Brucker and other earlier historians of philosophy. It is written in a very dry and scholastic style, and seldom names authorities.

The great dictionary of French, begun by the French Academy on the 7th of February 1639, excluded all words especially belonging to science and the arts. But the success of the rival dictionary of Furetière, which, as its title-page, as well as that of the *Essais* published in 1684, conspicuously announced, professed to give "les termes de toutes les Sciences et des Arts," induced Thomas Corneille, a member of the Academy, to compile *Le Dictionnaire des arts et des sciences*, which the Academy published with the first edition of their dictionary, Paris, 1694, folio, as a supplement in two volumes containing 1236 pages. It was reprinted at Amsterdam, 1696, fol. 2 vols., and at Paris in 1720, and again in 1732, revised by Fontenelle. A long series of dictionaries of arts and sciences have followed Corneille in placing in their titles the arts before the sciences, which he probably did merely in order to differ from Furetière. Corneille professed to quote no author whom he had not consulted; to take plants from Dioscorides and Matthiolus, medicine from Ettmüller, chemistry from a MS. of Perrault, and architecture, painting and sculpture from Félibien; and to give an abridged history of animals, birds and fishes, and an account of all religious and military orders and their statutes, heresiarchs and heresies, and dignities and charges ancient and modern.

Pierre Bayle (born on the 18th of November 1647, died on the 28th of December 1706) wrote a very important and valuable work, *Dictionnaire historique et critique*, Rotterdam, 1697, fol. 2 vols. His design was to make a dictionary of the errors and omissions of Moréri and others, but he was much embarrassed by the numerous editions and supplements of Moréri. A second edition with an additional volume appeared at Amsterdam in 1702, fol. 3 vols. The fourth edition, Rotterdam, 1720, fol. 4 vols., was much enlarged from his manuscripts, and was edited by Prosper Marchand. It contains 3132 pages besides tables, &c. The ninth edition was published at Basel, 1741, fol. 10 vols. It was translated into English from the second edition, London, 1709, fol. 4 vols., with some slight additions and corrections by the author; and again from the fifth edition of 1730 by Birch and Lockman, London, 1734–1740, fol. 5 vols. J. G. de Chaufepié published *Nouveau Dictionnaire historique*, Amsterdam, 1750–1756, fol. 4 vols., as a supplement to Bayle. It chiefly consists of the articles added by the English translators with many corrections and additions, and about 500 new articles added by himself, and contains in all about 1400 articles. Prosper Marchand, editor of the fourth edition, left at his death on the 14th of January 1756 materials for a supplementary *Dictionnaire historique*, La Haye, 1758, fol. 2 vols., 891 pages, 136 articles. It had occupied his leisure moments for forty years. Much of his work was written on small scraps of paper, sometimes 20 in half a page and no larger than a nail, in such small characters that not only the editor but the printer had to use powerful magnifiers. Bayle's dictionary was also translated into German, Leipzig, 1741–1744, fol. 4 vols., with a preface by J. C. Gottsched. It is still a work of great importance and value.

Vincenzo Maria Coronelli, a Franciscan friar, who was born in Venice about 1650, made cosmographer to the republic in 1685, became general of his order in 1702, and was found dead at his study table on the 9th of December 1718, began in 1701 to publish a general alphabetical encyclopaedia, written in Italian, at which he had been working for thirty years, *Biblioteca universale sacro-profana*. It was to explain more than 300,000 words, to include history and biography as well as all other subjects, and to extend to 45 volumes folio. Volumes 1-39 were to contain the dictionary A to Z; 40, 41, the supplement; 42, retractations and corrections; 43, universal index; 44, index divided into matters; 45, index in various languages. But seven volumes only were published, Venezia, 1701–1706, fol., 5609 pages, A to Caque. The first six volumes have each an index of from 28 to 48 pages (in all 224 pages) of subjects, whether forming articles or incidental. The articles in each are numbered, and amount to 30,269 in the six volumes, which complete the letter B. On an average 3 pages contain 22 articles. Each volume is dedicated to a different patron—the pope, the doge, the king of Spain, &c. This work is remarkable for the extent and completeness of its plan, and for being the first great alphabetical encyclopaedia, as well as for being written in a modern language, but it was hastily written and very incorrect. Never, perhaps, says Tiraboschi (*Storia della letteratura italiana*, viii. 546), was there so quick a writer; he composed a folio volume as easily as others would a page, but he never perfected his works, and what we have of this book will not induce us to regret the want of the remainder.

The first alphabetical encyclopaedia written in English was the work of a London clergyman, John Harris (born about 1667, elected first secretary of the Royal Society on the 30th of November 1709, died on the 7th of September 1719), *Lexicon technicum, or an universal English Dictionary of Arts and Sciences*, London, 1704, fol., 1220 pages, 4 plates, with many diagrams and figures printed in the text. Like many subsequent English encyclopaedias the pages are not numbered. It professes not merely to explain the terms used in the arts and sciences, but the arts and sciences themselves. The author complains that he found much less help from previous dictionaries than one would suppose, that Chauvin is full of obsolete school terms, and Corneille gives only bare explanations of terms, which often relate only to simple ideas and common things. He omits theology, antiquity, biography and poetry; gives only technical history, geography and chronology; and in logic, metaphysics, ethics, grammar and rhetoric, merely explains the terms used. In mathematics and anatomy he professes to be very full, but says that the catalogues and places of the stars are very imperfect, as Flamsteed refused to assist him. In botany he gave from Ray, Morrison and Tournefort "a pretty exact botanick lexicon, which was what we really wanted before," with an account of all the "kinds and subalternate species of plants, and their specific differences" on Ray's method. He gave a table of fossils from Dr Woodward, professor of medicine in Gresham College, and took great pains to describe the parts of a ship accurately and particularly, going often on board himself for the purpose. In law he abridged from the best writers what he thought necessary. He meant to have given at the end an alphabet for each art and science, and some more plates of anatomy and ships, "but the undertaker could not afford it at the price." A review of his work, extending to the unusual length of four pages, appeared in the *Philosophical Transactions*, 1704, p. 1699. This volume was reprinted in 1708. A second volume of 1419 pages and 4 plates appeared in 1710, with a list of about 1300 subscribers. Great part of it consisted of mathematical and astronomical tables, as he intended his work to serve as a small mathematical library. He was allowed by Sir Isaac Newton to print his treatise on acids. He gives a table of logarithms to seven figures of decimals (44 pages), and one of sines, tangents and secants (120 pages), a list of books filling two pages, and an index of the articles in both volumes under 26 heads, filling 50 pages. The longest lists are law (1700 articles), chyrurgery, anatomy, geometry, fortification, botany and music. The mathematical and physical part is considered very able. He often mentions his authorities, and gives lists of books on particular subjects, as botany and chronology. His dictionary was long very popular. The fifth edition was published in 1736, fol. 2 vols. A supplement, including no new subjects, appeared in 1744, London, fol., 996 pages, 6 plates. It was intended to rival Ephraim Chambers's work (see below), but, being considered a bookseller's speculation, was not well received.

Johann Hübner, rector of the Johanneum in Hamburg, born on the 17th of March 1668, wrote prefaces to two dictionaries written in German, which bore his name, and were long popular.

The first was *Reales Staats Zeitungs- und Conversations-Lexicon*, Leipzig, 1704, 8vo; second edition, 1706, 947 pages; at the end a register of arms, and indexes of Latin and French words; fifth edition, 1711; fifteenth edition 1735, 1119 pages. The thirty-first edition was edited and enlarged by F. A. Rüder, and published by Brockhaus, Leipzig, 1824–1828, 8vo, 4 vols., 3088 pages. It was translated into Hungarian by Fejer, Pesten, 1816, 8vo, 5 vols., 2958 pages. The second, published as a supplement, was *Curieuses und reales Natur- Kunst- Berg- Gewerb- und Handlungs-Lexicon*, Leipzig, 1712, 8vo, 788 pages, frequently reprinted to 1792. The first relates to the political state of the world, as religion, orders, states, rivers, towns, castles, mountains, genealogy, war, ships; the second to nature, science, art and commerce. They were the work of many authors, of whom Paul Jacob Marpurger, a celebrated and voluminous writer on trade and commerce, born at Nuremberg on the 27th of June 1656, was an extensive contributor, and is the only one named by Hübner.

Johann Theodor Jablonski, who was born at Danzig on the 15th of December 1654, appointed secretary to the newly founded Prussian Academy in 1700, when he went to Berlin, where he died on the 28th of April 1731, published *Allgemeines Lexicon der Künste und Wissenschaften*, Leipzig, 1721, 4to, a short but excellent encyclopaedia still valued in Germany. It does not include theology, history, geography, biography and genealogy. He not only names his authorities, but gives a list of their works. A new edition in 1748 was increased one-third to 1508 pages. An improved edition, Königsberg and Leipzig, 1767, 4to, 2 vols., 1852 pages, was edited by J. J. Schwabe, public teacher of philosophy at Leipzig.

Ephraim Chambers (*q.v.*) published his *Cyclopaedia; or an Universal Dictionary of Art and Sciences, containing an Explication of the Terms and an Account of the Things Signified thereby in the several Arts, Liberal and Mechanical, and the several Sciences, Human and Divine*, London, 1728, fol. 2 vols. The dedication to the king is dated October 15, 1727. Chambers endeavoured to connect the scattered articles relating to each subject by a system of references, and to consider "the several matters, not only in themselves, but relatively, or as they respect each other; both to treat them as so many wholes and as so many parts of some greater whole." Under each article he refers to the subject to which it belongs, and also to its subordinate parts; thus Copyhold has a reference to Tenure, of which it is a particular kind, and other references to Rolls, Custom, Manor, Fine, Charterland and Freehold. In his preface he gives an "analysis of the divisions of knowledge," 47 in number, with classed lists of the articles belonging to each, intended to serve as table of contents and also as a rubric or directory indicating the order in which the articles should be read. But it does so very imperfectly, as the lists are curtailed by many *et caeteras*; thus 19 occur in a list of 119 articles under Anatomy, which has nearly 2200 articles in Rees's index. He omits etymologies unless "they appeared of some significance"; he gives only one grammatical form of each word, unless peculiar ideas are arbitrarily attached to different forms, as *precipitate*, *precipitant*, *precipitation*, when each has an article; and he omits complex ideas generally known, and thus "gets free of a vast load of plebeian words." His work, he says, is a collection, not the produce of one man's wit, for that would go but a little way, but of the whole commonwealth of learning. "Nobody that fell in my way has been spared, antient or modern, foreign nor domestic, Christian or Jew nor heathen." To the subjects given by Harris he adds theology, metaphysics, ethics, politics, logic, grammar, rhetoric and poetry, but excludes history, biography, genealogy, geography and chronology, except their technical parts. A second edition appeared in 1738, fol. 2 vols., 2456 pages, "retouched and amended in a thousand places." A few articles are added and some others enlarged, but he was prevented from doing more because "the booksellers were alarmed with a bill in parliament containing a clause to oblige the publishers of all improved editions of books to print their improvements separately." The bill after passing the Commons was unexpectedly thrown out by the Lords; but fearing that it might be revived, the booksellers thought it best to retreat though more than twenty sheets had been printed. Five other editions were published in London, 1739 to 1751–1752, besides one in Dublin, 1742, all in 2 vols. fol. An Italian translation, Venezia, 1748–1749, 4to, 9 vols., was the first complete Italian encyclopaedia. When Chambers was in France in 1739 he rejected very favourable proposals to publish an edition there dedicated to Louis XV. His work was judiciously, honestly and carefully done, and long maintained its popularity. But it had many defects and omissions, as he was well aware; and at his death, on the 15th of May 1740, he had collected and arranged materials for seven new volumes. John Lewis Scott was employed by the booksellers to select such articles as were fit for the press and to supply others. He is said to have done this very efficiently until appointed sub-preceptor to the prince of Wales and Prince Edward. His task was entrusted to Dr (afterwards called Sir John) Hill, who performed it very hastily, and with characteristic carelessness and self-sufficiency, copying freely from his own writings. The *Supplement* was published in London, 1753, fol. 2 vols., 3307 pages and 12 plates. As Hill was a botanist, the botanical part, which had been very defective in the *Cyclopaedia*, was the best.

Abraham Rees (1743–1825), a famous Nonconformist minister, published a revised and enlarged edition, "with the supplement and modern improvements incorporated in one alphabet," London, 1778–1788, fol. 2 vols., 5010 pages (but not paginated), 159 plates. It was published in 418 numbers at 6d. each. Rees says that he has added more than 4400 new articles. At the end he gives an index of articles, classed under 100 heads, numbering about 57,000 and filling 80 pages. The heads, with 39 cross references, are arranged alphabetically. Subsequently there were reprints.

One of the largest and most comprehensive encyclopaedias was undertaken and in a great measure completed by Johann Heinrich Zedler, a bookseller of Leipzig, who was born at Breslau 7th January 1706, made a Prussian commerzienrath in 1731, and died at Leipzig in 1760,—*Grosses vollständiges Universal Lexicon Aller Wissenschaften und Künste welche bishero durch menschlichen Verstand und Witz erfunden und verbessert worden*, Halle and Leipzig, 1732–1750, fol. 64 vols., 64,309 pages; and *Nöthige Supplemente*, ib. 1751–1754, vols. i. to iv., A to Caq, 3016 pages. The columns, two in a page, are numbered, varying from 1356 in vol. li. to 2588 in vol. xlix. Each volume has a dedication, with a portrait. The first nine are the emperor, the kings of Prussia and Poland, the empress of Russia, and the kings of England, France, Poland, Denmark and Sweden. The dedications, of which two are in verse, and all are signed by Zedler, amount to 459 pages. The supplement has no dedications or portraits. The preface to the first volume of the work is by Johann Peter von Ludewig, chancellor of the university of Halle (born 15th August 1690, died 6th September 1743). Nine editors were employed, whom Ludewig compares to the nine muses; and the whole of each subject was entrusted to the same person, that all its parts might be uniformly treated. Carl Günther Ludovici (born at Leipzig 7th August 1707, public teacher of philosophy there from 1734, died 3rd July 1778) edited the work from vol. xix., beginning the letter M, and published in 1739, to the end, and also the supplement. The work was published by subscription. Johann Heinrich Wolff, an eminent merchant and shopkeeper in Leipzig, born there on the 29th of April 1690, came to Zedler's assistance by advancing the funds for expenses and becoming answerable for the subscriptions, and spared no cost that the work might be complete. Zedler very truly says, in his preface to vol. xviii., that his *Universal Lexicon* was a work such as no time and no nation could show, and both in its plan and execution it is much more comprehensive and complete than any previous encyclopaedia. Colleges, says Ludewig, where all sciences are taught and studied, are on that account called *universities*, and their teaching is called *studium universale*; but the *Universal Lexicon* contains not only what they teach in theology, jurisprudence, medicine, philosophy, history, mathematics, &c., but also many other things belonging to courts, chanceries, hunting, forests, war and peace, and to artists, artizans, housekeepers and merchants not thought of in colleges. Its plan embraces not only history, geography and biography, but also genealogy, topography, and from vol. xviii., published in 1738, lives of illustrious living persons. Zedler inquires why death alone should make a deserving man capable of having his services and worthy deeds made known to the world in print. The lives of the dead, he says, are to be found in books, but those of the living are not to be met with anywhere, and would often be more useful if known. In consequence of this preface, many lives and genealogies were sent to him for publication. Cross references generally give not only the article referred to, but also the volume and column, and, when necessary, such brief information as may distinguish the word referred to from others similar but of different meaning. Lists of authorities, often long, exact and valuable are frequently appended to the articles. This work, which is well and carefully compiled, and very trustworthy, is still a most valuable book of reference on many subjects, especially topography, genealogy and biography. The genealogies and family histories are excellent, and many particulars are given of the lives and works of authors not easily found elsewhere.

A work on a new plan was published by Dennis de Coetlogon, a Frenchman naturalized in England, who styled himself "Knight of St Lazare, M.D., and member of the Royal Academy of Angers"—*An Universal History of Arts and Sciences*, London, 1745, fol. 2 vols., 2529 pages, 33 plates and 161 articles arranged alphabetically. He "endeavours to render each treatise as complete as possible, avoiding above all things needless repetitions, and never puzzling the reader with the least reference." Theology is divided into several treatises; Philosophy into Ethicks, Logick and Metaphysick, each under its letter; and Physick is subdivided into Anatomy, Botany, Geography, Geometry, &c. Military Art is divided into Army, Fortification, Gunnery. The royal licence is dated 13th March 1740–1741, the dedication is to the duke of Gisors, the pages are numbered, there is an appendix of 35 pages of astronomical tables, and the two indexes, one to each volume, fill 69 pages, and contain about 9000 subjects. The type is large and the style diffuse, but the subject matter is sometimes curious. The author says that his work is the only one of the kind, and that he wrote out with his own hand every line, even the index. But notwithstanding the novelty of his plan, his work does not seem ever to have been popular.

Gianfrancesco Pivati, born at Padua in 1689, died at Venice in 1764, secretary of the Academy of Sciences at Venice, who had published in 1744 a 4to volume containing a *Dizionario universale*, wrote *Nuovo dizionario scientifico e curioso sacro-profano*, Venezia, 1746–1751, fol. 10 vols., 7791 pages, 597 plates. It is a general encyclopaedia, including geography, but not history or biography. He gives frequent references to his authorities and much curious information. His preliminary discourse (80 pages) contains a history of the several sciences from mathematics to geography. The book was published by subscription, and at the end of the last volume is a *Catalogo dei Signori Associati*, 252 in number, who took 266 copies. It is also remarkable for the number of its plates, which are engraved on copper. In each volume they are placed together at the end, and are preceded by an explanatory index of subjects referring to the plates and to the articles they illustrate.

One of the greatest and most remarkable literary enterprises of the 18th century, the famous French *Encyclopédie*, originated in a French translation of Ephraim Chambers's *Cyclopaedia*, begun in 1743 and finished in 1745 by John Mills, an Englishman resident in France, assisted by Gottfried Sellius, a very learned native of Danzig, who, after being a professor at Halle and Göttingen, and residing in Holland, had settled in Paris. They applied to Lebreton, the king's printer, to publish the work, to fulfil the formalities required by French law, with which, as foreigners, they were not acquainted, and to solicit a royal privilege. This he obtained, but in his own name alone. Mills complained so loudly and bitterly of this deception that Lebreton had to acknowledge formally that the privilege belonged *en toute propriété* to John Mills. But, as he again took care not to acquaint Mills with the necessary legal formalities, this title soon became invalid. Mills then agreed to grant him part of his privilege, and in May 1745 the work was announced as *Encyclopédie ou dictionnaire universel des arts et des sciences*, folio, four volumes of 250 to 260 sheets each, with a fifth of at least 120 plates, and a vocabulary or list of articles in French, Latin, German, Italian and Spanish, with other lists for each language explained in French, so that foreigners might easily find any article wanted. It was to be published by subscription at 135 livres, but for large paper copies 200 livres, the first volume to be delivered in June 1746, and the two last at the end of 1748. The subscription list, which was considerable, closed on the 31st of December 1745. Mills demanded an account, which Lebreton, who had again omitted certain formalities, insultingly refused. Mills brought an action against him, but before it was decided Lebreton procured the revocation of the privilege as informal, and obtained another for himself dated the 21st of January 1746. Thus, for unwittingly contravening regulations with which his unscrupulous publisher ought to have made him acquainted, Mills was despoiled of the work he had both planned and executed, and had to return to England. Jean Paul de Gua de Malves, professor of philosophy in the college of France (born at Carcassonne in 1713, died on the 15th of June 1785), was then engaged as editor merely to correct errors and add new discoveries. But he proposed a thorough revision, and obtained the assistance of many learned men and artists, among whom Desessarts names Louis, Condillac, d'Alembert and Diderot. But the publishers did not think his reputation high enough to ensure success, withheld their confidence, and often opposed his plans as too expensive. Tired at last of disputes, and too easily offended, de Gua resigned the editorship. The publishers, who had already made heavy advances, offered it to Diderot, who was probably recommended to them by his very well received *Dictionnaire universel de médecine*, Paris, 1746–1748, fol. 6 vols., published by Briasson, David and Durand, with notes and additions by Julien Busson, doctor regent of the faculty of medicine of Paris. It was a translation, made with the assistance of Eidous and Toussaint, of the celebrated work of Dr Robert James, inventor of the fever powders, *A Medicinal Dictionary*, London, 1743–1745, fol. 3 vols., 3275 pages and 98 plates, comprising a history of drugs, with chemistry, botany and natural history so far as they relate to medicine, and with an historical preface of 99 pages (in the translation 136). The proposed work was to have been similar in character. De Gua's papers were handed over to Diderot in great confusion. He soon persuaded the publishers to undertake a far more original and comprehensive work. His friend d'Alembert undertook to edit the mathematics. Other subjects were allotted to 21 contributors, each of whom received the articles on this subject in Mills' translation to serve as a basis for his work. But they were in most cases so badly composed and translated, so full of errors and omissions, that they were not used. The contributions were to be finished in three months, but none was ready in time, except Music by Rousseau, which he admits was hastily and badly done. Diderot was imprisoned at Vincennes, on the 29th of July 1749, for his *Lettre sur les aveugles*. He was closely confined for 28 days, and was then for three months and ten days a prisoner on parole in the castle. This did not stop the printing, though it caused delay. The prospectus by Diderot appeared in November 1750. The work, was to form 8 vols. fol., with at least 600 plates. The first volume was published in July 1751, and delivered to the subscribers in August. The second appeared in January 1752. An *arrêt* of the council, 9th of February, suppressed both volumes as injurious to the king's authority and to religion. Malesherbes, director-general of the Librairie, stopped the issue of volume ii., 9th of February, and on the 21st went with a *lettre de cachet* to Lebreton's to seize the plates and the MSS., but did not find, says Barbier, even those of volume iii., as they had been taken to his own house by Diderot and one of the publishers. The Jesuits tried to continue the work, but in vain. It was less easy, says Grimm, than to ruin philosophers. The *Dictionnaire de Trévoux* pronounced the completion of the *Encyclopédie* impossible, and the project ridiculous (5th edition, 1752, iii. 750). The government had to request the editors to resume the work as one honourable to the nation. The marquis d'Argenson writes, 7th of May 1752, that Mme de Pompadour had been urging them to proceed, and at the end of June he reports them as again at work. Volume iii., rather improved by the delay, appeared in October 1753; and volume vii., completing G. in November 1757. The clamours against the work soon recommenced. D'Alembert retired in January 1758, weary of sermons, satires and intolerant and absurd censors. The parlement of Paris, by an *arrêt*, 23rd of January 1759, stopped the sale and distribution of the *Encyclopédie*, Helvetius's *De l'Esprit*, and six other books; and by an *arrêt*, 6th February, ordered them all to be burnt, but referred the *Encyclopédie* for examination to a commission of nine. An *arrêt du conseil*, 7th of March, revoked the privilege of 1746, and stopped the printing. Volume viii. was then in the press. Malesherbes warned Diderot that he would have his papers seized next day; and when Diderot said he could not make a selection, or find a place of safety at such short notice, Malesherbes said, "Send them to me, they will not look for them there." This, according to Mme de Vandeul, Diderot's daughter, was done with perfect success. In the article Pardonner Diderot refers to these persecutions, and says, "In the space of some months we have seen our honour, fortune, liberty and life imperilled." Malesherbes, Choiseul and Mme de Pompadour protected the work; Diderot obtained private permission to go on printing, but with a strict charge not to publish any part until the whole was finished. The Jesuits were condemned by the parlement of Paris in 1762, and by the king in November 1764. Volume i. of plates appeared in 1762, and volumes viii. to xvii., ten volumes of text, 9408 pages, completing the work, with the 4th volume of plates in 1765, when there were 4250 subscribers. The work circulated freely in the provinces and in foreign countries, and was secretly distributed in Paris and Versailles. The general assembly of the clergy, on the 20th of June 1765, approved articles in which it was condemned, and on the 27th of September adopted a *mémoire* to be presented to the king They were forbidden to publish their acts which favoured the Jesuits, but Lebreton was required to give a list of his subscribers, and was put into the Bastille for eight days in 1766. A royal order was sent to the subscribers to deliver their copies to the lieutenant of police. Voltaire in 1774 relates that, at a *petit souper* of the king at Trianon, there was a debate on the composition of gunpowder. Mme de Pompadour said she did not know how her rouge or her silk stockings were made. The duc de la Vallière regretted that the king had confiscated their encyclopaedias, which could decide everything. The king said he had been told that the work was most dangerous, but as he wished to judge for himself, he sent for a copy. Three servants with difficulty brought in the 21 volumes. The company found everything they looked for, and the king allowed the confiscated copies to be returned. Mme de Pompadour died on the 15th of April 1764. Lebreton had half of the property in the work, and Durand, David and Briasson had the rest. Lebreton, who had the largest printing office in Paris, employed 50 workmen in printing the last ten volumes. He had the articles set in type exactly as the authors sent them in, and when Diderot had corrected the last proof of each sheet, he and his foreman, hastily, secretly and by night, unknown to his partners in the work, cut out whatever seemed to them daring, or likely to give offence, mutilated most of the best articles without any regard to the consecutiveness of what was left, and burnt the manuscript as they proceeded. The printing of the work was nearly finished when Diderot, having to consult one of his great philosophical articles in the letter S, found it entirely mutilated. He was confounded, says Grimm, at discovering the atrocity of the printer; all the best articles were in the same confusion. This discovery put him into a state of frenzy and despair from rage and grief. His daughter never heard him speak coolly on the subject, and after twenty years it still made him angry. He believed that every one knew as well as he did what was wanting in each article, but in fact the mutilation was not perceived even by the authors, and for many years was known to few persons. Diderot at first refused to correct the remaining proofs, or to do more than write the explanations of the plates. He required, according to Mme de Vandeul, that a copy, now at St Petersburg with his library, should be printed with columns in which all was restored. The mutilations began as far back as the article Intendant. But how far, says Rosenkranz, this murderous, incredible and infamous operation was carried cannot now be exactly ascertained. Diderot's articles, not including those on arts and trades, were reprinted in Naigeon's edition (Paris, 1821, 8vo, 22 vols.). They fill 4132 pages, and number 1139, of which 601 were written for the last ten volumes. They are on very many subjects, but principally on grammar, history, morality, philosophy, literature and metaphysics. As a contributor, his special department of the work was philosophy, and arts and trades. He passed whole days in workshops, and began by examining a machine carefully, then he had it taken to pieces and put together again, then he watched it at work, and lastly worked it himself. He thus learned to use such complicated machines as the stocking and cut velvet looms. He at first received 1200 livres a year as editor, but afterwards 2500 livres a volume, besides a final sum of 20,000 livres. Although after his engagement he did not suffer from poverty as he had done before, he was obliged to sell his library in order to provide for his daughter. De Jaucourt spared neither time, trouble nor expense in perfecting the work, for which he received nothing, and he employed several secretaries at it for ten years. To pay them he had to sell his house in Paris, which Lebreton bought with the profits derived from De Jaucourt's work. All the publishers made large fortunes; their expenses amounted to 1,158,000 livres and their profits to 2,162,000. D'Alembert's "Discours Preliminaire," 45 pages, written in 1750, prefixed to the first volume, and delivered before the French Academy on his reception on the 19th of December 1754, consists of a systematic arrangement of the various branches of knowledge, and an account of their progress since their revival. His system, chiefly taken from Bacon, divides them into three classes, under memory, reason and imagination. Arts and trades are placed under natural history, superstition and magic under science de Dieu, and orthography and heraldry under logic. The literary world is divided into three corresponding classes —*érudits*, *philosophes* and *beaux esprits*. As in Ephraim Chambers's *Cyclopaedia*, history and biography were excluded, except incidentally; thus Aristotle's life is given in the article Aristotelisme. The science to which an article belongs is generally named at the beginning of it, references are given to other articles, and the authors' names are marked by initials, of which lists are given in the earlier volumes, but sometimes their names are subscribed in full. Articles by Diderot have no mark, and those inserted by him as editor have an asterisk prefixed. Among the contributors were Voltaire, Euler, Marmontel, Montesquieu, D'Anville, D'Holbach and Turgot, the leader of the new school of economists which made its first appearance in the pages of the *Encyclopédie*. Louis wrote the surgery, Daubenton natural history, Eidous heraldry and art, Toussaint jurisprudence, and Condamine articles on South America.

No encyclopaedia perhaps has been of such political importance, or has occupied so conspicuous a place in the civil and literary history of its century. It sought not only to give information, but to guide opinion. It was, as Rosenkranz says (*Diderot*, i. 157), theistic and heretical. It was opposed to the church, then all-powerful in France, and it treated dogma historically. It was, as Desnoiresterres says (*Voltaire*, v. 164), a war machine; as it progressed, its attacks both on the church and the still more despotic government, as well as on Christianity itself, became bolder and more undisguised, and it was met by opposition and persecution unparalleled in the history of encyclopaedias. Its execution is very unequal, and its articles of very different value. It was not constructed on a regular plan, or subjected to sufficient supervision; articles were sent in by the contributors, and not seen by the editors until they were in type. In each subject there are some excellent articles, but others are very inferior or altogether omitted, and references are often given to articles which do not exist. Thus marine is said to be more than three-fourths deficient; and in geography errors and omissions abound—even capitals and sovereign states are overlooked, while villages are given as towns, and towns are described which never existed. The style is too generally loose, digressive and inexact; dates are seldom given; and discursiveness, verbosity and dogmatism are frequent faults. Voltaire was constantly demanding truth, brevity and method, and said it was built half of marble and half of wood. D'Alembert compared it to a harlequin's coat, in which there is some good stuff but too many rags. Diderot was dissatisfied with it as a whole; much of it was compiled in haste; and carelessly written articles and incompetent contributors were admitted for want of money to pay good writers. Zedler's *Universal Lexicon* is on the whole much more useful for reference than its far more brilliant successor. The permanent value of encyclopaedias depends on the proportion of exact and precise facts they contain and on their systematic regularity.

The first edition of the *Encyclopédie*, in 17 vols. folio, 16,288 pages, was imitated by a counterfeit edition printed at Geneva as the volumes appeared in Paris. Eleven folio volumes of plates were published at Paris (1762 to 1772), containing 2888 plates and 923 pages of explanation, &c. A supplement was printed at Amsterdam and Paris (1776–1777), fol. 5 vols., 3874 pages, with 224 plates. History was introduced at the wish of the public, but only "the general features which mark epochs in the annals of the world." The astronomy was by Delalande, mathematics by Condorcet, tables by Bernouilli, natural history by Adanson, anatomy and physiology by Haller. Daubenton, Condamine, Marmontel and other old contributors wrote many articles, and several were taken from foreign editions. A very full and elaborate index of the articles and subjects of the 33 volumes was printed at Amsterdam in 1780, fol. 2 vols. 1852 pages. It was made by Pierre Mouchon, who was born at Geneva on the 30th of July 1735, consecrated minister on the 18th of August 1758, pastor of the French church at Basel 1766, elected a pastor in Geneva on the 6th of March 1788, principal of the college there 22nd of April 1791, died on the 20th of August 1797. This *Table analytique*, which took him five years to make, was undertaken for the publishers Cramer and De Tournes, who gave him 800 louis for it. Though very exact and full, he designedly omits the attacks on Christianity. This index was rendered more useful and indispensable by the very diffuse and digressive style of the work, and by the vast number of its articles. A complete copy of the first edition of the *Encyclopédie* consists of 35 vols. fol., printed 1751–1780, containing 23,135 pages and 3132 plates. It was written by about 160 contributors. About 1761 Panckoucke and other publishers in Paris proposed a new and revised edition, and bought the plates for 250,000 livres. But, as Diderot indignantly refused to edit what he considered a fraud on the subscribers to the as yet unfinished work, they began simply to reprint the work, promising supplementary volumes. When three volumes were printed the whole was seized in 1770 by the government at the complaint of the clergy, and was lodged in the Bastille. The plan of a second French edition was laid aside then, to be revived twenty years later in a very different form. Foreign editions of the *Encyclopédie* are numerous, and it is difficult to enumerate them correctly. One, with notes by Ottavio Diodati, Dr Sebastiano Paoli and Carlo Giuliani, appeared at Lucca (1758–1771), fol. 17 vols. of text and 10 of plates. Though it was very much expurgated, all engaged in it were excommunicated by the pope in 1759. An attempt made at Siena to publish an Italian translation failed. An addition by the abbé Serafini and Dr Gonnella (Livourne, 1770), &c., fol. 33 vols., returned a profit of 60,000 piastres, and was protected by Leopold II., who secured the pope's silence. Other editions are Genève, Cramer (1772–1776), a facsimile reprint. Genève, Pellet (1777–1779), 4to, 36 vols. of text and 3 of plates, with 6 vols. of Mouchon's index (Lyon, 1780), 4to; Genève et Neufchâtel, Pellet (1778–1779), 4to, 36 vols. of text and 3 of plates; Lausanne (1778–1781), 36 vols. 4to, or 72 octavo, of text and 3 of plates (1779–1780); Lausanne et Bern, chez les Sociétés Typographiques (1780–1782), 36 vols. 8vo of text and 3 vols. 4to of plates (1782). These four editions have the supplement incorporated. Fortuné Barthelemy de Felice, an Italian monk, born at Rome on the 24th of August 1723, who had been professor at Rome and Naples, and had become a Protestant, printed a very incorrect though successful edition (Yverdun, 1770–1780) 4to, 42 vols. of text, 5 of supplement and 10 of plates. It professed to be a new work, standing in the same relationship to the *Encyclopédie* as that did to Chambers's, which is far from being the case. Sir Joseph Ayloffe issued proposals, 14th December 1751, for an English translation of the *Encyclopédie*, to be finished by Christmas 1756, in 10 vols. 4to, with at least 600 plates. No. 1 appeared in January 1752, but met with little success. Several selections of articles and extracts have been published under the title of *L'Esprit de l'Encyclopédie*. The last was by Hennequin (Paris, 1822–1823), 8vo, 15 vols. An English selection is *Select Essays from the Encyclopedy* (London, 1773), 8vo. The articles of most of the principal contributors have been reprinted in the editions of their respective works. Voltaire wrote 8 vols. 8vo of a kind of fragmentary supplement, *Questions sur l'Encyclopédie*, frequently printed, and usually included in editions of his works, together with his contributions to the *Encyclopédie* and his *Dictionnaire philosophique*. Several special dictionaries have been formed from the *Encyclopédie*, as the *Dictionnaire portatif des arts et métiers* (Paris, 1766), 8vo, 2 vols. about 1300 pages, by Philippe Macquer, brother of the author of the *Dict. de chimie*. An enlarged edition by the abbé Jaubert (Paris, 1773), 5 vols. 8vo, 3017 pages, was much valued and often reprinted. The books attacking and defending the *Encyclopédie* are very many. No original work of the 18th century, says Lanfrey, has been more depreciated, ridiculed and calumniated. It has been called chaos, nothingness, the Tower of Babel, a work of disorder and destruction, the gospel of Satan and even the ruins of Palmyra.

The *Encyclopaedia Britannica*, "by a society of gentlemen in Scotland, printed in Edinburgh for A. Bell and C. Macfarquhar, and sold by Colin Macfarquhar at his printing office in Nicolson Street," was completed in 1771 in 3 volumes 4to, containing 2670 pages, and 160 copperplates engraved by Andrew Bell. It was published in numbers, of which the two first were issued in December 1768, "price 6d. each, or 8d on a finer paper," and was to be completed in 100 weekly numbers. It was compiled, as the title-page says, on a new plan. The different sciences and arts were "digested into distinct treatises or systems," of which there are 45 with cross headings, that is, titles printed across the page, and about 30 other articles more than three pages long. The longest are "Anatomy," 166 pages, and "Surgery," 238 pages. "The various technical terms, &c., are explained as they occur in the order of the alphabet." "Instead of dismembering the sciences, by attempting to treat them intelligibly under a multitude of technical terms, they have digested the principles of every science in the form of systems or distinct treatises, and explained the terms as they occur in the order of the alphabet, with references to the sciences to which they belong." This plan, as the compilers say, differs from that of all the previous dictionaries of arts and sciences. Its merit and novelty consist in the combination of De Coetlogon's plan with that in common use,—on the one hand keeping important subjects together, and on the other facilitating reference by numerous separate articles. It is doubtful to whom the credit of this plan is due. The editor, William Smellie, a printer (born in 1740, died on the 24th of June 1795), afterwards secretary and superintendent of natural history to the Society of Scottish Antiquaries, is said by his biographer to have devised the plan and written or compiled all the chief articles; and he prints, but without date, part of a letter written and signed by Andrew Bell by which he was engaged in the work:—"Sir, As we are engaged in publishing a dictionary of the arts and sciences, and as you have informed us that there are fifteen capital sciences which you will undertake for and write up the subdivisions and detached parts of these conform to your plan, and likewise to prepare the whole work for the press, &c., &c., we hereby agree to allow you £200 for your trouble, &c." Prof. Macvey Napier says that Smellie "was more likely to have suggested that great improvement than any of his known coadjutors." Archibald Constable, who was interested in the work from 1788, and was afterwards intimately acquainted with Bell, says Colin Macfarquhar was the actual projector of the *Encyclopaedia*, and the editor of the two first editions, while Smellie was merely "a contributor for hire" (*Memoirs*, ii. 311). Dr Gleig, in his preface to the third edition, says: "The idea had been conceived by him (Colin Macfarquhar) and his friend Mr Andrew Bell, engraver. By whom these gentlemen were assisted in digesting the plan which attracted to that work so much public attention, or whether they had any assistance, are questions in which our readers cannot be interested." Macfarquhar, according to Constable, was a person of excellent taste and very general knowledge, though at starting he had little or no capital, and was obliged to associate Bell, then the principal engraver in Edinburgh, as a partner in his undertaking.

The second edition was begun in 1776, and was published in numbers, of which the first was issued on the 21st of June 1777, and the last, No. 181, on the 18th of September 1784, forming 10 vols. 4to, dated 1778 to 1783, and containing 8595 pages and 340 plates. The pagination is continuous, ending with page 9200, but 295 pages are inserted in various places, and page 7099 is followed by 8000. The number and length of the articles were much increased, 72 have cross headings, and more than 150 others may be classed as long articles. At the end is an appendix ("Abatement" to "Wood") of 200 pages, containing, under the heading Botanical Table, a list of the 931 genera included in the 58 natural orders of Linnaeus, and followed by a list of 526 books, said to have been the principal authorities used. All the maps are placed together under the article "Geography" (195 pages). Most of the long articles have numbered marginal titles; "Scotland," 84 pages, has 837. "Medicine," 309 pages, and "Pharmacy" have each an index. The plan of the work was enlarged by the addition of history and biography, which encyclopaedias in general had long omitted. "From the time of the second edition of this work, every cyclopaedia of note, in England and elsewhere, has been a cyclopaedia, not solely of arts and sciences, but of the whole wide circle of general learning and miscellaneous information" (*Quarterly Review*, cxiii. 362). Smellie was applied to by Bell to edit the second edition, and to take a share of one-third in the work; but he refused, because the other persons concerned in it, at the suggestion of "a very distinguished nobleman of very high rank" (said by Professor Napier to have been the duke of Buccleuch), insisted upon the introduction of a system of general biography which he considered inconsistent with the character of a dictionary of arts and sciences. James Tytler, M.A., seems to have been selected as the next most eligible compiler. His father, a man of extensive knowledge, was 53 years minister of Fearn in Forfarshire, and died in 1785. Tytler (outlawed by the High Court of Justiciary, 7th of January 1793, buried at Salem in Massachusetts on the 11th of January 1804, aged fifty-eight) "wrote," says Watt, "many of the scientific treatises and histories, and almost all the minor articles" (*Bibliotheca Brit.*).

After about a year's preparation, the third edition was announced in 1787; the first number was published early in 1788, and the first volume in October 1788. There were to be 300 weekly numbers, price 1s. each, forming 30 parts at 10s. 6d. each, and 15 volumes, with 360 plates. It was completed in 1797 in 18 vols. 4to, containing 14,579 pages and 542 plates. Among the multifarious articles represented in the frontispiece, which was required by the traditional fashion of the period, is a balloon. The maps are, as in subsequent editions, distributed among the articles relating to the respective countries. It was edited by Colin Macfarquhar as far as the article "Mysteries" (by Dr Doig, vol. xii.), when he died, on the 2nd of April 1793, in his forty-eighth year, "worn out," says Constable, "by fatigue and anxiety of mind." His children's trustees and Andrew Bell requested George Gleig of Stirling (consecrated on the 30th of October 1808 assistant and successor to the bishop of Brechin), who had written about twelve articles, to edit the rest of the work; "and for the time, and the limited sum allowed him for the reward of contributors, his part in the work was considered very well done" (Constable, ii. 312). Professor Robison was induced by Gleig to become a contributor. He first revised the article "Optics," and then wrote a series of articles on natural philosophy, which attracted great attention and were long highly esteemed by scientific men. The sub-editors were James Walker (Primus Scotiae Episcopus 27th of May 1837, died on the 5th of March 1841, aged seventy) until 1795, then James Thomson, succeeded in November 1796 by his brother Thomas, afterwards professor of chemistry at Glasgow, who remained connected with the *Encyclopaedia* until 1800. According to Kerr (*Smellie's Life*, i. 364-365), 10,000 copies were printed, and the profit to the proprietors was £42,000, besides the payments for their respective work in the conduct of the publication as tradesmen,—Bell as engraver of all the plates, and Macfarquhar as sole printer. According to Constable (*Memoirs*, ii. 312), the impression was begun at 5000 copies, and concluded with a sale of 13,000. James Hunter, "an active bookseller of no character," who had a shop in Middle Row, Holborn, sold the book to the trade, and on his failure Thomson Bonar, a wine merchant, who had married Bell's daughter, became the seller of the book. He quarrelled with his father-in-law, who would not see him for ten years before his death in 1809. When the edition was completed, the copyright and remaining books were sold in order to wind up the concern, and "the whole was purchased by Bell, who gave £13 a copy, sold all the complete copies to the trade, printed up the odd volumes, and thus kept the work in the market for several years" (Constable, ii. 312).

The supplement of the third edition, printed for Thomson Bonar, and edited by Gleig, was published in 1801 in 2 vols. 4to, containing 1624 pages and 50 copperplates engraved by D. Lizars. In the dedication to the king, dated Stirling, 10th December 1800, Dr Gleig says: "The French *Encyclopédie* had been accused, and justly accused, of having disseminated far and wide the seeds of anarchy and atheism. If the *Encyclopaedia Britannica* shall in any degree counteract the tendency of that pestiferous work, even these two volumes will not be wholly unworthy of your Majesty's attention." Professor Robison added 19 articles to the series he had begun when the third edition was so far advanced. Professor Playfair assisted in "Mathematics." Dr Thomas Thomson wrote "Chemistry," "Mineralogy" and other articles, in which the use of symbols was for the first time introduced into chemistry; and these articles formed the first outline of his *System of Chemistry*, published at Edinburgh in 1802, 8vo, 4 vols.; the sixth edition, 1821.

The fourth edition, printed for Andrew Bell, was begun in 1800 or 1801, and finished in 1810 in 20 vols. 4to, containing 16,033 pages, with 581 plates engraved by Bell. The dedication to the king, signed Andrew Bell, is dated Lauristoun, Edinburgh, 1809. The preface is that of the third edition with the necessary alterations and additions in the latter part. No articles were reprinted from the supplement, as Bell had not the copyright. Professor Wallace's articles on mathematics were much valued, and raised the scientific character of the work. Dr Thomas Thomson declined the editorship, and recommended Dr James Millar, afterwards editor of the *Encyclopaedia Edinensis* (died on the 13th of July 1827). He was fond of natural history and a good chemist, but, according to Constable, slow and dilatory and not well qualified. Andrew Bell died on the 10th of June 1809, aged eighty-three, "leaving," says Constable, "two sets of trustees, one literary to make the money, the other legal to lay it out after it was made." The edition began with 1250 copies and concluded at 4000, of which two-thirds passed through the hands of Constable's firm. Early in 1804 Andrew Bell had offered Constable and his partner Hunter the copyright of the work, printing materials, &c., and all that was then printed of the fourth edition, for £20,000. This offer was in agitation in March 1804, when the two partners were in London. On the 5th of May 1804, after Lord Jeffrey's arrival in Edinburgh, as he relates to Francis Horner, they entrusted him with a design, on which he found that most of his friends had embarked with great eagerness, "for publishing an entire new encyclopaedia upon an improved plan. Stewart, I understand, is to lend his name, and to write the preliminary discourse, besides other articles. Playfair is to superintend the mathematical department, and Robison the natural philosophy. Thomas Thomson is extremely zealous in the cause. W. Scott has embraced it with great affection. . . . The authors are to be paid at least as well as reviewers, and are to retain the copyright of their articles for separate publication if they think proper" (Cockburn, *Life of Lord Jeffrey*, 1852, ii. 90). It was then, perhaps, that Constable gave £100 to Bonar for the copyright of the supplement.

The fifth edition was begun immediately after the fourth as a mere reprint. "The management of the edition, or rather mismanagement, went on under the *lawyer trustees* for several years, and at last the whole property was again brought to the market by public sale. There were about 1800 copies printed of the five first volumes, which formed one lot, the copyright formed another lot, and so on. The whole was purchased by myself and in my name for between £13,000 and £14,000, and it was said by the wise booksellers of Edinburgh and others that I had completely ruined myself and all connected with me by a purchase to such an enormous amount; this was early in 1812" (Constable, ii. 314). Bonar, who lived next door to the printing office, thought he could conduct the book, and had resolved on the purchase. Having a good deal of money, he seemed to Constable a formidable rival, whose alliance was to be secured. After "sundry interviews" it was agreed that Constable should buy the copyright in his own name, and that Bonar should have one-third, and also one-third of the copyright of the supplement, for which he gave £200. Dr James Millar corrected and revised the last 15 volumes. The preface is dated the 1st of December 1814. The printing was superintended by Bonar, who died on the 26th of July 1814. His trustees were repaid his advances on the work, about £6000, and the copyright was valued at £11,000, of which they received one-third, Constable adding £500, as the book had been so extremely successful. It was published in 20 vols., 16,017 pages, 582 plates, price £36, and dated 1817.

Soon after the purchase of the copyright, Constable began to prepare for the publication of a supplement, to be of four or, at the very utmost, five volumes. "The first article arranged for was one on 'Chemistry' by Sir Humphry Davy, but he went abroad [in October 1813] and I released him from his engagement, and employed Mr Brande; the second article was Mr Stewart's Dissertation, for which I agreed to pay him £1000, leaving the extent of it to himself, but with this understanding, that it was not to be under ten sheets, and might extend to twenty" (Constable, ii. 318). Dugald Stewart, in a letter to Constable, the 15th of November 1812, though he declines to engage to execute any of his own suggestions, recommends that four discourses should "stand in front," forming "a general map of the various departments of human knowledge," similar to "the excellent discourse prefixed by D'Alembert to the French *Encyclopédie*," together with historical sketches of the progress since Bacon's time of modern discoveries in metaphysical, moral and political philosophy, in mathematics and physics, in chemistry, and in zoology, botany and mineralogy. He would only promise to undertake the general map and the first historical sketch, if his health and other engagements permitted, after the second volume of his *Philosophy of the Human Mind* (published in 1813) had gone to press. For the second he recommended Playfair, for chemistry Sir Humphry Davy. He received £1000 for the first part of his dissertation (166 pages), and £700 for the second (257 pages), the right of publication being limited to the Supplement and *Encyclopaedia*. Constable next contracted with Professor Playfair for a dissertation "to be equal in length or not to Mr Stewart's, for £250; but a short time afterwards I felt that to pay one eminent individual £1000 because he would not take less would be quite unfair, and I wrote to the worthy Professor that I had fixed his payment at £500." Constable gave him £500 for the first part (127 pages), and would have given as much for the second (90 pages) if it had been as long. His next object was to find out the greatest defects in the book, and he gave Professor Leslie £200 and Graham Dalyell £100 for looking over it. He then wrote out a prospectus and submitted it in print to Stewart, "but the cautious philosopher referred" him to Playfair, who "returned it next day very greatly improved." For this Constable sent him six dozen of very fine old sherry, only feeling regret that he had nothing better to offer. He at first intended to have two editors, "one for the strictly literary and the other for the scientific department." He applied to Dr Thomas Brown, who "preferred writing trash of poetry to useful and lucrative employment." At last he fixed on Mr Macvey Napier (born 1777), whom he had known from 1798, and who "had been a hard student, and at college laid a good foundation for his future career, though more perhaps in general information than in what would be, strictly speaking, called scholarship; this, however, does not fit him the less for his present task." Constable, in a letter dated the 11th of June 1813, offered him £300 before the first part went to press, £150 on the completion at press of each of the eight half volumes, £500 if the work was reprinted or extended beyond 7000 copies and £200 for incidental expenses. "In this way the composition of the four volumes, including the introductory dissertations, will amount to considerably more than £9000." In a postscript the certain payment is characteristically increased to £1575, the contingent to £735, and the allowance for incidental expenses to £300 (Constable, ii. 326). Napier went to London, and obtained the co-operation of many literary men. The supplement was published in half-volume parts from December 1816 to April 1824. It formed six volumes 4to, containing 4933 pages, 125 plates, 9 maps, three dissertations and 669 articles, of which a list is given at the end. The first dissertation, on the "progress of metaphysical, ethical and political philosophy," was by Stewart, who completed his plan only in respect to metaphysics. He had thought it would be easy to adapt the intellectual map or general survey of human knowledge, sketched by Bacon and improved by D'Alembert, to the advanced state of the sciences, while its unrivalled authority would have softened criticism. But on closer examination he found the logical views on which this systematic arrangement was based essentially erroneous; and, doubting whether the time had come for a successful repetition of this bold experiment, he forebore to substitute a new scheme of his own. Sir James Mackintosh characterized this discourse as "the most splendid of Mr. Stewart's works, a composition which no other living writer of English prose has equalled" (*Edinburgh Review*, xxvii. 191, September 1816). The second dissertation, "On the progress of mathematics and physics," was by Playfair, who died 19th July 1819, when he had only finished the period of Newton and Leibnitz. The third, by Professor Brande, "On the progress of chemistry from the early middle ages to 1800," was the only one completed. These historical dissertations were admirable and delightful compositions, and important and interesting additions to the *Encyclopaedia*; but it is difficult to see why they should form a separate department distinct from the general alphabet. The preface, dated March 1824, begins with an account of the more important previous encyclopaedias, relates the history of this to the sixth edition, describes the preparation for the supplement and gives an "outline of the contents," and mentions under each great division of knowledge the principal articles and their authors' names, often with remarks on the characters of both. Among the distinguished contributors were Leslie, Playfair, Ivory, Sir John Barrow, Tredgold, Jeffrey, John Bird Sumner, Blanco White, Hamilton Smith and Hazlitt. Sir Walter Scott, to gratify his generous friend Constable, laid aside *Waverley*, which he was completing for publication, and in April and May 1814 wrote "Chivalry." He also wrote "Drama" in November 1818, and "Romance" in the summer of 1823. As it seemed to the editor that encyclopaedias had previously attended little to political philosophy, he wrote "Balance of Power," and procured from James Mill "Banks for Savings," "Education," "Law of Nations," "Liberty of the Press," and other articles, which, reprinted cheaply, had a wide circulation. M'Culloch wrote "Corn Laws," "Interest," "Money," "Political Economy," &c. Mr Ricardo wrote "Commerce" and "Funding System," and Professor Malthus, in his article "Population," gave a comprehensive summary of the facts and reasonings on which his theory rested. In the article "Egypt" Dr Thomas Young "first gave to the public an extended view of the results of his successful interpretation of the hieroglyphic characters on the stone of Rosetta," with a vocabulary of 221 words in English, Coptic, Hieroglyphic and Enchorial, engraved on four plates. There were about 160 biographies, chiefly of persons who had died within the preceding 30 years. Constable "wished short biographical notices of the first founders of this great work, but they were, in the opinion of my editor, too insignificant to entitle them to the rank which such separate notice, it was supposed, would have given them as literary men, although his own consequence in the world had its origin in their exertions" (*Memoirs*, ii. 326). It is to be regretted that this wish was not carried out, as was done in the latter volumes of Zedler. Arago wrote "Double Refraction" and "Polarization of Light," a note to which mentions his name as author. Playfair wrote "Aepinus," and "Physical Astronomy." Biot wrote "Electricity" and "Pendulum." He "gave his assistance with alacrity," though his articles had to be translated. Signatures, on the plan of the *Encyclopédie*, were annexed to each article, the list forming a triple alphabet, A to XXX, with the full names of the 72 contributors arranged apparently in the order of their first occurrence. At the end of vol. vi. are Addenda and Corrigenda, including "Interpolation," by Leslie, and "Polarization of Light," by Arago.

The sixth edition, "revised, corrected and improved," appeared in half-volume parts, price 16s. in boards, vol. xx. part ii. completing the work in May 1823. Constable, thinking it not wise to reprint so large a book year after year without correction, in 1820 selected Mr Charles Maclaren (1782–1866), as editor. "His attention was chiefly directed to the historical and geographical articles. He was to keep the press going, and have the whole completed in three years." He wrote "America," "Greece," "Troy," &c. Many of the large articles as "Agriculture," "Chemistry," "Conchology," were new or nearly so; and references were given to the supplement. A new edition in 25 vols. was contemplated, not to be announced till a certain time after the supplement was finished; but Constable's house stopped payment on the 19th of January 1826, and his copyrights were sold by auction. Those of the *Encyclopaedia* were bought by contract, on the 16th of July 1828, for £6150, by Thomas Allan, proprietor of the *Caledonian Mercury*, Adam Black, Abram Thomson, bookbinder, and Alexander Wight, banker, who, with the trustee of Constable's estate, had previously begun the seventh edition. Not many years later Mr Black purchased all the shares and became sole proprietor.

The seventh edition, 21 vols. 4to (with an index of 187 pages, compiled by Robert Cox), containing 17,101 pages and 506 plates, edited by Macvey Napier, assisted by James Browne, LL.D., was begun in 1827, and published from March 1830 to January 1842. It was reset throughout and stereotyped. Mathematical diagrams were printed in the text from woodcuts. The first half of the preface was nearly that of the supplement. The list of signatures, containing 167 names, consists of four alphabets with additions, and differs altogether from that in the supplement: many names are omitted, the order is changed and 103 are added. A list follows of over 300 articles, without signatures, by 87 writers. The dissertations—1st, Stewart's, 289 pages; 2nd, "Ethics" (136 pages), by Sir James Mackintosh, whose death prevented the addition of "Political Philosophy"; 3rd, Playfair's, 139 pages; 4th, its continuation by Sir John Leslie, 100 pages—and their index of 30 pages, fill vol. i. As they did not include Greek philosophy, "Aristotle," "Plato" and "Socrates" were supplied by Dr Hampden, afterwards bishop of Hereford. Among the numerous contributors of eminence, mention may be made of Sir David Brewster, Prof. Phillips, Prof. Spalding, John Hill Burton, Thomas De Quincey, Patrick Fraser Tytler, Capt. Basil Hall, Sir Thomas Dick Lauder, Antonio Panizzi, John Scott Russell and Robert Stephenson. Zoology was divided into 11 chief articles, "Mammalia," "Ornithology," "Reptilia," "Ichthyology," "Mollusca," "Crustacea," "Arachnides," "Entomology," "Helminthology," "Zoophytes," and "Animalcule"—all by James Wilson.

The eighth edition, 1853–1860, 4to, 21 vols. (and index of 239 pages; 1861), containing 17,957 pages and 402 plates, with many woodcuts, was edited by Dr Thomas Stewart Traill, professor of medical jurisprudence in Edinburgh University. The dissertations were reprinted, with one on the "Rise, Progress and Corruptions of Christianity" (97 pages), by Archbishop Whately, and a continuation of Leslie's to 1850, by Professor James David Forbes, 198 pages, the work of nearly three years, called by himself his "magnum opus" (*Life*, pp. 361, 366). Lord Macaulay, Charles Kingsley, Isaac Taylor, Hepworth Dixon, Robert Chambers, Rev. Charles Merivale, Rev. F. W. Farrar, Sir John Richardson, Dr Scoresby, Dr Hooker, Henry Austin Layard, Edw. B. Eastwick, John Crawfurd, Augustus Petermann, Baron Bunsen, Sir John Herschel, Dr Lankester, Professors Owen, Rankine, William Thomson, Aytoun, Blackie, Daniel Wilson and Jukes, were some of the many eminent new contributors found among the 344 authors, of whom an alphabetical list is given, with a key to the signatures. In the preface a list of 279 articles by 189 writers, classed under 15 heads, is given. This edition was not wholly reset like the seventh, but many long articles were retained almost or entirely intact.

The publication of the ninth edition (A. & C. Black) was commenced in January 1875, under the editorship of Thomas Spencer Baynes until 1880, and subsequently of W. Robertson Smith, and completed in 1889, 24 vols., with index. This great edition retained a certain amount of the valuable material in the eighth, but was substantially a new work; and it was universally acknowledged to stand in the forefront of the scholarship of its time. Its contributors included the most distinguished men of letters and of science. In 1898 a reprint, sold at about half the original price, and on the plan of payment by instalments, was issued by *The Times* of London; and in 1902, under the joint editorship of Sir Donald Mackenzie Wallace, President Arthur T. Hadley of Yale University, and Hugh Chisholm, eleven supplementary volumes were published, forming, with the 24 vols. of the ninth edition, a tenth edition of 35 volumes. These included a volume of maps, and an elaborate index (vol. 35) to the whole edition, comprising some 600,000 entries. In May 1903 a start was made with the preparation of the 11th edition, under the general editorship of Hugh Chisholm, with W. Alison Phillips as chief assistant-editor, and a staff of editorial assistants, the whole work of organization being conducted up to December 1909 from *The Times* office. Arrangements were then made by which the copyright and control of the *Encyclopaedia. Britannica* passed to Cambridge University, for the publication at the University Press in 1910–1911 of the 29 volumes (one being Index) of the 11th edition, a distinctive feature of this issue being the appearance of the whole series of volumes practically at the same time.

A new and enlarged edition of the *Encyclopédie* arranged as a system of separate dictionaries, and entitled *Encyclopédie méthodique ou par ordre de matières*, was undertaken by Charles Joseph Panckoucke, a publisher of Paris (born at Lille on the 26th of November 1736, died on the 19th of December 1798). His privilege was dated the 20th of June 1780. The articles belonging to different subjects would readily form distinct dictionaries, although, having been constructed for an alphabetical plan, they seemed unsuited for any system wholly methodical. Two copies of the book and its supplement were cut up into articles, which were sorted into subjects. The division adopted was: 1, mathematics; 2 physics; 3, medicine; 4, anatomy and physiology; 5, surgery; 6, chemistry, metallurgy and pharmacy; 7, agriculture; 8, natural history of animals, in six parts; 9, botany; 10, minerals; 11, physical geography; 12, ancient and modern geography; 13, antiquities; 14, history; 15, theology; 16, philosophy; 17, metaphysics, logic and morality; 18, grammar and literature; 19, law; 20, finance; 21, political economy; 22, commerce; 23, marine; 24, art militaire; 25, beaux arts; 26, arts et métiers—all forming distinct dictionaries entrusted to different editors. The first object of each editor was to exclude all articles belonging to other subjects, and to take care that those of a doubtful nature should not be omitted by all. In some words (such as air, which belonged equally to chemistry, physics and medicine) the methodical arrangement has the unexpected effect of breaking up the single article into several widely separated. Each dictionary was to have an introduction and a classified table of the principal articles. History and its minor parts, as inscriptions, fables, medals, were to be included. Theology, which was neither complete, exact nor orthodox, was to be by the abbé Bergier, confessor to Monsieur. The whole work was to be completed and connected together by a Vocabulaire Universel, 1 vol. 4to, with references to all the places where each word occurred, and a very exact history of the *Encyclopédie* and its editions by Panckoucke. The prospectus, issued early in 1782, proposed three editions—84 vols. 8vo, 43 vols. 4to with 3 columns to a page, and 53 vols. 4to of about 100 sheets with 2 columns to a page, each edition having 7 vols. 4to of 250 to 300 plates each. The subscription was to be 672 livres from the 15th of March to July 1782, then 751, and 888 after April 1783. It was to be issued in livraisons of 2 vols. each, the first (jurisprudence, vol. i., literature, vol. i.) to appear in July 1782, and the whole to be finished in 1787. The number of subscribers, 4072, was so great that the subscription list of 672 livres was closed on the 30th of April. Twenty-five printing offices were employed, and in November 1782 the 1st livraison (jurisprudence, vol. i., and half vol. each of arts et métiers and histoire naturelle) was issued. A Spanish prospectus was sent out, and obtained 330 Spanish subscribers, with the inquisitor-general at their head. The complaints of the subscribers and his own heavy advances, over 150,000 livres, induced Panckoucke, in November 1788, to appeal to the authors to finish the work. Those *en retard* made new contracts, giving their word of honour to put their parts to press in 1788, and to continue them without interruption, so that Panckoucke hoped to finish the whole, including the vocabulary (4 or 5 vols.), in 1792. Whole sciences, as architecture, engineering, hunting, police, games, &c., had been overlooked in the prospectus; a new division was made in 44 parts, to contain 51 dictionaries and about 124 vols. Permission was obtained on the 27th of February 1789, to receive subscriptions for the separate dictionaries. Two thousand subscribers were lost by the Revolution. The 50th livraison appeared on the 23rd of July 1792, when all the dictionaries eventually published had been begun except seven—jeux familiers and mathématiques, physics, art oratoire, physical geography, chasses and pêches; and 18 were finished,—mathematics, games, surgery, ancient and modern geography, history, theology, logic, grammar, jurisprudence, finance, political economy, commerce, marine, arts militaires, arts académiques, arts et métiers, encyclopediana. Supplements were added to military art in 1797, and to history in 1807, but not to any of the other 16, though required for most long before 1832. The publication was continued by Henri Agasse, Panckoucke's son-in-law, from 1794 to 1813, and then by Mme Agasse, his widow, to 1832, when it was completed in 102 livraisons or 337 parts, forming 166½ vols. of text, and 51 parts containing 6439 plates. The letterpress issued with the plates amounts to 5458 pages, making with the text 124,210 pages. To save expense the plates belonging to architecture were not published. Pharmacy (separated from chemistry), minerals, education, ponts et chaussées had been announced but were not published, neither was the Vocabulaire Universel, the key and index to the whole work, so that it is difficult to carry out any research or to find all the articles on any subject. The original parts have been so often subdivided, and have been so added to by other dictionaries, supplements and appendices, that, without going into great detail, an exact account cannot be given of the work, which contains 88 alphabets, with 83 indexes, and 166 introductions, discourses, prefaces, &c. Many dictionaries have a classed index of articles; that of économie politique is very excellent, giving the contents of each article, so that any passage can be found easily. The largest dictionaries are medicine, 13 vols., 10,330 pages; zoology, 7 dictionaries, 13,645 pages, 1206 plates; botany, 12,002 pages, 1000 plates (34 only of cryptogamic plants); geography, 3 dictionaries and 2 atlases, 9090 pages, 193 maps and plates; jurisprudence (with police and municipalities), 10 vols., 7607 pages. Anatomy, 4 vols., 2866 pages, is not a dictionary but a series of systematic treatises. Assemblée Nationale was to be in three parts,—(1) the history of the Revolution, (2) debates, and (3) laws and decrees. Only vol. ii., debates, appeared, 1792, 804 pages, Absens to Aurillac. Ten volumes of a Spanish translation with a vol. of plates were published at Madrid to 1806—viz. historia natural, i. ii.; grammatica, i.; arte militar, i., ii.; geografia, i.-iii.; fabricas, i., ii., plates, vol. i. A French edition was printed at Padua, with the plates, says Peignot, very carefully engraved. Probably no more unmanageable body of dictionaries has ever been published except Migne's *Encyclopédie théologique*, Paris, 1844–1875, 4to, 168 vols., 101 dictionaries, 119,059 pages.

No work of reference has been more useful and successful, or more frequently copied, imitated and translated, than that known as the *Conversations Lexikon* of Brockhaus. It was begun as *Conversations Lexikon mit vorzüglicher Rücksicht auf die gegenwärtigen Zeiten*, Leipzig, 1796 to 1808, 8vo, 6 vols., 2762 pages, by Dr Gotthelf Renatus Löbel (born on the 1st of April 1767 at Thalwitz near Wurzen in Saxony, died on the 14th of February 1799), who intended to supersede Hübner, and included geography, history, and in part biography, besides mythology, philosophy, natural history, &c. Vols. i. iv. (A to R) appeared 1796 to 1800, vol. v. in 1806. Friedrich Arnold Brockhaus (*q.v.*) bought the work with its copyright on the 25th of October 1808, for 1800 thalers from the printer, who seems to have got it in payment of his bill. The editor, Christian Wilhelm Franke, by contract dated the 16th of November, was to finish vol. vi. by the 5th of December, and the already projected supplement, 2 vols., by Michaelmas 1809, for 8 thalers a printed sheet. No penalty was specified, but, says his grandson, Brockhaus was to learn that such contracts, whether under penalty or not, are not kept, for the supplement was finished only in 1811. Brockhaus issued a new impression as *Conversations Lexikon oder kurzgefasstes Handwörterbuch*, &c., 1809–1811, and on removing to Altenburg in 1811 began himself to edit the 2nd edition (1812–1819, 10 vols.), and, when vol. iv. was published, the 3rd (1814–1819). He carried on both editions together until 1817, when he removed to Leipzig, and began the 4th edition as *Allgemeine deutsche Real-encyclopädie für die gebildeten Stände. Conversations Lexikon.* This title was, in the 14th edition, changed to that of *Brockhaus' Konversations Lexicon.* The 5th edition was at once begun, and was finished in eighteen months. Dr Ludwig Hain assisted in editing the 4th and 5th editions until he left Leipzig in April 1820, when Professor F. C. Hasse took his place. The 12,000 copies of the 5th edition being exhausted while vol. x. was at press, a 2nd unaltered impression of 10,000 was required in 1820 and a 3rd of 10,000 in 1822. The 6th edition, 10 vols., was begun in September 1822. Brockhaus died in 1823, and his two eldest sons, Friedrich and Heinrich, who carried on the business for the heirs and became sole possessors in 1829, finished the edition with Hasse's assistance in September 1823. The 7th edition (1827–1829, 12 vols., 10,489 pages, 13,000 copies, 2nd impression 14,000) was edited by Hasse. The 8th edition (1833–1836, 12 vols., 10,689 pages, 31,000 copies to 1842), begun in the autumn of 1832, ended May 1837, was edited by Dr Karl August Espe (born February 1804, died in the Irrenanstalt at Stötteritz near Leipzig on the 24th of November 1850) with the aid of many learned and distinguished writers. A general index, Universal Register, 242 pages, was added in 1839. The 9th edition (1843–1847, 15 vols., 11,470 pages, over 30,000 copies) was edited by Dr Espe. The 10th edition (1851–1855, 12,564 pages) was also in 15 vols., for convenience in reference, and was edited by Dr August Kurtzel aided by Oskar Pilz. Friedrich Brockhaus had retired in 1849; Dr Heinrich Edward, the elder son of Heinrich, made partner in 1854, assisted in this edition, and Heinrich Rudolf, the younger son, partner since 1863, in the 11th (1864–1868, 15 vols. of 60 sheets, 13,366 pages).

Kurtzel died on the 24th of April 1871, and Pilz was sole editor until March 1872, when Dr Gustav Stockmann joined, who was alone from April until joined by Dr Karl Wippermann in October. Besides the Universal Register of 136 pages and about 50,000 articles, each volume has an index. The supplement, 2 vols., 1764 pages, was begun in February 1871, and finished in April 1873. The 12th edition, begun in 1875 was completed in 1879 in 15 vols., the 13th edition (1882–1887), in 16 vols., and the 14th (1901–1903) in 16 vols. with a supplementary volume in 1904. The *Conversations Lexicon* is intended, not for scientific use, but to promote general mental improvement by giving the results of research and discovery in a simple and popular form without extended details. The articles, often too brief, are very excellent and trustworthy, especially on German subjects, give references to the best books, and include biographies of living men.

One of the best German encyclopaedias is that of Meyer, *Neues Konversations-Lexicon.* The first edition, in 37 vols., was published in 1839–1852. The later editions, following closely the arrangement of Brockhaus, are the 4th (1885–1890, 17 vols.), the 5th (1894–1898, 18 vols.), and the 6th (begun in 1902).

The most copious German encyclopaedia is Ersch and Gruber's *Allgemeine Encyklopädie der Wissenschaften und Künste*, Leipzig. It was designed and begun in 1813 by Professor Johann Samuel Ersch (born at Gross Glogau on the 23rd of June 1766, chief librarian at Halle, died on the 16th of January 1828) to satisfy the wants of Germans, only in part supplied by foreign works. It was stopped by the war until 1816, when Professor Hufeland (born at Danzig on the 19th of October 1760) joined, but he died on the 25th of November 1817 while the specimen part was at press. The editors of the different sections at various times have been some of the best-known men of learning in Germany, including J. G. Gruber, M. H. E. Meier, Hermann Brockhaus, W. Müller and A. G. Hoffmann of Jena.

The work is divided into three sections (1) A-G, of which 99 vols. had appeared by 1905, (2) H-N, 43 vols., (3) O-Z, 25 vols. All articles bear the authors' names, and those not ready in time were placed at the end of their letter. The longest in the work is Griechenland, vols. 80-87, 3668 pages, with a table of contents. It began to appear after vol. 73 (Götze to Gondouin), and hence does not come in its proper place, which is in vol. 91. Gross Britannien contains 700 pages, and Indien by Benfey 356.

The *Encyclopaedia Metropolitana* (London, 1845, 4to, 28 vols., issued in 59 parts in 1817–1845, 22,426 pages, 565 plates) professed to give sciences and systematic arts entire and in their natural sequence, as shown in the introductory treatise on method by S. T. Coleridge. "The plan was the proposal of the poet Coleridge, and it had at least enough of a poetical character to be eminently unpractical" (*Quarterly Review*, cxiii., 379). However defective the plan, the excellence of many of the treatises by Archbishop Whately, Sir John Herschel, Professors Barlow, Peacock, de Morgan, &c., is undoubted. It is in four divisions, the last only being alphabetical:—I. *Pure Sciences*, 2 vols., 1813 pages, 16 plates, 28 treatises, includes grammar, law and theology; II. *Mixed and Applied Sciences*, 8 vols., 5391 pages, 437 plates, 42 treatises, including fine arts, useful arts, natural history and its "application," the medical sciences; III. *History and Biography*, 5 vols., 4458 pages, 7 maps, containing biography (135 essays) chronologically arranged (to Thomas Aquinas in vol. 3), and interspersed with (210) chapters on history (to 1815), as the most philosophical, interesting and natural form (but modern lives were so many that the plan broke down, and a division of biography, to be in 2 vols., was announced but not published); IV. *Miscellaneous*, 12 vols., 10,338 pages, 105 plates, including geography, a dictionary of English (the first form of Richardson's) and descriptive natural history. The index, 364 pages, contains about 9000 articles. A re-issue in 38 vols. 4to, was announced in 1849. Of a second edition 42 vols. 8vo, 14,744 pages, belonging to divisions i. to iii., were published in 1849–1858.

The very excellent and useful *English Cyclopaedia* (London, 1854–1862, 4to, 23 vols., 12,117 pages; supplements, 1869–1873, 4 vols., 2858 pages), conducted by Charles Knight, based on the *Penny Cyclopaedia* (London, 1833–1846, 4to, 29 vols., 15,625 pages), of which he had the copyright, is in four divisions all alphabetical, and evidently very unequal as classes:—1, geography; 2, natural history; 3, biography (with 703 lives of living persons); 4, arts and sciences. The synoptical index, 168 pages, has four columns on a page, one for each division, so that the order is alphabetical and yet the words are classed.

Chambers's Encyclopaedia (Edinburgh, W. & R. Chambers), 1860–1868, 8vo, 10 vols., 8283 pages, edited in part by the publishers, but under the charge of Dr Andrew Findlater as "acting editor" throughout, was founded on the 10th edition of *Brockhaus*. A revised edition appeared in 1874, 8320 pages. In the list of 126 contributors were J.H. Burton, Emmanuel Deutsch, Professor Goldstücker, &c. The index of matters not having special articles contained about 1500 headings. The articles were generally excellent, more especially on Jewish literature, folk-lore and practical science; but, as in *Brockhaus*, the scope of the work did not allow extended treatment. A further revision took place, and in 1888–1892 an entirely new edition was published, in 10 vols., still further new editions being issued in 1895 and in 1901.

An excellent brief compilation, the *Harmsworth Encyclopaedia* (1905), was published in 40 fortnightly parts (sevenpence each) in England, and as *Nelson's Encyclopaedia* (revised) in 12 vols. (1906) in America. It was originally prepared for Messrs Nelson of Edinburgh and for the Carmelite Press, London.

In the United States various encyclopaedias have been published, but without rivalling there the *Encyclopædia Britannica*, the 9th edition of which was extensively pirated. Several American Supplements were also issued.

The *New American Cyclopaedia*, New York (Appleton & Co.), 1858–1863, 16 vols., 12,752 pages, was the work of the editors, George Ripley and Charles Anderson Dana, and 364 contributors, chiefly American. A supplementary work, the *American Annual Cyclopaedia*, a yearly 8vo vol. of about 800 pages and 250 articles, was started in 1861, but ceased in 1902. In a new edition, the *American Cyclopaedia*, 1873–1876, 8vo, 16 vols., 13,484 pages, by the same editors, 4 associate editors, 31 revisers and a librarian, each article passed through the hands of 6 or 8 revisers.

Other American encyclopaedias are Alvin J. Johnson's *New Universal Cyclopaedia*, 1875–1877, in 4 vols., a new edition of which (excellently planned) was published in 8 vols., 1893–1895, under the name of *Johnson's Universal Cyclopaedia*; the *Encyclopaedia Americana*, edited by Francis Lieber, which appeared in 1839–1847 in 14 vols.; a new work under the same title, published in 1903–1904 in 16 vols.; the *International Cyclopaedia*, first published in 1884 (revised in 1891, 1894 and 1898), and superseded in 1902 (revised, 1906) by the *New International Encyclopaedia* in 17 vols.

In Europe a great impetus was given to the compilation of encyclopaedias by the appearance of Brockhaus' *Conversations-Lexicon* (see above), which, as a begetter of these works, must rank, in the 19th century, with the *Cyclopaedia* of Ephraim Chambers in the 18th. The following, although in no sense an exhaustive list, may be here mentioned. In France, *Le Grand Dictionnaire universel du XIX*^{e} *siècle*, of Pierre Larousse (15 vols., 1866–1876), with supplementary volumes in 1877, 1887 and 1890; the *Nouveau Larousse illustré, dictionnaire universel encyclopédique* (7 vols., 1901–1904), (this is in no way a re-issue or an abridgment of *Le Grand Dictionnaire* of Pierre Larousse); *La Grande Encyclopédie, inventaire raisonné des sciences, des lettres, et des arts*, in 31 vols. (1886–1903). In Italy, the *Nuova Enciclopedia Italiana* (14 vols., 1841–1851, and in 25 vols., 1875–1888). In Spain, the *Diccionario enciclopedico Hispano-Americano de litteratura, ciencias y artes*, published at Barcelona (25 vols., 1877–1899). The Russian encyclopaedia, *Russkiy Entsiklopedicheskiy Slovar* (41 vols., 1905, 2 supplementary vols., 1908) was begun in 1890 as a Russian version of Brockhaus' *Conversations-Lexicon*, but has become a monumental encyclopaedia, to which all the best Russian men of science and letters have contributed. Elaborate encyclopaedias have also appeared in the Polish, Hungarian, Bohemian and Rumanian languages. Of Scandinavian encyclopaedias there have been re-issues of the *Nordisk Conversations-Lexicon*, first published in 1858–1863, and of the *Svenskt Conversations-Lexicon*, first published in 1845–1851.

ENDECOTT, JOHN (*c.* 1588–1665), English colonial governor in America, was born probably at Dorchester, Dorsetshire, England, about 1588. Little is known of him before 1628, when he was one of the six "joint adventurers" who purchased from the Plymouth Company a strip of land about 60 m. wide along the Massachusetts coast and extending westward to the Pacific Ocean. By his associates Endecott was entrusted with the responsibility of leading the first colonists to the region, and with some sixty persons proceeded to Naumkeag (later Salem) where Roger Conant, a seceder from the colony at Plymouth, had begun a settlement two years earlier. Endecott experienced some trouble with the previous settlers and with Thomas Morton's settlement at "Merry Mount" (Mount Wollaston, now Quincy), where, in accordance with his strict Puritanical tenets, he cut down the maypole and dispersed the merrymakers. He was the local governor of the Massachusetts Bay Colony from the 30th of April 1629 to the 12th of June 1630, when John Winthrop, who had succeeded Matthew Cradock as governor of the company on the 20th of October 1629, brought the charter to Salem and became governor of the colony as well as of the company. In the years immediately following he continued to take a prominent part in the affairs of the colony, serving as an assistant and as a military commissioner, and commanding, although with little success, an expedition against the Pequots in 1636. At Salem he was a member of the congregation of Roger Williams, whom he resolutely defended in his trouble with the New England clerical hierarchy, and excited by Williams's teachings, cut the cross of St George from the English flag in token of his hatred of all symbols of Romanism. He was deputy-governor in 1641–1644, and governor in 1644–1645, and served also as sergeant-major-general (commander-in-chief) of the militia and as one of the commissioners of the United Colonies of New England, of which in 1658 he was president. On the death of John Winthrop in 1649 he became governor, and by annual re-elections served continuously until his death, with the exception of two years (1650–1651 and 1654–1655), when he was deputy-governor. Under his authority the colony of Massachusetts Bay made rapid progress, and except in the matter of religious intolerance—he showed great bigotry and harshness, particularly towards the Quakers—his rule was just and praiseworthy. Of him Edward Eggleston says: "A strange mixture of rashness, pious zeal, genial manners, hot temper, and harsh bigotry, his extravagances supply the condiment of humour to a very serious history—it is perhaps the principal debt posterity owes him." He died on the 15th of March 1665.

See C. M. Endicott, *Memoirs of John Endecott* (Salem, 1847), and a "Memoir of John Endecott" in *Antiquarian Papers* of the American Antiquarian Society (Worcester, Mass., 1879).

A lineal descendant, William Crowninshield Endicott (1826–1900), graduated at Harvard in 1847, was a justice of the Massachusetts supreme court in 1873–1882, and was secretary of war in President Cleveland's cabinet from 1885 to 1889. His daughter, Mary Crowninshield Endicott, was married to the English statesman Mr Joseph Chamberlain in 1888.

ENDIVE, *Cichorium Endivia*, an annual esculent plant of the natural order Compositae, commonly reputed to have been introduced into Europe from the East Indies, but, according to some authorities, more probably indigenous to Egypt. It has been cultivated in England for more than three hundred years, and is mentioned by John Gerarde in his *Herbal* (1597). There are numerous varieties of the endive, forming two groups, namely, the curled or narrow-leaved (var. *crispa*), and the Batavian or broad-leaved (var. *latifolia*), the leaves of which are not curled. The former varieties are those most used for salads, the latter being grown chiefly for culinary purposes. The plant requires a light, rich and dry soil, in an unshaded situation. In the climate of England sowing for the main crop should begin about the second or third week in June; but for plants required to be used young it may be as early as the latter half of April, and for winter crops up to the middle of August. The seed should be finely spread in drills 4 in. asunder, and then lightly covered. After reaching an inch in height the young plants are thinned; and when about a month old they may be placed out at distances of 12 or 15 in., in drills 3 in. in depth, care being taken in removing them from the seed-bed to disturb their roots as little as possible. The Batavian require more room than the curled-leaved varieties. Transplantation, where early crops are required, has been found inadvisable. Rapidity of growth is promoted by the application of liquid manures. The bleaching of endive, in order to prevent the development of the natural bitter taste of the leaves, and to improve their appearance, is begun about three months after the sowing, and is best effected either by tying the outer leaves around the inner, or, as in damp seasons, by the use of the bleaching-pot. The bleaching may be completed in ten days or so in summer, but in winter it takes three or four weeks. For late crops, protection from frost is requisite; and to secure fine winter endive, it has been recommended to take up the full-grown plants in November, and to place them under shelter, in a soil of moderately dry sand or of half-decayed peat earth. Where forcing-houses are employed, endive may be sown in January, so as to procure by the end of the following month plants ready for use.

ENDOEUS, an early sculptor, who worked at Athens in the middle of the 6th century B.C. We are told that he made an image of Athena dedicated by Callias the contemporary of Pisistratus at Athens about 564 B.C. An inscription bearing his name has been found at Athens, written in Ionian dialect. The tradition which made him a pupil of Daedalus is apparently misleading, since Daedalus had no connexion with Ionic art.

ENDOGAMY (Gr. ἔνδον, within, and γάμος, marriage), marriage within the tribe or community, the term adopted to express the custom compelling those of a tribe to marry among themselves. Endogamy was probably characteristic of the very early stages of social organization (see FAMILY), and is to-day found only among races low in the scale of civilization. As a custom it is believed to have been preceded in most lands by the far more general rule of Exogamy (*q.v.*). Lord Avebury (*Origin of Civilisation*, p. 154) points out that "there is not the opposition between exogamy and endogamy which Mr McLennan supposed." Some races which are endogamous as regards the tribe are exogamous as regards the gens. Thus the Abors, Kochs, Hos and other peoples of India, are forbidden to marry out of the tribe; but the tribe itself is divided into "keelis" or clans, and no man is allowed to take as wife a girl of his own "keeli." Endogamy must have in most cases arisen from racial pride, and a contempt, either well or ill founded, for the surrounding peoples.

Among the Ahtena of Alaska, though the tribes are extremely militant and constantly at war, the captured women are never made wives, but are used as slaves. Endogamy also prevails among tribes of Central America. With the Yerkalas of southern India a custom prevails by which the first two daughters of a family may be claimed by the maternal uncle as wives for his sons. The value of a wife is fixed at twenty pagodas (a 16th-century Indian coin equivalent to about five shillings), and should the uncle forgo his claim he is entitled to share in the price paid for his nieces. Among some of the Karen tribes marriages between near relatives are usual. The Douignaks, a branch of the Chukmas, seem to have practised endogamy; and they "abandoned the parent stem during the chiefship of Janubrix Khan about 1782. The reason of this split was a disagreement on the subject of marriages. The chief passed an order that the Douignaks should intermarry with the tribe in general. This was contrary to an ancient custom and caused discontent and eventually a break in the tribe" (Lewin's *Hill Tracts of Chittagong*, p. 65). This is interesting as being one of the few cases in which evidence of a change in this respect is available. The Kalangs of Java are endogamous, and every man must first prove his common descent before he can enter a family. The Manchu Tatars prohibit those who have the same family names from marrying. Among the Bedouins "a man has an exclusive right to the hand of his cousin." Hottentots seldom marry out of their own kraal, and David Livingstone quotes other examples. Endogamy seems to have existed in the Sandwich Islands and in New Zealand. A community of Javans near Surabaya, on the Tengger Hills, numbering about 1200 persons, distributed in about forty villages, and still following the ancient Hindu religion, is endogamous. Good examples of what biologists call "in-and-in breeding" are to be found in various fishing villages in Great Britain, such as Itchinferry, near Southampton, Portland Island, Bentham in Yorkshire, Mousehole and Newlyn in Mountsbay, Cornwall, Boulmer near Alnwick (where almost all the inhabitants are called Stephenson, Stanton or Stewart), Burnmouth, Ross and (to some extent) Eyemouth in Berwickshire, Boyndie in Banffshire, Rathen in Aberdeenshire, Buckhaven in Fifeshire, Portmahomack and Balnabruach in Eastern Ross. In France may be mentioned the commune of Batz, near Le Broisic in Loire-Inférieur, many of the central cantons of Brétagne, and the singular society called Foréatines—supposed to be of Irish descent—living between St Arnaud and Bourges. Many other European examples might be mentioned, such as the Marans of Auvergne, a race of Spanish converted Jews accused of introducing syphilis into France; the Burins and Sermoyers, chiefly cattle-breeders, scattered over the department of Ain and especially in the arrondissement of Bourg-en-Bresse; the Vaquéros, shepherds in the Asturias Mountains; and the Jewish Chuetas of Majorca.

See Gilbert Malcolm Sproat's *Scenes and Studies of Savage Life*; Westermarck's *History of Human Marriage* (1894); Lord Avebury's *Origin of Civilisation* (1902); J. F. McLennan's *Primitive Marriage* (1865).

ENDOR, an ancient town of Palestine, chiefly memorable as the abode of the sorceress whom Saul consulted on the eve of the battle of Gilboa, in which he perished (1 Sam. xxviii. 5-25). According to a psalmist (Ps. lxxxiii. 9) it was the scene of the rout of Jabin and Sisera. Although situated in the territory of the tribe of Issachar, it was assigned to Manasseh. In the time of Eusebius and Jerome Endor existed as a large village 5 m. south of Mount Tabor; there is still a poor village of the same name on the slope of Jebel Dahi, near which are numerous caves.

For a description of the locality see Stanley, *Sinai and Palestine*, p. 337.

ENDOSPORA, a natural group or class of the Sporozoa, consisting of the orders Myxosporidia, Actinomyxidia, Sarcosporidia and Haplosporidia, together with various insufficiently-known forms (Sero- and Exosporidia), regarded at present as Sporozoa *incertae sedis*. The distinguishing feature of the group is that the spore-mother-cells (pansporoblasts) arise in the interior of the body of the parent-individual; in other words, sporulation is endogenous. Another very general character—though not so universal—is that the adult trophozoite possesses more than one nucleus, usually many (*i.e.* it is multinucleate). In the majority of forms, though apparently not in all (*e.g.* certain Microsporidia), sporulation goes on coincidently with growth and trophic life. With regard to the origin of the group, the probability is greatly in favour of a Rhizopod ancestry. The entire absence, at any known period, of a flagellate or even gregariniform phase; on the other hand, the amoeboid nature of the trophozoites in very many cases together with the formation of pseudopodia; and, lastly, the simple endogenous spore-formation characteristic of the primitive forms,—are all points which support this view, and exclude any hypothesis of a Flagellate origin, such as, on the contrary, is probably the case in the Ectospora (*q.v.*).

1. Order **Myxosporidia**. The Myxosporidia, or, more correctly, the dense masses formed by their spores, were well known to the earlier zoological observers. The parasites in fishes were called by Müller "fish-psorosperms," a name which has stuck to them ever since, although, as is evident from the meaning of the term ("mange-seed"), Müller had little idea of the true nature of the bodies. Other examples, infesting silkworms, have also long been known as "Pèbrine-corpuscles," from the ravaging disease which they produce in those caterpillars in France, in connexion with which Pasteur did such valuable work. The foundation of our present morphological and biological knowledge of the order was well laid by the admirable researches of Thélohan in 1895. In spite, however, of the contributions of numerous workers since then (*e.g.* Doflein, Cohn, Stempell and others), there are still one or two very important points, such as the occurrence of sexual conjugation, upon which light is required.

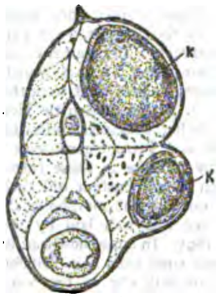
Occurrence and habitat.

Although pre-eminently parasites of fishes, Myxosporidia also occur, in a few cases, in other Vertebrates (frogs and reptiles); no instance of their presence in a warm-blooded Vertebrate has, however, yet been described. One suborder (the Microsporidia or Cryptocystes) is pretty equally distributed between fishes on the one hand and Invertebrates—chiefly, but not exclusively, Arthropods—on the other. The parasites are frequently the cause of severe and fatal illness in their hosts, and devastating epidemics of myxosporidiosis have often been reported (*e.g.* among carp and barbel in continental rivers, due to a *Myxobolus*, and among crayfish in France, to *Thelohania*).

The seat of the invasion and the mode of parasitism are extremely varied. Practically any organ or tissue may be attacked, excepting, apparently, the testis and cartilage and bone. In one instance at least (that of *Nosema bombycis* of the silkworm) the parasites penetrate into the ova, so that true hereditary infection occurs, the progeny being born with the disease. The parasites may be either free in some lumen, such as that of the gall bladder or urinary bladder (not of the alimentary canal, or the body-cavity itself), when they are known as *coelozoic* forms; or in intimate relation with some tissue, intracellular while young but becoming intercellular in the adult phase (*histozoic* forms); or entirely intracellular (*cytozoic* forms). Among the histozoic and cytozoic types, moreover, two well-defined conditions, *concentration* and *diffuse infiltration*, occur. In the former, the parasitic zone is strictly limited, and well-marked cysts are formed; in the latter, the infection spreads throughout the neighbouring tissue, and the parasitic development becomes inextricably commingled with the host's cells. Sometimes, as shown by Woodcock (**45**), there may be an attempt on the part of the host's tissue to circumscribe and check the growth of these parasitic areas, which results in the formation of *pseudocysts*, quite different in character from true cysts.

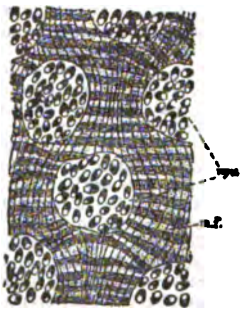
Morphology.

The most noticeable feature about the Myxosporidian trophozoite is its amoeboid and Rhizopod-like character. Pseudopodia of various kinds, from long slender ones (fig. 3, B) to short blunt lobose ones, are of general occurrence, being most easily observed, of course, in the free-living forms. The pseudopodia serve chiefly for movement and attachment, and never, it should be noted, for the injection of solid food-particles, as in the case of *Amoebae*. The general protoplasm is divisible into ectoplasm and endoplasm. The former is a clear, finely-granular layer, of which the pseudopodia are mainly constituted (fig. 3, A). In one or two instances (*e.g. Myxidium lieberkühnii*) the ectoplasm shows a vertical striation, and in the older trophozoites breaks down partially, appearing like a fur of delicate, non-motile filaments. A somewhat similar modification is found in *Myxocystis*. The endoplasm is more fluid, and contains numerous inclusions of a granular nature, as well as vacuoles of varying size. In the endoplasm are lodged the nuclei, of which in an adult trophozoite there may be very many; they are all derived by multiplication from the single nucleus with which the young individuals begin life, the number increasing as growth proceeds.



From Lankester's *Treatise on Zoology*, vol. Protozoa, from Wasielewski, after Thélohan.

FIG. 1.—Transverse section of a stickle-back (*Gasterosteus aculeatus*), showing two cysts of *Glugea anomala*, Moniez (*kk*), in the body musculature on the right side.

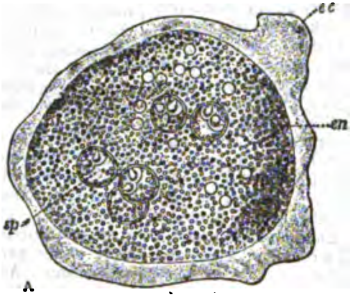


From Lankester's *Treatise on Zoology*, vol. Protozoa.

FIG. 2.—Portion of a section through a muscle fibre of *Cottus scorpius* invaded by *Pleistophora typicalis*, Gurley.
m.f, Muscle fibrils, retaining their striation.
myx, Cysts of the parasite, lying between the fibrils.

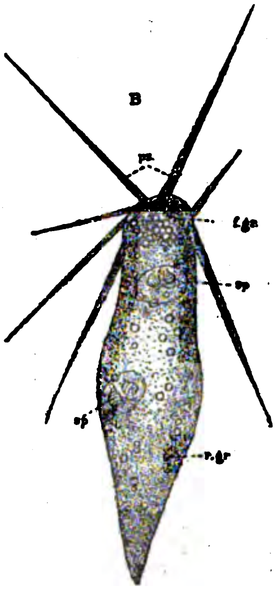
Spore-formation goes on entirely in the endoplasm. The number of spores formed is very variable. It may be as low as two (as in free-living forms, *e.g. Leptotheca*), in which case a large amount of trophic protoplasm is unconverted into spores; or, on the other hand, the number of spores may be very great (as in tissue-parasites), practically the whole of the parent-body being thus used up. The sporont may or may not encyst at the commencement of sporulation. In the free-living forms there is no cyst-membrane secreted; but in certain *Glugeidae*, on the other hand, the ectoplasm becomes altered into a firm, enclosing layer, the *ectorind*, which forms a thick cyst-wall (fig. 5). The process of sporulation begins by the segregation of small quantities of endoplasm around certain of the nuclei, to form little, rounded bodies, the *pansporoblasts*. There may be either very many or only few pansporoblasts developed; in some cases, indeed, there is only one, the sporont either itself becoming a pansporoblast (certain *Microsporidia*), or giving rise to a solitary one (*Ceratomyxidae*). The pansporoblast constituted, nuclear multiplication goes on preparatory to the formation of sporoblasts, which in their turn become spores (see figs. 4 and 5). Not all the nuclei thus formed, however, are made use of. In the *Phaenocystes* there are always two sporoblasts developed in each pansporoblast; in the *Cryptocystes* there may be from one to several. Around each sporoblast a spore-membrane is secreted, which usually has the form of two valves. It has recently been shown by Léger and Hesse (**29b**) that, in many Phaenocystes at any rate, each of these valves is formed by a definite nucleated portion of the sporoblast.

Spore-formation: multiplicative processes.



From Wasielewski, *Sporozoenkunde*.

FIG. 3.—A. Trophozoite of *Sphaerospora divergens*, Thél. (par. *Blennius* and *Crenilabrus*). *ec*, Ectoplasm; *en*, endoplasm; *sp*, spores, each with four pole capsules.

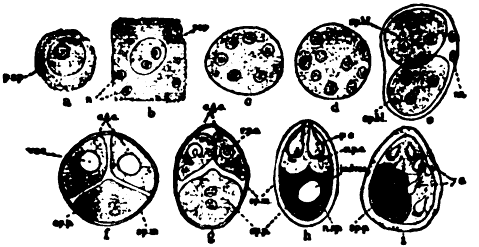


From Lankester's *Treatise on Zoology*, vol. Protozoa.

B. Spore-bearing trophozoite of *Leptotheca agilis*, Thél. (par. *Trygon* and *Scorpaena*) *ps*, Pseudopodia localized at the anterior end; *f.gr*, fatty granules similarly localized; *r.gr*, refringent granules; *sp*, spores, two in number.

The spores themselves vary greatly in size and shape (figs. 7 and 8). They may be as small as 1·5 μ by 1μ (as in a species of *Nosema*), or as large as 100 μ by 12 μ (as in *Ceratomyxa*). A conspicuous feature in the structure of a fully-developed spore is the polar-capsules, of which there may be either 1, 2, or 4 to each. In the

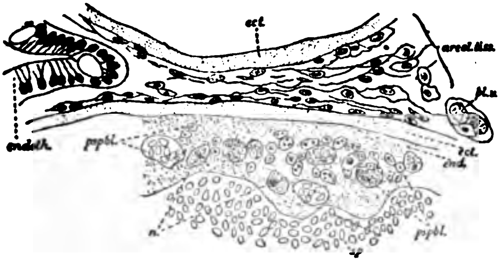
Phaenocystes the polar-capsules are visible in the fresh condition, but not in the Cryptocystes. The polar-capsule is an organella which recalls the nematocyst of a Hydrozoan, containing a spirally-coiled filament, often of great length, which is shot out on the application of a suitable stimulus. Normally, as was ingeniously shown by Thélohan (48), the digestive juices of the fresh host serve this purpose, but various artificial means may suffice. The function of the everted filament is probably to secure the attachment of the spore to the epithelium of the new host. In the Phaenocystes, in connexion with each polar-capsule, a small nuclear body can be generally made out; these two little nuclei are those of the two "capsulogenous" areas of the protoplasm of the pansporoblast, which formed the capsules. The sporoplasm, representing the sporozoite, is always single. Nevertheless, in the Phaenocystes it is invariably binuclear; and, in the Microsporidia, the nucleus, at first single, gives rise later to four nuclei, two of which are regarded by Stempell (42) as corresponding to those of two polar-capsules (of which only one is developed in the spore), the remaining two representing germ-nuclei. Hence it is possible that the Myxosporidian sporoplasm really consists of two, incompletely-divided (sister) germs. Moreover, it is supposed by some that these two nuclei fuse together later, this act representing a sexual conjugation; since the earliest known phases of young trophozoites (amoebulae) have been described as uninuclear.



From Lankester's *Treatise on Zoology*, vol. Protozoa, after Thélohan.

FIG. 4.—Stages in spore-formation. All the figures are from *Myxobolus ellipsoides*, except *a* and *f*, which are from *M. pfeifferi*.

a, Differentiation of the pansporoblast (*p.sp*).
b, Pansporoblast with two nuclei.
c and *d*, Pansporoblasts with six and ten nuclei respectively; in *d*, four of the nuclei are degenerating.
e, Pansporoblast segmented into two definitive sporoblasts, each with three nuclei. In the next four figures the definitive sporoblast, or the spore produced from it, is alone figured.
f, Definitive sporoblast segmented into three masses, the capsulogenous cells (*c.g.c*) and the sporoplasm (*sp.p*), within an envelope, the spore membrane (*sp.m*).
g, More advanced stage.
h, Spore completely developed, with two polar capsules and sporoplasm containing an iodinophilous vacuole.
i, Abnormal spore containing six polar capsules.
n, Nuclei.
sp.bl, Definitive sporoblast.
r.n, Residuary nuclei.
vac, Vacuole.
r.p.c, Rudiment of *p.c*, polar capsule.
n.p.c, Nuclei of polar capsules.
iod.vac, Iodinophilous vacuole.
n.sp, Nuclei of sporoplasm.

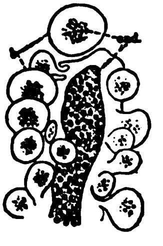


From Woodcock, *Proc. and Trans. of the Liverpool Biological Society*, 1904.

FIG. 5.—Part of the periphery of a cyst of *Glugea stephani*, in the intestinal wall of the plaice, showing sporoblast and spore-formation.

ect, Ectorind.
end, Endoplasm.
endoth, Fold of the mucous membrane, normal in character.
p.sp.bl, Various stages in the development of the pansporoblasts.
sp, Ripe spores, filling the greater part of the cyst.
n, Large (vegetative) nuclei.

In addition to spore-formation, two or three modes of endogenous reproduction, serving for auto-infection, have been made known. One, termed by Doflein *plasmotomy*, consists either in the division of the (multinucleate) trophozoite into two, by more or less equal fission (simple plasmotomy), or in the budding-off, from the parent trophozoite, of several portions (example: *Myxidium lieberkühnii*, fig. 6). A variety of this method has been described by Stempell (40) in the case of the young trophozoites (meronts) of *Thelohania mülleri*, which may divide into two while still uninuclear; and by rapid successive divisions chains of meronts may be formed, the different individuals being incompletely separated. Another method, which is probably chiefly responsible for the rapid spread of tissue-parasites and cell-parasites (such as *Myxobolidae* and *Glugeidae*) through their host's tissue in the condition of diffuse infiltration, consists in multiple nuclear division, and the liberation of amoebulae while the parasite is yet quite young and possesses only few nuclei. As Woodcock has pointed out in considering the case of *Glugea stephani*, it is very probable that this "multiplicative reproduction," in diffuse infiltration, is to be looked upon as a separation of the pansporoblast-rudiments as daughter-individuals; *i.e.* that the pansporoblasts are, in certain circumstances, capable of independent existence as little sporonts. A further stage in this direction of evolution is seen, according to Stempell, in *Thelohania*, *Pleistophora* and other types where the whole individual becomes one reproductive organella; such forms are to be considered as examples of a phylogenetic individualization of the pansporoblasts, which now exist as solitary sporonts. An extreme case of this "reduction of the individual" is found, apparently in the genus *Nosema*, as lately characterized by Perez (34), where vast numbers of minute entirely independent sporonts (pansporoblasts) are produced, each of which gives rise to only a single spore.



From Lankester's *Treatise on Zoology*, vol. Protozoa.

FIG. 6.—Formation of buds by multiple plasmotomy in *Myxidium lieberkühnii*, Bütschli (par. *Esox* and *Lota*) after Cohn.

b, Buds.
end, Endoplasm; the clear outer portion represents the ectoplasm.

The Myxosporidia are divided into two suborders, the Phaenocystes and the Cryptocystes. Some authors have of late years separated these two divisions and raised each to the rank of a distinct order, considering that they are not more closely related to each other than to other Endosporan orders. We think this is a mistake; and it is very interesting to find that Léger and Hesse (1908) have described (29*a*) a new genus of Phaenocystes, *Coccomyxa*, which represents a type intermediate between these two suborders, and shows that they are closely connected.

Classification.

Suborder 1: *Phaenocystes*, Gurley. Spores relatively large, with generally two or four polar-capsules, visible in the fresh condition. There are nearly always two spores formed in each pansporoblast.

Section (*a*): *Disporea*. Only two spores (*i.e.* one pansporoblast) produced in each individual trophozoite. The greatest length of the spore is at right angles to the plane of the suture.

One family, *Ceratomyxidae*, including two genera, *Ceratomyxa* (fig. 3, B) and *Leptotheca*, typically "free" parasites, mostly from the gall bladders of fishes. The valves of the spore in the former genus are prolonged into hollow cones. The type-species of this genus is *C. sphaerulosa*, from *Mustelus* and *Galeus*; that of *Leptotheca* is *L. agilis*, from *Trygon*.

Section (*b*): *Polysporea*. More than two spores, generally very many, are produced typically by each individual trophozoite. The greatest length of the spore is usually in the sutural plane.

Family, *Myxidiidae*. Spores with two polar-capsules, and without an iodinophilous vacuole in the sporoplasm. Mostly "free" parasites. Gen. *Sphaerospora*. Four or five species are known, from the kidneys or gall bladder of fishes (fig. 3, A). One, *S. elegans*, is interesting in that it affords a transition between the two sections, being disporous. Gen. *Myxidium*; spores elongated and fusiform, with a polar capsule at each extremity. The best-known species is *M. lieberkühnii*, from the urinary bladder of the pike. One or two species occur in reptiles. Other genera are *Sphaeromyxa*, *Cystodiscus*, *Myxosoma* and *Myxoproteus*.

Family, *Chloromyxidae*. Spores with four polar capsules and no iodinophilous vacuole. One genus, *Chloromyxum*, of which several species are known; the type being *C. leydigi*, from the gall bladder of various Elasmobranchs (fig. 7, B).

Family, *Myxobolidae*. Spores with two polar-capsules (exceptionally one), and with a characteristic iodinophilous vacuole in the sporoplasm. Typically tissue parasites of Teleosteans, often very dangerous. Genus *Myxobolus*. Spores oval or rounded, without a tail-like process. Very many species are known, which are grouped into three subsections: (*a*) forms with only one polar-capsule, such as *M. piriformis*, of the tench; (*b*) forms with two unequal capsules, *e.g.* *M. dispar* from *Cyprinus* and *Leuciscus*; and (*c*) the great majority of species with two equal polar-capsules, including *M. mülleri*, the type-species, from different fish, *M. cyprini* and *M. pfeifferi*, the cause of deadly disease in carp and barbel respectively and others. Other genera are *Henneguya* and *Hoferellus*, differing from *Myxobolus* in having, respectively, one or two tail-like processes to the spore. *Lentospora*, according to Plehn (37), lacks an iodinophilous vacuole.

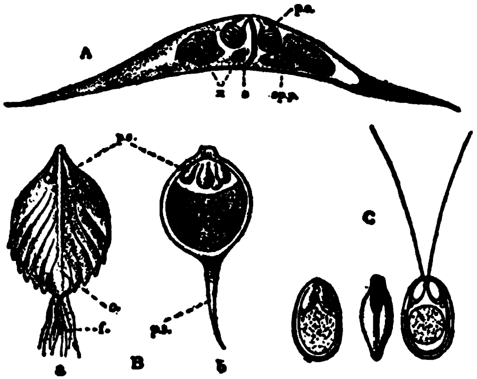


FIG. 7.—A. Spore of *Ceratomyxa sphaerulosa*, Thél. (par. *Mustelus* and *Galeus*); after Thélohan. *sp.p*, Sporoplasm; *p.c*, polar capsules; *s*, suture; *x*, "irregular, pale masses, of undetermined origin."

From Lankester's *Treatise on Zoology*, vol. Protozoa.

B. Spores of *Chloromyxidae*, after Thélohan. *a*, *Chloromyxum leydigi*, Ming., seen from the sutural aspect. *b*, *C. caudatum*, Thél. *p.c*, Polar capsules; *s*, suture; *f*, filaments; *p.s*, tail-like process of the spore envelope.

From Wasielewski's *Sporozoenkunde*.

C. Spores of *Myxobolus ellipsoides*, Thél. The spores on the left and right are lying with the sutural plane horizontal, that in the middle with the sutural plane vertical.

Family *Coccomyxidae*. The pansporoblasts produce (probably) only one spore. Spore oval, large (14μ by $5{\cdot}5\mu$), with a single very large polar-capsule. Sporoplasm with no vacuole. Single genus *Coccomyxa*, with the characters of the family. One species, *C. morovi*, Léger and Hesse, from the gall bladder of the sardine. The spore greatly resembles a Cryptocystid spore.

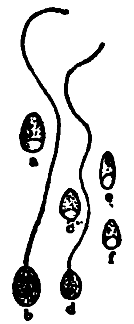
Suborder 2: *Cryptocystes*, Gurley (= *Microsporidia*, Balbiani). Spores minute, usually pear-shaped, with only one polar-capsule, which is visible only after treatment with reagents. The number of spores formed in each pansporoblast varies greatly in different forms.

Section (*a*): *Polysporogenea*. The trophozoite produces numerous pansporoblasts, each of which gives rise to many spores. Genus *Glugea*, with numerous species, of which the best-known is *G. anomala*, from the stickleback (fig. 1). The genus *Myxocystis*, which has been shown by Hesse (24) to be a true Microsporidian, is placed by Perez in this section, but this is a little premature, as Hesse does not describe the exact character of the sporulation, *i.e.* with regard to the number of pansporoblasts and the spores they produce.

Section (*b*): *Oligosporogenea*. The trophozoite becomes itself the (single) pansporoblast. In *Pleistophora*, the pansporoblast produces many spores; *P. typicalis*, from the muscles of various fishes (fig. 2), is the type-species. In *Thelohania*, eight spores are formed; the different species are parasitic in Crustacea. In *Gurleya*, parasitic in *Daphnia*, only four are formed; and, lastly, in *Nosema* (exc. *N. pulvis*, from *Carcinus*, and, most likely, *N. bombycis*, of the silkworm), each pansporoblast produces only a single spore.

2. Order—**Actinomyxidia.** This order comprises a peculiar group of parasites, first described by A. Stolc in 1899, which are restricted to Oligochaete worms of the family *Tubificidae*. Most forms attack the intestinal wall, often destroying its epithelium over considerable areas; but one genus, *Sphaeractinomyxon*, inhabits the body-cavity of its host. The researches of Caullery and Mesnil (10-12) and of Léger (28 and 29) have shown that the parasites exhibit the typical features of the Endospora, and the spores possess the characteristic polar-capsules of the Myxosporidian spore, but differ therefrom by their more complicated structure.

The growth and development of an Actinomyxidian have been recently worked out by Caullery and Mesnil in the case of *Sphaeractinomyxon stolci*. A noteworthy point is the differentiation of an external (covering) cellular layer, which affords, perhaps, the nearest approach to distinct tissue-formation known among Protozoa. This envelope is formed soon after nuclear multiplication of the young trophozoite has begun, and is constituted by two nuclei and a thin, peripheral layer of cytoplasm. It remains binuclear throughout the entire period of development, and serves as a delicate cyst-membrane. The multiplication of the internal nuclei is accompanied by a corresponding division of the cytoplasm; so that instead of a multinucleate or plasmodial condition, distinct uninucleate cellules are formed, up to sixteen in number. These cellules, as a matter of fact, are sexual elements or gametes; and eight of them can be distinguished from the other eight by slight differences in the nuclei. The gametes unite in couples, each couple being most probably composed of dissimilar members: in other words, conjugation is slightly anisogamous. Each of these eight copulae gives rise to a spore.



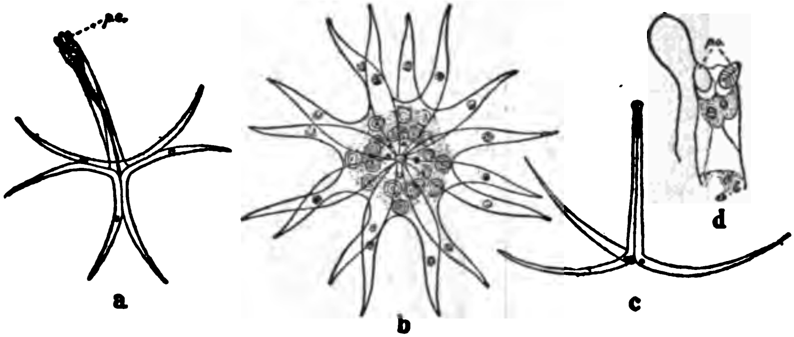
From Lankester's *Treatise on Zoology*, vol. Protozoa.

FIG. 8.—Spores of various *Glugeidae*, (after Thélohan).
a and *b*, *Pleistophora typicalis*, Gurley; *a* in the fresh condition, *b* after treatment with iodine water, causing extrusion of the filament.
c and *d*, *Thelohania octospora*, Henneguy; *c* fresh, *d* treated with ether.
e, *Glugea depressa*, Thél., fresh.
f, *G. acuta*, Thél.

As the name of the order implies, there are always eight spores formed. These differ from other Endosporan spores in having invariably a ternary symmetry and constitution (fig. 9). The wall of the spore is composed of three valves, each formed from an enveloping cell, and three capsular cells, placed at the upper or anterior pole, and containing each a polar-capsule, visible in the fresh condition. The valves are usually prolonged into processes or appendages, whose form and arrangement characterize the genus; but in *Sphaeractinomyxon* the spore is spherical and lacks processes. The sporoplasm may be either a plasmodial mass, with numerous nuclei, or may form a certain number of uninuclear sporozoites. A remarkable feature in the development of the spore is that the germinal tissue (sporoplasm) arises separate from and outside the cellules which give rise to the spore-wall; later, when the envelopes are nearly developed, the sporoplasm penetrates into the spore.

Four genera have been made known. (1) *Hexactinomyxon*, Stolc. Spores having the form of an anchor with six arms; sporoplasm plasmodial, situate near the anterior pole of the spore. One sp. *H. psammoryctis*, from *Psammoryctes*. (2) *Triactinomyxon*, St. Spores having the form of an anchor with three arms; distinct sporozoites, disposed near the anterior pole. *T. ignotum*, with eight spores, from *Tubifex tubifex*, and also from an unspecified Tubificid; another sp., unnamed, with 32 sporozoites, also from *T. t.* (3) *Synactinomyxon*, St. Spores united to one another, each having two aliform appendages; sporoplasm plasmodial. One sp., *S. tubificis*, from *T. rivulorum*. (4) *Sphaeractinomyxon*, C. and M. Spores spherical, without aliform prolongations; sporoplasm gives rise to very many sporozoites, occupying the whole spore. One sp., *S. stolci*, from *Clitellio* and *Hemitubifex*.

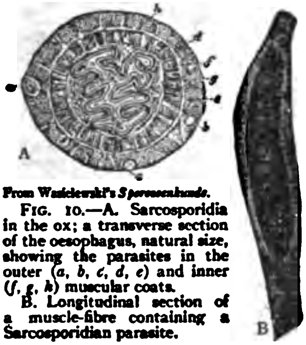
3. Order—**Sarcosporidia.** With the exception of one or two forms occurring in reptiles, these parasites are always found in warm-blooded Vertebrates, usually Mammals. They are of common occurrence in domestic animals, such as pigs, sheep, horses and (sometimes) cattle. A Sarcosporidian has also been described from man. The characteristic habitat is the striped muscle, generally of the oesophagus (fig. 10, A) and heart, but in acute cases the parasites overrun the general musculature. When this occurs, as often happens in mice, the result is usually fatal. Unless, however, the organisms thus spread throughout the body, the host does not appear to suffer any serious consequences. In addition to the effects produced by the general disturbance to the tissues, the attacked animals have apparently to contend—at any rate in the case of *Sarcocystis tenella* in the sheep—with a poison secreted by the parasite. For Laveran and Mesnil (27) have isolated a toxine from this form, which they have termed sarcocystin.



From Lankester's *Treatise on Zoology*, vol. Protozoa.

FIG. 9.—Spores of Actinomyxidia (after Stolc).

a, *Hexactinomyxon psammoryctis* (par. *Psammoryctes barbatus*).
b, *Synactinomyxon tubificis* (par. *Tubifex rivulorum*); the mass of united spores.
c, *Triactinomyxon ignotum* (par. *Clitellio*, sp.).
d, Upper portion of *Hexactinomyxon*, showing two of the three polar capsules, one with filament discharged.



From Wasielewski's *Sporozoenkunde*.

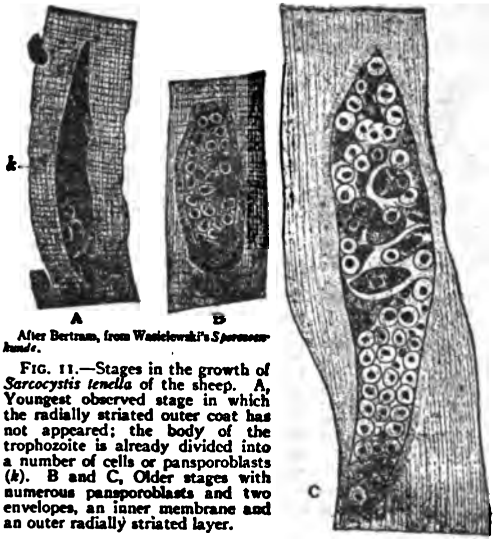
FIG. 10.—A. Sarcosporidia in the ox; a transverse section of the oesophagus, natural size, showing the parasites in the outer (*a*, *b*, *c*, *d*, *e*) and inner (*f*, *g*, *h*) muscular coats.

B. Longitudinal section of a muscle-fibre containing a Sarcosporidian parasite.

In the early stages of growth, a Sarcosporidian appears as an elongated whitish body lodged in the substance of a muscle-fibre; this phase has long been known as a "Miescher's tube," or *Miescheria*. The youngest trophozoites that have been yet observed (by Bertram, 1) were multinucleate (fig. 11, A), but there is no reason to doubt that they begin life in a uninuclear condition. The protoplasm is limited by a delicate cuticle. With growth, organellae corresponding to the Myxosporidian pansporoblasts are formed by the segregation internally of little uninuclear spheres of protoplasm. At the same time, a thick striated envelope is developed around the parasite, which later comes to look like a fur of fine filaments. The probable explanation of this feature (given by Vuillemin, 44) is that it is due to the partial breaking down of a stiff, vertically (or radially) striated external layer (fig. 12, A), such as is seen in *Myxidium lieberkühnii*. Immediately internal to this is a thin, homogeneous membrane, which sends numerous partitions or septa inwards; these divide up the endoplasm into somewhat angular chambers or alveoli (fig. 12). In each chamber is a pansporoblast, which divides up to produce many spores; hence the spores formed from different pansporoblasts are kept more or less separate. The pansporoblasts originate, in a growing Sarcosporidian, at the two poles of the body, where the peripheral endoplasm with its nuclei is chiefly aggregated. More internally, spore-formation is in progress; and in the centre, pansporoblasts full of ripe spores are found.

By this time the parasite has greatly distended the muscle-fibre in which it has hitherto lain, absorbing, with its growth, practically all the contractile-substance, until it is surrounded only by the sarcolemma and sarcoplasm. It next passes into the adjacent connective-tissue, and in this phase has been distinguished from *Miescheria* as *Balbiania*, under the impression that the two forms were quite distinct. In the later stages, the parasite may become more rounded, and a cyst may be secreted around it by the host's tissue. In these older forms, the most centrally placed spores degenerate and die, having become over-ripe and stale.

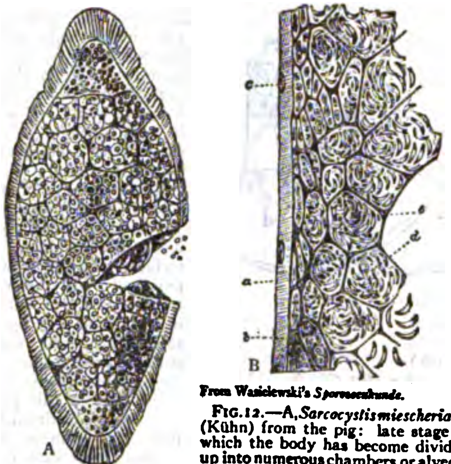
With regard to the spores themselves and what becomes of them, our knowledge is defective. Two kinds of reproductive germ have been described, termed respectively *gymnospores* (so-called sporozoites, "Rainey's corpuscles") and *chlamydospores*, or simply spores. It seems probable that the former serve for endogenous or auto-infection, and the latter for infecting fresh hosts. Unfortunately, however, both kinds of germ are not yet known in the case of any one species. The gymnospores, which are the more commonly found (*e.g.* in *S. muris*, *S. miescheriana* of the pig, and other forms), are small sickle-shaped



After Bertram, from Wasielewski's *Sporozoenkunde*.

FIG. 11.—Stages in the growth of *Sarcocystis tenella* of the sheep. A, Youngest observed stage in which the radially striated outer coat has not appeared; the body of the trophozoite is already divided into a number of cells or pansporoblasts (*k*). B and C, Older stages with numerous pansporoblasts and two envelopes, an inner membrane and an outer radially striated layer.

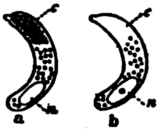
or reniform bodies which are more or less amoeboid, and capable of active movement at certain temperatures. They appear to be naked, and consist of finely granular protoplasm, containing a single nucleus and one or two vacuoles. The chlamydospores, or true spores, occur in *S. tenella* of sheep (fig. 13), and have been described by Laveran and Mesnil (26). They also are falciform, but one extremity is rounded, the other pointed. There is a very thin, delicate membrane, most unlike a typical, resistant spore-wall; and the spores themselves are extremely fragile and easily acted upon and deformed by reagents, even by distilled water. The rounded end of the spore contains a large nucleus, while at the other end is an oval, clear space, which, in the fresh condition, shows a distinct spiral striation. The exact significance of this structure has been much debated. In position and appearance it recalls the polar-capsule of a Myxosporidian spore. The proof of this interpretation would be the expulsion of a filament on suitably stimulating the spore; while, however, some investigators have asserted that such a filament is extruded, this cannot be regarded as at all certain. Hence it is still doubtful whether this striated body really corresponds to a polar-capsule.



From Wasielewski's *Sporozoenkunde.*

FIG. 12.—A, *Sarcocystis miescheriana* (Kühn) from the pig: late stage in which the body has become divided up into numerous chambers or alveoli, each containing a number of germs.

B, *Sarcocystis* of the ox: section of a stage similar to fig. 12. *a*, Substance of muscle-fibre; *b*, envelope of parasite; *c*, nuclei of the muscle; *d*, parasitic germs (gymnospores); *e*, walls of the alveoli. In the peripheral alveoli are seen immature germs.



(After Laveran and Mesnil, from Lankester's *Treatise on Zoology*, vol. Protozoa.)

FIG. 13.—Spores of *Sarcocystis tenella*, Raill., from the sheep.

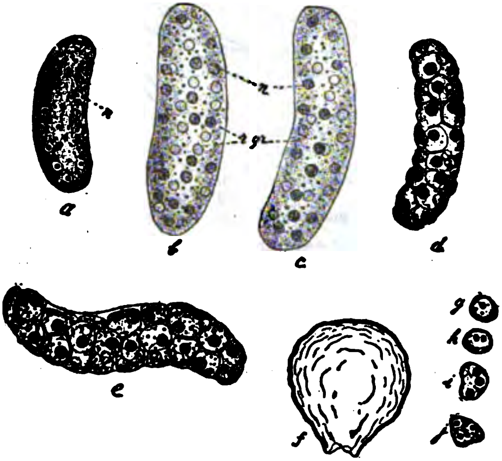
a, Spore in the fresh condition, showing a clear nucleus (*n*) and a striated body or capsule (*c*).

b, Stained spore; the nucleus (*n*) shows a central karyosome; the striations of the polar capsule (*c*) are not visible.

Nothing whatever is known as to the natural means by which infection with Sarcosporidia is brought about. Smith (39) showed that mice can be infected with *Sarcocystis muris* by simply feeding them on the flesh of infected mice. It is not very likely, however, that this represents the natural mode, even in the case of mice; and it certainly cannot do so in the case of Herbivora. The difficulty in the way is the delicacy of the spores, which seem totally unfitted to withstand external conditions. It may be that some alternative (intermediate) host is concerned in dispersal; but this has yet to be ascertained.

All known Sarcosporidia are included in a single genus *Sarcocystis*, Lank. (= *Miescheria* + *Balbiania*, Blanchard.) Some of the principal species are: *S. miescheriana*, from pigs. *S. tenella*, from sheep; *S. bertrami*, from horses; *S. blanchardi*, from Bovines; *S. muris*, from mice; *S. platydactyli*, from the gecko; and lastly, *S. lindemanni*, described from man.

4. Order—**Haplosporidia.** The Sporozoa included in this order are characterized by the general simplicity of their development, and by the undifferentiated character of their spores. The order includes a good many forms, whose arrangement and classification have been recently undertaken by Caullery and Mesnil (15), to whom, indeed, most of our knowledge relating to the Haplosporidia is due. The habitat of the parasites is sufficiently varied; Rotifers, Crustacea, Annelids and fishes furnishing most of the hosts. A recent addition to the list of Protozoa causing injury to man, a Haplosporidian, has been described by Minchin and Fantham (29d), who have termed the parasite *Rhinosporidium*, from its habitat in the nasal septum, where it produces pedunculate tumours.



From Minchin, in Lankester's *Treatise on Zoology*, vol. Protozoa.

FIG. 14.—*Bertramia Asperospora* (Fritsch) from the body-cavity of *Brachionus*.

a, Young form with opaque, evenly-granulated protoplasm and few refringent granules; the nuclei (*n*) are small, and appear to be surrounded each by a clear space.

b and *c*, Full-grown specimens with large nuclei and clearer protoplasm, containing numerous refringent granules (*r.gr.*).

d and *e*, Morula stages, derived from *b* and *c* by division of the body into segments centred round the nuclei, each cell so formed being a spore. Between the spores a certain amount of intercellular substance or residual protoplasm is left, in which the refringent granules seem to be embedded. The morula may break up forthwith and scatter the spores, or may first round itself off and form a spherical cyst with a tough, fairly thick wall.

f, Empty, slightly shrunken cyst, from which the spores have escaped.

g, Free spore or youngest unicellular trophozoite.

h, *i*, *j*, Commencing growth of the trophozoite, with multiplication of the nuclei, which results ultimately in forms such as *a* and *b*.

Bertramia, a well-known parasite of the body-cavity of Rotifers, will serve very well to give a general idea of the life-cycle so far as it has yet been made out (fig. 14). The trophozoite begins life as a small, rounded uninucleate corpuscle, which as it grows, becomes multinucleate. The multinuclear body generally assumes a definite shape, often that of a sausage. Later, the protoplasm becomes segregated around each of the nuclei, giving the parasite a mulberry-like aspect; hence this stage is frequently known as a morula. The uninuclear cellules thus formed are the spores, which are ultimately liberated by the break-up of the parent body. Each is of quite simple, undifferentiated structure, possesses a large, easily-visible nucleus, and gives rise in due course to another young trophozoite. In some instances, as described by

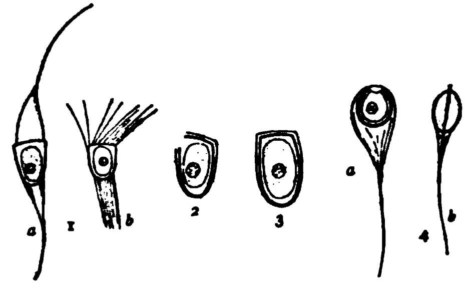
Minchin, the sporulating parasite becomes rounded off and forms a protective cyst, doubtless for the protection of the spores during dissemination.

In some forms (*e.g. Haplosporidium* and *Rhinosporidium*) the spore-mother-cells, instead of becoming each a single spore, as in *Bertramia*, give rise to several, four in the first case, many in the latter. Sometimes, again, the spore, while preserving the essentially simple character of the sporoplasm, may be enclosed in a spore-case; this may have the form of a little box with a lid or operculum, as in some species of *Haplosporidium*, or may possess a long process or tail, as in *Urosporidium* (fig. 15).

The *Haplosporidia* are divided by Caullery and Mesnil into three families, *Haplosporidiidae*, *Bertramiidae* and *Coelosporidiidae*; one or two genera are also included whose exact position is doubtful.

(*a*) *Haplosporidiidae*: 3 genera, *Haplosporidium*, type-species *H. heterocirri*; *Urosporidium*, with one sp., *U. fuliginosum*; all parasitic in various Annelids; and *Anurosporidium*, with the species *A. pelseneeri*, from the sporocysts of a Trematode, parasitic on *Donax*.

(*b*) *Bertramiidae*: 2 genera, *Bertramia*, with *B. capitellae* from an Annelid and *B. asperospora*, the Rotiferan parasite above described; and *Ichthyosporidium*, with *I. gasterophilum* and *I. phymogenes*, parasitic in various fish.



From Caullery and Mesnil, *Archives de zoologie expérimentale*, vol. 4, 1905, by permission of Schleicher Frères et Cie, Paris.

FIG. 15.—Spores of various Haplosporidia.

1, *Haplosporidium heterocirri*:
  a, on liberation;
  b, after being in sea-water.
2, *H. scolopli.*
3, *H. vejdovskii.*
4, *Urosporidium fuliginosum:*
  a, surface-view;
  b, side-view.

(*c*) *Coelosporidiidae*: genera *Coelosporidium*, type-species *C. chydoricola*; and *Polycaryum*, type-species *P. branchiopodianum*. These forms are parasitic in small Crustacea. The genus *Blastulidium* is referred, doubtfully, by Caullery and Mesnil to this family; but certain phases of this organism seem to indicate rather a vegetable nature.

The genus *Rhinosporidium* should probably be placed in a distinct family. The only species so far described is *R. kinealyi* from the nasal septum of man, to which reference has above been made. Another form, *Neurosporidium cephalodisci*, agreeing in some respects with *Rhinosporidium*, has been described by Ridewood and Fantham (37a) from the nervous system of *Cephalodiscus*.

A parasite whose affinities are doubtful, but which is regarded by Caullery and Mesnil as allied to the Haplosporidia, is the curious parasite originally described by Schewiakoff as "endoparasitic tubes" of *Cyclops*; it has been named by Caullery and Mesnil, *Schewiakovella*. This organism is remarkable in one or two ways: it possesses a contractile vacuole; the amoeboid trophozoites tend to form plasmodia; and the spores, of the usual simple type, may apparently divide by binary fission.

5. There remain, lastly, certain forms, which are conveniently grouped together as "Sporozoa *incertaesedis*," either for the reason that it is impossible to place them in any of the well-defined orders, or because their life-cycle is at present too insufficiently known. Serosporidia is the name given by Pfeiffer to certain minute parasites of the body-cavity of Crustacea; they include *Serosporidium*, *Blanchardina* and *Botellus*. *Lymphosporidium*, a form with distributed nucleus, causing virulent epidemics among brook-trout, is considered by Calkins (3) to be suitably placed here. Another parasite of lymphatic spaces and channels is the remarkable *Lymphocystis*, described by Woodcock (46), from plaice and flounders, which in some respects rather recalls a Gregarine. The group Exosporidia was founded by Perrier to include a peculiar organism, ectoparasitic on Arthropods, to which the name of *Amoebidium* had been given by Cienkowsky. It has recently been shown, however, that this organism is most probably an Alga. Another genus, *Exosporidium*, described by Sand (88), is placed at present in this group. For details of the structure of these forms and others like *Siedleckia*, *Toxosporidium*, *Chilonicium* *Joyeuxella* and *Metschnikovella*, a comprehensive treatise on the Sporozoa, such as that of Minchin, should be consulted.

To complete this article, it will be sufficient to mention various enigmatical bodies, associated with different diseases, which are regarded by their describers as Protozoa. Among such is the "*Histosporidium carcinomatosum*" of Feinberg, which he finds in cancerous growths. *Cytoryctes*, the name given to "Guarnieri's bodies" in small-pox and vaccinia, has been recently investigated by Calkins (3a), who has described a complex life-cycle for the alleged parasite. Other workers, however, such as Siegel, give a quite different account of these bodies, and, moreover, find similar ones in scarlet-fever, syphilis, &c.; while yet others (*e.g.* Prowazek) deny that they are parasitic organisms at all.

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ENDYMION, in Greek mythology, son of Aëthlius and king of Elis. He was loved by Selene, goddess of the moon, by whom he had fifty daughters, supposed to represent the fifty moons of the Olympian festal cycle. In other versions, Endymion was a beautiful youth, a shepherd or hunter whom Selene visited every night while he lay asleep in a cave on Mount Latmus in Caria (Pausanias v. 1; Ovid, *Ars am.* iii. 83). Zeus left him free to choose anything he might desire, and he chose an everlasting sleep, in which he might remain youthful for ever (Apollodorus i. 7). According to others, Endymion's eternal sleep was a punishment inflicted by Zeus upon him because he ventured to fall in love with Hera, when he was admitted to the society of the Olympian gods (Schol. Theocritus iii. 49). The usual form of the legend, however, represents Endymion as having been put to sleep by Selene herself in order that she might enjoy his society undisturbed (Cicero, *Tusc. disp.* i. 38). Some see in Endymion the sun, setting opposite to the rising moon, the Latmian cave being the cave of forgetfulness, into which the sun plunges beneath the sea; others regard him as the personification of sleep or death (see Mayor on Juvenal x. 318).

ENERGETICS. The most fundamental result attained by the progress of physical science in the 19th century was the definite enunciation and development of the doctrine of energy, which is now paramount both in mechanics and in thermodynamics. For a discussion of the elementary ideas underlying this conception see the separate heading ENERGY.

Ever since physical speculation began in the atomic theories of the Greeks, its main problem has been that of unravelling the nature of the underlying correlation which binds together the various natural agencies. But it is only in recent times that scientific investigation has definitely established that there is a quantitative relation of simple equivalence between them, whereby each is expressible in terms of heat or mechanical power; that there is a certain measurable quantity associated with each type of physical activity which is always numerically identical with a corresponding quantity belonging to the new type into which it is transformed, so that the energy, as it is called, is conserved in unaltered amount. The main obstacle in the way of an earlier recognition and development of this principle had been the doctrine of caloric, which was suggested by the principles and practice of calorimetry, and taught that heat is a substance that can be transferred from one body to another, but cannot be created or destroyed, though it may become latent. So long as this idea maintained itself, there was no possible compensation for the destruction of mechanical power by friction; it appeared that mechanical effect had there definitely been lost. The idea that heat is itself convertible into power, and is in fact energy of motion of the minute invisible parts of bodies, had been held by Newton and in a vaguer sense by Bacon, and indeed long before their time; but it dropped out of the ordinary creed of science in the following century. It held a place, like many other anticipations of subsequent discovery, in the system of Natural Philosophy of Thomas Young (1804); and the discrepancies attending current explanations on the caloric theory were insisted on, about the same time, by Count Rumford and Sir H. Davy. But it was not till the actual experiments of Joule verified the same exact equivalence between heat produced and mechanical energy destroyed, by whatever process that was accomplished, that the idea of caloric had to be definitely abandoned. Some time previously R. Mayer, physician, of Heilbronn, had founded a weighty theoretical argument on the production of mechanical power in the animal system from the food consumed; he had, moreover, even calculated the value of a unit of heat, in terms of its equivalent in power, from the data afforded by Regnault's determinations of the specific heats of air at constant pressure and at constant volume, the former being the greater on Mayer's hypothesis (of which his calculation in fact constituted the verification) solely on account of the power required for the work of expansion of the gas against the surrounding constant pressure. About the same time Helmholtz, in his early memoir on the Conservation of Energy, constructed a cumulative argument by tracing the ramifications of the principle of conservation of energy throughout the whole range of physical science.

Mechanical and Thermal Energy.—The amount of energy, defined in this sense by convertibility with mechanical work, which is contained in a material system, must be a function of its physical state and chemical constitution and of its temperature. The change in this amount, arising from a given transformation in the system, is usually measured by degrading the energy that leaves the system into heat; for it is always possible to do this, while the conversion of heat back again into other forms of energy is impossible without assistance, taking the form of compensating degradation elsewhere. We may adopt the provisional view which is the basis of abstract physics, that all these other forms of energy are in their essence mechanical, that is, arise from the motion or strain of material or ethereal media; then their distinction from heat will lie in the fact that these motions or strains are simply co-ordinated, so that they can be traced and controlled or manipulated in detail, while the thermal energy subsists in irregular motions of the molecules or smallest portions of matter, which we cannot trace on account of the bluntness of our sensual perceptions, but can only measure as regards total amount.

Historical: Abstract Dynamics.—Even in the case of a purely mechanical system, capable only of a finite number of definite types of disturbance, the principle of the conservation of energy is very far from giving a complete account of its motions; it forms only one among the equations that are required to determine their course. In its application to the kinetics of invariable systems, after the time of Newton, the principle was emphasized as fundamental by Leibnitz, was then improved and generalized by the Bernoullis and by Euler, and was ultimately expressed in its widest form by Lagrange. It is recorded by Helmholtz that it was largely his acquaintance in early years with the works of those mathematical physicists of the previous century, who had formulated and generalized the principle as a help towards the theoretical dynamics of complex systems of masses, that started him on the track of extending the principle throughout the whole range of natural phenomena. On the other hand, the ascertained validity of this extension to new types of phenomena, such as those of electrodynamics, now forms a main foundation of our belief in a mechanical basis for these sciences.

In the hands of Lagrange the mathematical expression for the manner in which the energy is connected with the geometrical constitution of the material system became a sufficient basis for a complete knowledge of its dynamical phenomena. So far as statics was concerned, this doctrine took its rise as far back as Galileo, who recognized in the simpler cases that the work expended in the steady driving of a frictionless mechanical system is equal to its output. The expression of this fact was generalized in a brief statement by Newton in the *Principia*, and more in detail by the Bernoullis, until, in the analytical guise of the so-called principle of "virtual velocities" or virtual work, it finally became the basis of Lagrange's general formulation of dynamics. In its application to kinetics a purely physical principle, also indicated by Newton, but developed long after with masterly applications by d'Alembert, that the reactions of the infinitesimal parts of the system against the accelerations of their motions statically equilibrate the forces applied to the system as a whole, was required in order to form a sufficient basis, and one which Lagrange soon afterwards condensed into the single relation of Least Action. As a matter of history, however, the complete formulation of the subject of abstract dynamics actually arose (in 1758) from Lagrange's precise demonstration of the principle of Least Action for a particle, and its immediate extension, on the basis of his new Calculus of Variations, to a system of connected particles such as might be taken as a representation of any material system; but here too the same physical as distinct from mechanical considerations come into play as in d'Alembert's principle. (See DYNAMICS: *Analytical*.)

It is in the cases of systems whose state is changing so slowly that reactions arising from changing motions can be neglected, that the conditions are by far the simplest. In such systems, whether stationary or in a state of steady motion, the energy depends on the configuration alone, and its mathematical expression can be determined from measurement of the work required for a sufficient number of simple transformations; once it is thus found, all the statical relations of the system are implicitly determined along with it, and the results of all other transformations can be predicted. The general development of such relations is conveniently classed as a separate branch of physics under the name *Energetics*, first invented by W. J. M. Rankine; but the essential limitations of this method have not always been observed. As regards statical change, the complete specification of a mechanical system is involved in its geometrical configuration and the function expressing its mechanical energy in terms thereof. Systems which have statical energy-functions of the same analytical form behave in corresponding ways, and can serve as models or representations of one another.

Extension to Thermal and Chemical Systems.—This dominant position of the principle of energy, in ordinary statical problems, has in recent times been extended to transformations involving change of physical state or chemical constitution as well as change of geometrical configuration. In this wider field we cannot assert that mechanical (or available) energy is never lost, for it may be degraded into thermal energy; but we can use the principle that on the other hand it can never spontaneously increase. If this were not so, cyclic processes might theoretically be arranged which would continue to supply mechanical power so long as energy of any kind remained in the system; whereas the irregular and uncontrollable character of the molecular motions and strains which constitute thermal energy, in combination with the vast number of the molecules, must place an effectual bar on their unlimited co-ordination. To establish a doctrine of *energetics* that shall form a sufficient foundation for a theory of the trend of chemical and physical change, we have, therefore, to impart precision to this motion of available energy.

Carnot's Principle: Entropy.—The whole subject is involved in the new principle contributed to theoretical physics by Sadi Carnot in 1824, in which the far-reaching modern conception of cyclic processes was first scientifically developed. It was shown by Carnot, on the basis of certain axioms, whose theoretical foundations were subsequently corrected and strengthened by Clausius and Lord Kelvin, that a reversible mechanical process, working in a cycle by means of thermal transfers, which takes heat, say H_1, into the material system at a given temperature T_1, and delivers the part of it not utilized, say H_2, at a lower given temperature T_2, is more efficient, considered as a working engine, than any other such process, operating between the same two temperatures but not reversible, could be. This relation of inequality involves a definite law of equality, that the mechanical efficiencies of all reversible cyclic processes are the same, whatever be the nature of their operation or the material substances involved in them; that in fact the efficiency is a function solely of the two temperatures at which the cyclically working system takes in and gives out heat. These considerations constitute a fundamental general principle to which all possible slow reversible processes, so far as they concern matter in bulk, must conform in all their stages; its application is almost coextensive with the scope of general physics, the special kinetic theories in which inertia is involved, being excepted. (See THERMODYNAMICS.) If the working system is an ideal gas-engine, in which a perfect gas (known from experience to be a possible state of matter) is passed through the cycle, and if temperature is measured from the absolute zero by the expansion of this gas, then simple direct calculation on the basis of the laws of ideal gases shows that $H_1/T_1=H_2/T_2$; and as by the conservation of energy the work done is H_1-H_2, it follows that the efficiency, measured as the ratio of the work done to the supply of heat, is $1-T_2/T_1$. If we change the sign of H_1 and thus consider heat as positive when it is restored to the system as is H_2, the fundamental equation becomes $H_1/T_1+H_2/T_2=0$; and as any complex reversible working system may be considered as compounded in various ways of chains of elementary systems of this type, *whose effects are additive*, the general proposition follows, that in any reversible complete cyclic change which involves the taking in of heat by the system of which the amount is δH, when its temperature ranges between T_r and $T_r+\delta T$, the equation $\Sigma\delta H_r/T_r=0$ holds good. Moreover, if the changes are not reversible, the proportion of the heat supply that is utilized for mechanical work will be smaller, so that more heat will be restored to the system, and $\Sigma\delta H_r/T_r$ or, as it may be expressed, $\int dH/T$, must have a larger value, and must thus be positive. The first statement involves further, that for all reversible paths of change of the system from one state C to another state D, the value of $\int dH/T$ must be the same, because any one of these paths and any other one reversed would form a cycle; whereas for any irreversible path of change between the same states this integral must have a greater value (and so exceed the difference of entropies at the ends of the path). The definite quantity represented by this integral for a reversible path was introduced by Clausius in 1854 (also adumbrated by Kelvin's investigations about the same time), and was named afterwards by him the increase of the *entropy* of the system in passing from the state C to the state D. This increase, being thus the same for the unlimited number of possible reversible paths involving independent variation of all its finite co-ordinates, along which the system can pass, can depend only on the terminal states. The entropy belonging to a given state is therefore a function of that state alone, irrespective of the manner in which it has been reached; and this is the justification of the assignment to it of a special name, connoting a property of the system depending on its actual condition and not on its previous history. Every reversible change in an isolated system thus maintains the entropy of that system unaltered; no possible spontaneous change can involve decrease of the entropy; while any defect of reversibility, arising from diffusion of matter or motion in the system, necessarily leads to increase of entropy. For a physical or chemical system only those changes are spontaneously possible which would lead to increase of the entropy; if the entropy is already a maximum for the given total energy, and so incapable of further continuous increase under the conditions imposed upon the system, there must be stable equilibrium.

This definite quantity belonging to a material system, its entropy ϕ, is thus concomitant with its energy E, which is also a definite function of its actual state by the law of conservation of energy; these, along with its temperature T, and the various co-ordinates expressing its geometrical configuration and its physical and chemical constitution, are the quantities with which the thermodynamics of the system deals. That branch of science develops the consequences involved in just two principles: (i.) that the energy of every isolated system is constant, and (ii.) that its entropy can never diminish; any complication that may be involved arises from complexity in the systems to which these two laws have to be applied.

The General Thermodynamic Equation.—When any physical or chemical system undergoes an infinitesimal change of state, we have $\delta E=\delta H+\delta U$, where δH is the energy that has been acquired *as heat* from sources extraneous to the system during the change, and δU is the energy that has been imparted by reversible agencies such as mechanical or electric work. It is, however, not usually possible to discriminate permanently between heat acquired and work imparted, for (unless for isothermal transformations) neither δH nor δU is the exact differential of a function of the constitution of the system and so independent of its previous history, although their sum δE is such; but we can utilize the fact that δH is equal to $T\delta\phi$ where $\delta\phi$ is such, as has just been seen. Thus E and ϕ represent properties of the system which, along with temperature, pressure and other independent data specifying its constitution, must form the variables of an analytical exposition. We have, therefore, to substitute $T\delta\phi$ for δH; also the *change* of internal energy is determined by the change of constitution, involving a differential relation of type

$$\delta U = -p\delta v + \delta W + \mu_1\delta m_1 + \mu_2\delta m_2 + \ldots + \mu_n\delta m_n,$$

when the system consists of an intimate mixture (solution) of masses $m_1, m_2, \ldots m_n$ of given constituents, which differ physically or chemically but may be partially transformable into each other by chemical or physical action during the changes under consideration, the whole being of volume v and under extraneous pressure p, while W is potential energy arising from physical forces such as those of gravity, capillarity, &c. The variables $m_1, m_2, \ldots\ldots m_n$ may not be all independent; for example, if the system were chloride of ammonium gas existing along with its gaseous products of dissociation, hydrochloric acid and ammonia, only one of the three masses would be independently variable. The sufficient number of these variables (independent components) together with two other variables, which may be v and T, or v and ϕ, specifies and determines the state of the system, considered as matter in bulk, at each instant. It is usual to include δW in $\mu_1\delta m_1 + \ldots$; in all cases where this is possible the single equation

$$\delta E = T\delta\phi - p\delta v + \mu_1\delta m_1 + \mu_2\delta m_2 + \ldots + \mu_n\delta m_n \qquad (1)$$

thus expresses the complete variation of the energy-function E arising from change of state; and when the part involving the n constitutive differentials has been expressed in terms of the number of them that are really independent, this equation by itself becomes the unique expression of *all* the thermodynamic relations of the system. These are in fact the various relations ensuring that the right-hand side is an exact differential, and are of the type of reciprocal relations such as $d\mu_r/d\phi = dT/dm_r$.

The condition that the state of the system be one of stable equilibrium is that $\delta\phi$, the variation of entropy, be negative for all formally imaginable infinitesimal transformations which make δE vanish; for as $\delta\phi$ cannot actually be negative for any spontaneous variation, none of these transformations can then occur. From the form of the equation, this condition is the same as that $\delta E - T\delta\phi$ must be positive for *all possible* variations of state of the system as above defined in terms of co-ordinates representing its constitution in bulk, without restriction.

We can change one of the independent variables expressing the state of the system from ϕ to T by subtracting $\delta(\phi T)$ from both sides of the equation of variation: then

$$\delta(E - T\phi) = -\phi\delta T - p\delta v + \mu_1\delta m_1 + \ldots + \mu_n\delta m_n.$$

It follows that for *isothermal* changes, *i.e.* those for which δT is maintained null by an environment at constant temperature, the condition of stable equilibrium is that the function $E - T\phi$ shall be a minimum. If the system is subject to an external pressure p, which as well as the temperature is imposed constant from without and thus incapable of variation through internal changes, the condition of stable equilibrium is similarly that $E - T\phi + pv$ shall be a minimum.

A chemical system maintained at constant temperature by communication of heat from its environment may thus have several states of stable equilibrium corresponding to different minima of the function here considered, just as there may be several minima of elevation on a landscape, one at the bottom of each depression; in fact, this analogy, when extended to space of n dimensions, exactly fits the case. If the system is sufficiently disturbed, for example, by electric shock, it may pass over (explosively) from a higher to a lower minimum, but never (without compensation from outside) in the opposite direction. The former passage, moreover, is often effected by introducing a new substance into the system; sometimes that substance is recovered unaltered at the end of the process, and then its action is said to be purely *catalytic*; its presence modifies the form of the function $E - T\phi$ so as to obliterate the ridge between the two equilibrium states in the graphical representation.

There are systems in which the equilibrium states are but very slightly dependent on temperature and pressure within wide limits, outside which reaction takes place. Thus while there are cases in which a state of mobile dissociation exists in the system which changes continuously as a function of these variables, there are others in which change does not sensibly occur at all until a certain *temperature of reaction* is attained, after which it proceeds very rapidly owing to the heat developed, and the system soon becomes sensibly permanent in a transformed phase by completion of the reaction. In some cases of this latter type the cause of the delay in starting lies possibly in passive resistance to change, of the nature of viscosity or friction, which is competent to convert an unstable mechanical equilibrium into a moderately stable one; but in most such reactions there seems to be no exact equilibrium at any temperature, short of the ultimate state of dissipated energy in which the reaction is completed, although the velocity of reaction is found to diminish exponentially with change of temperature, and thus becomes insignificant at a small interval from the temperature of pronounced activity.

Free Energy.—The quantity $E - T\phi$ thus plays the same fundamental part in the thermal statics of general chemical systems at uniform temperature that the potential energy plays in the statics of mechanical systems of unchanging constitution. It is a function of the geometrical co-ordinates, the physical and chemical constitution, and the temperature of the system, which determines the conditions of stable equilibrium *at each temperature*; it is, in fact, the potential energy generalized so as to include temperature, and thus be a single function relating to each temperature but at the same time affording a basis of connexion between the properties of the system at different temperatures. It has been called the *free energy* of the system by Helmholtz, for it is the part of the energy whose variation is connected with changes in the bodily structure of the system represented by the variables $m_1, m_2, \ldots m_n$, and not with the irregular molecular motions represented by heat, so that it can take part freely in physical transformations. Yet this holds good only subject to the condition that the temperature is not varied; it has been seen above that for the more general variation neither δH nor δU is an exact differential, and no line of separation can be drawn between thermal and mechanical energies.

The study of the evolution of ideas in this, the most abstract branch of modern mathematical physics, is rendered difficult in the manner of most purely philosophical subjects by the variety of terminology, much of it only partially appropriate, that has been employed to express the fundamental principles by different investigators and at different stages of the development. Attentive examination will show, what is indeed hardly surprising, that the principles of the theory of free energy of Gibbs and Helmholtz had been already grasped and exemplified by Lord Kelvin in the very early days of the subject (see the paper "On the Thermoelastic and Thermomagnetic Properties of Matter, Part I." *Quarterly Journal of Mathematics*, No. 1, April 1855; reprinted in *Phil. Mag.*, January 1878, and in *Math. and Phys. Papers*, vol. i. pp. 291, seq.). Thus the striking new advance contained in the more modern work of J. Willard Gibbs (1875-1877) and of Helmholtz (1882) was rather the sustained general application of these ideas to chemical systems, such as the galvanic cell and dissociating gaseous systems, and in general fashion to heterogeneous concomitant phases. The fundamental paper of Kelvin connecting the electromotive force of the cell with the energy of chemical transformation is of date 1851, some years before the distinction between free energy and total energy had definitely crystallized out; and, possibly satisfied with the approximate exactness of his imperfect formula when applied to a Daniell's cell (*infra*), and deterred by absence of experimental data, he did not return to the subject. In 1852 he briefly announced (*Proc. Roy. Soc. Edin.*) the principle of the dissipation of mechanical (or available) energy, including the necessity of compensation elsewhere when restoration occurs, in the form that "any restoration of mechanical energy, without more than an equivalent of dissipation, is impossible"—probably even in vital activity; but a sufficient specification of available energy (cf. *infra*) was not then developed. In the paper above referred to, where this was done, and illustrated by full application to solid elastic systems, the total energy is represented by e and is named "the intrinsic energy," the energy taken in during an isothermal transformation is represented by e, of which H is taken in as heat, while the remainder, the change of free (or mechanical or available) energy of the system is the unnamed quantity denoted by the symbol w, which is "the work done by the applied forces" at uniform temperature. It is pointed out that it is w and not e that is the potential energy-function for isothermal change, of which the form can be determined directly by dynamical and physical experiment, and from which alone the criteria of equilibrium and stress are to be derived—simply for the reason that for all *reversible* paths at constant temperature between the same terminal configurations, there must, by Carnot's principle, be the same gain or loss of heat. And a system of formulae are given (5) to (11)—*Ex. gr.* $e = w - t\frac{dw}{dt} + J\iint s\,dt$ for finding the total energy e for any temperature t when w and the thermal capacity s of the system, in a standard state, have thus been ascertained, and another for establishing connexion between the form of w for one temperature and its form for adjacent temperatures—which are identical with those developed by Helmholtz long afterwards, in 1882, except that the entropy appears only as an unnamed integral. The progress of physical science is formally identified with the exploration of this function w for physical systems, with continually increasing exactness and range—except where pure kinetic considerations prevail, in which cases the wider Hamiltonian dynamical formulation is fundamental. Another aspect of the matter will be developed below.

A somewhat different procedure, in terms of entropy as fundamental, has been adopted and developed by Planck. In an isolated system the trend of change must be in the direction which increases the entropy ϕ, by Clausius' form of the principle. But in experiment it is a system at constant temperature rather than an adiabatic one that usually is involved; this can be attained formally by including in the isolated system (cf. *infra*) a source of heat at that temperature and of unlimited capacity, when the energy of the original system increases by δE this source must give up heat of amount δE, and its entropy therefore diminishes $\delta E/T$. Thus for the original system maintained at constant temperature T it is $\delta\phi - \delta E/T$ that must always be positive in spontaneous change, which is the same criterion as was reached above. Reference may also be made to H. A. Lorentz's *Collected Scientific Papers*, part i.

A striking anticipation, almost contemporaneous, of Gibbs's thermodynamic potential theory (*infra*) was made by Clerk Maxwell in connexion with the discussion of Andrews's experiments on the critical temperature of mixed gases, in a letter published in Sir G. G. Stokes's *Scientific Correspondence* (vol. ii. p. 34).

Available Energy.—The same quantity ϕ, which Clausius named the entropy, arose in various ways in the early development of the subject, in the train of ideas of Rankine and Kelvin relating to the expression of the *available energy* A of the material system. Suppose there were accessible an auxiliary system containing an *unlimited* quantity of heat at absolute temperature T_0, forming a condenser into which heat can be discharged from the working system, or from which it may be recovered at that temperature: we proceed to find how much of the heat of our system is available for transformation into mechanical work, in a process which reduces the whole system to the temperature of this condenser. Provided the process of reduction is performed reversibly, it is immaterial, by Carnot's principle, in what manner it is effected: thus in following it out in detail we can consider each elementary quantity of heat δH removed from the system as set aside at its actual temperature between T and $T+\delta T$ for the production of mechanical work δW and the residue of it δH_0 as directly discharged into the condenser at T_0. The principle of Carnot gives $\delta H/T = \delta H_0/T_0$, so that the portion of the heat δH that is not available for work is δH_0, equal to $T_0\delta H/T$. In the whole process the part not available in connexion with the condenser at T_0 is therefore $T_0\int dH/T$. This quantity must be the same whatever reversible process is employed: thus, for example, we may first transform the system reversibly from the state C to the state D, and then from the state D to the final state of uniform temperature T_0. It follows that the value of $T_0\int dH/T$, representing the heat degraded, is the same along all reversible paths of transformation from the state C to the state D; so that the function $\int dH/T$ is the excess of a definite quantity ϕ connected with the system in the former state as compared with the latter.

It is usual to change the law of sign of δH so that gain of heat by the system is reckoned positive; then, relative to a condenser of unlimited capacity at T_0, the state C contains more mechanically *available energy* than the state D by the amount $E_C - E_D + T_0\int dH/T$, that is, by $E_C - E_D - T_0(\phi_C - \phi_D)$. In this way the existence of an entropy function with a definite value for each state of the system is again seen to be the direct analytical equivalent of Carnot's axiom that no process can be more efficient than a reversible process between the same initial and final states. The name *motivity* of a system was proposed by Lord Kelvin in 1879 for this conception of available energy. It is here specified as relative to a condenser of unlimited capacity at an assigned temperature T_0: some such specification is necessary to the definition; in fact, if T_0 were the absolute zero, all the energy would be mechanically available.

But we can obtain an intrinsically different and self-contained comparison of the available energies in a system in two different states at different temperatures, by ascertaining how much energy would be dissipated in each in a reduction to the *same* standard state of the system itself, at a standard temperature T_0. We have only to reverse the operation, and change back this standard state to each of the others in turn. This will involve abstractions of heat δH_0 from the various portions of the system in the standard state, and returns of δH to the state at T_0; if this return were $\delta H_0 T/T_0$ instead of δH, there would be no loss of availability in the direct process; hence there is actual dissipation $\delta H - \delta H_0 T/T_0$, that is $T(\delta\phi - \delta\phi_0)$. On passing from state 1 to state 2 through this standard state o the difference of these dissipations will represent the energy of the system that has become unavailable. Thus in this sense $E - T\phi + T\phi_0 + \text{const.}$ represents for each state the amount of energy that is available; but instead of implying an unlimited source of heat at the standard temperature T_0, it implies that there is no extraneous source. The available energy thus defined differs from $E - T\phi$, the *free energy* of Helmholtz, or the *work function of the applied forces* of Kelvin, which involves no reference to any standard state, by a simple linear function of the temperature alone which is immaterial as regards its applications.

The determination of the available mechanical energy arising from differences of temperature between the parts of the same system is a more complex problem, because it involves a determination of the common temperature to which reversible processes will ultimately reduce them; for the simple case in which no changes of state occur the solution was given by Lord Kelvin in 1853, in connexion with the above train of ideas (cf. Tait's *Thermodynamics*, §179). In the present exposition the system is sensibly in equilibrium at each stage, so that its temperature T is always uniform throughout; isolated portions at different temperatures would be treated as different systems.

Thermodynamic Potentials.—We have now to develop the relations involved in the general equation (1) of thermodynamics. Suppose the material system includes two coexistent states or phases, with opportunity for free interchange of constituents—for example, a salt solution and the aqueous vapour in equilibrium with it. Then in equilibrium a slight transfer δm of the water-substance of mass m_r constituting the vapour, into the water-substance of mass m_s existing in the solution, should not produce any alteration of the first order in $\delta E - T\delta\phi$; therefore μ_r must be equal to μ_s. The quantity μ_r is called by Willard Gibbs the potential of the corresponding substance of mass m_r; it may be defined as its marginal available energy per unit mass at the given temperature. If then a system involves in this way coexistent phases which remain permanently separate, the potentials of any constituent must be the same in all of them in which that constituent exists, for otherwise it would tend to pass from the phases in which its potential is higher to those in which it is lower. If the constituent is non-existent in any phase, its potential when in that phase would have to be higher than in the others in which it is actually present; but as the potential increases logarithmically when the density of the constituent is indefinitely diminished, this condition is automatically satisfied—or, more strictly, the constitutent cannot be entirely absent, but the presence of the merest trace will suffice to satisfy the condition of equality of potential. When the action of the force of gravity is taken into account, the potential of each constituent must include the gravitational potential gh; in the equilibrium state the total potential of each constituent, including this part, must be the same throughout all parts of the system into which it is freely mobile. An example is Dalton's law of the independent distributions of the gases in the atmosphere, if it were in a state of rest. A similar statement applies to other forms of mechanical potential energy arising from actions at a distance.

When a slight constitutive change occurs in a galvanic element at given temperature, producing available energy of electric current, in a reversible manner and isothermally, at the expense of chemical energy, it is the free energy of the system $E-T\phi$, not its total intrinsic energy, whose value must be conserved during the process. Thus the electromotive force is equal to the change of this free energy per electrochemical equivalent of reaction in the cell This proposition, developed by Gibbs and later by Helmholtz, modifies the earlier one of Kelvin—which tacitly assumed all the energy of reaction to be available—except in the cases such as that of a Daniell's cell, in which the magnitude of the electromotive force does not depend sensibly on the temperature.

The effects produced on electromotive forces by difference of concentrations in dilute solutions can thus be accounted for and traced out, from the knowledge of the form of the free energy for such cases; as also the effects of pressure in the case of gas batteries. The free energy does not sensibly depend on whether the substance is solid or fused—for the two states are in equilibrium at the temperature of fusion—though the total energy differs in these two cases by the heat of fusion; for this reason, as Gibbs pointed out, voltaic potential-differences are the same for the fused as for the solid state of the substances concerned.

Relations involving Constitution only.—The potential of a component in a given solution can depend only on the temperature and pressure of the solution, and the densities of the various components, including itself; as no distance-actions are usually involved in chemical physics, it will not depend on the aggregate masses present. The example above mentioned, of two coexistent phases liquid and vapour, indicates that there may thus be relations between the constitutions of the phases present in a chemical system which do not involve their total masses. These are developed in a very direct manner in Willard Gibbs's original procedure. In so far as attractions at a distance (a uniform force such as gravity being excepted) and capillary actions at the interfaces between the phases are inoperative, the fundamental equation (1) can be integrated. Increasing the volume k times, and all the masses to the same extent—in fact, placing alongside each other k identical systems at the same temperature and pressure—will increase ϕ and E in the same ratio k; thus E must be a homogeneous function of the first degree of the independent variables ϕ, v, m_1, . . ., m_n, and therefore by Euler's theorem relating to such functions

$$E=T\phi-pv+\mu_1m_1+\ldots\ldots+\mu_nm_n.$$

This integral equation merely expresses the additive character of the energies and entropies of adjacent portions of the system at uniform temperature, and thus depends only on the absence of sensible physical action directly across finite distances. If we form from it the expression for the complete differential δE, and subtract (1), there remains the relation

$$0=\phi\delta T-v\delta p+m_1\delta\mu_1+\ldots\ldots+m_n\delta\mu_n. \qquad (2)$$

This implies that in each phase the change of pressure depends on and is determined by the changes in T, μ_1, . . . μ_n alone; as we know beforehand that a physical property like pressure is an analytical function of the state of the system, it is therefore a function of these $n+1$ quantities. When they are all independently variable, the densities of the various constituents and of the entropy in the phase are expressed by the partial fluxions of p with respect to them: thus

$$\frac{\phi}{v}=\frac{dp}{dT},\qquad \frac{m_r}{v}=\frac{dp}{d\mu_r}.$$

But when, as in the case above referred to of chloride of ammonium gas existing partially dissociated along with its constituents, the masses are not independent, necessary linear relations, furnished by the laws of definite combining proportions, subsist between the partial fluxions, and the form of the function which expresses p is thus restricted, in a manner which is easily expressible in each special case.

This proposition that the pressure in any phase is a function of the temperature and of the potentials of the independent constituents, thus appears as a consequence of Carnot's axiom combined with the energy principle and the absence of effective actions at a distance. It shows that at a given temperature and pressure the potentials are not all independent, that there is a necessary relation connecting them. This is the *equation of state* or constitution of the phase, whose existence forms one mode of expression of Carnot's principle, and in which all the properties of the phase are involved and can thence be derived by simple differentiation.

The Phase Rule.—When the material system contains only a single phase, the number of independent variations, in addition to change of temperature and pressure, that can spontaneously occur in its constitution is thus one less than the number of its independent constituents. But where several phases coexist in contact in the same system, the number of possible independent variations may be much smaller. The present independent variables μ_1, . . ., μ_n are specially appropriate in this problem, because each of them has the same value in all the phases. Now each phase has its own characteristic equation, giving a relation between δp, δT, and $\delta\mu_1$, . . . $\delta\mu_n$, or such of the latter as are independent; if r phases coexist, there are r such relations; hence the number of possible independent variations, including those of v and T, is reduced to $m-r+2$, where m is the number of independently variable chemical constituents which the system contains. This number of degrees of constitutive freedom cannot be negative; therefore the number of possible phases that can coexist alongside each other cannot exceed $m+2$. If $m+2$ phases actually coexist, there is no variable quantity in the system, thus the temperature and pressure and constitutions of the phases are all determined; such is the triple point at which ice, water and vapour exist in presence of each other. If there are $m+1$ coexistent phases, the system can vary in one respect only; for example, at any temperature of water-substance different from the triple point two phases only, say liquid and vapour, or liquid and solid, coexist, and the pressure is definite, as also are the densities and potentials of the components. Finally, when but one phase, say water, is present, both pressure and temperature can vary independently. The first example illustrates the case of systems, physical or chemical, in which there is only one possible state of equilibrium, forming a point of transition between different constitutions; in the second type each temperature has its own completely determined state of equilibrium; in other cases the constitution in the equilibrium state is indeterminate as regards the corresponding number of degrees of freedom. By aid of this phase rule of Gibbs the number of different chemical substances actually interacting in a given complex system can be determined from observation of the degree of spontaneous variation which it exhibits; the rule thus lies at the foundation of the modern subject of chemical equilibrium and continuous chemical change in mixtures or alloys, and in this connexion it has been widely applied and developed in the experimental investigations of Roozeboom and van 't Hoff and other physical chemists, mainly of the Dutch school.

Extent to which the Theory can be practically developed.—It is only in systems in which the number of independent variables is small that the forms of the various potentials,—or the form of the fundamental characteristic equation expressing the energy of the system in terms of its entropy and constitution, or the pressure in terms of the temperature and the potentials, which includes them all,—can be readily approximated to by experimental determinations. Even in the case of the simple system water-vapour, which is fundamental for the theory of the steam-engine, this has not yet been completely accomplished. The general theory is thus largely confined, as above, to defining the restrictions on the degree of variability of a complex chemical system which the principle of Carnot imposes. The tracing out of these general relations of continuity of state is much facilitated by geometrical diagrams, such as James Thomson first introduced in order to exhibit and explain Andrews' results as to the range of coexistent phases in carbonic acid. Gibbs's earliest thermodynamic surface had for its co-ordinates volume, entropy and energy; it was constructed to scale by Maxwell for water-substance, and is fully explained in later editions of the *Theory of Heat* (1875); it forms a relief map which, by simple inspection, reveals the course of the transformations of water, with the corresponding mechanical and thermal changes, in its three coexistent states of solid, liquid and gas. In the general case, when the substance has more than one independently variable constituent, there are more than three variables to be represented; but Gibbs has shown the utility of surfaces representing, for instance, the entropy in terms of the constitutive variables when temperature and pressure are maintained constant. Such graphical methods are now of fundamental importance in connexion with the phase rule, for the experimental exploration of the trend of the changes of constitution of complex mixtures with interacting components, which arise as the physical conditions are altered, as, for example in modern metallurgy, in the theory of alloys. The study of the phenomena of condensation in a mixture of two gases or vapours, initiated by Andrews and developed in this manner by van der Waals and his pupils, forms a case in point (see CONDENSATION OF GASES).

Dilute Components: Perfect Gases and Dilute Solutions.—There are, however, two simple limiting cases, in which the theory can be completed by a determination of the functions involved in it, which throw much light on the phenomena of actual systems not far removed trom these ideal limits. They are the cases of mixtures of perfect gases, and of very dilute solutions.

If, following Gibbs, we apply his equation (2) expressing the pressure in terms of the temperature and the potentials, to a very dilute solution of substances m_2, m_3, . . . m_n in a solvent substance m_1, and vary the co-ordinate m_r alone, p and T remaining unvaried, we have in the equilibrium state

$$m_r\frac{d\mu_r}{dm_r}+m_1\frac{d\mu_1}{dm_r}+\ldots+m_n\frac{d\mu_n}{dm_r}=0,$$

in which every m except m_1 is very small, while $d\mu_1/dm_r$ is presumably finite. As the second term is thus finite, this requires that the total potential of each component m_r, which is $m_r d\mu_r/dm_r$, shall be finite, say k_r, in the limit when m_r is null. Thus for very small concentrations the potential μ_r of a dilute component must be of the form $k_r \log m_r/v$, being proportional to the logarithm of the density of that component; it thus tends logarithmically to an infinite value at evanescent concentrations, showing that removal of the last traces of any impurity would demand infinite proportionate expenditure of available energy, and is therefore practically impossible with finite intensities of force. It should be noted, however, that this argument applies only to fluid phrases, for in the case of deposition of a solid m_r is not uniformly distributed throughout the phase; thus it remains possible for the growth of a crystal at its surface in aqueous solution to extrude all the water except such as is in some form of chemical combination.

The precise value of this logarithmic expression for the potential can be readily determined for the case of a perfect gas from its characteristic properties, and can be thence extended to other dilute forms of matter. We have $pv=R/m.T$ for unit mass of the gas, where m is the molecular weight, being 2 for hydrogen, and R is a constant equal to 82×10^6 in C.G.S. dynamical units, or 2 calories approximately in thermal energy units, which is the same for all gases because they have all the same number of molecules per unit volume. The increment of heat received by the unit mass of the gas is $\delta H=p\delta v+\kappa\delta T$, κ being thus the specific heat at constant volume, which can be a function only of the temperature. Thus

$$\phi=\int dH/T=R/m.\log v+\int\kappa T^{-1}dT;$$

and the available energy A per unit mass is $E-T\phi+T\phi_0$ where $E=\epsilon+\int\kappa dT$, the integral being for a standard state, and ϵ being intrinsic energy of chemical constitution; so that

$$A=\epsilon+\phi_0T+\int\kappa dT-T\int\kappa T^{-1}dT-R/m.T\log v.$$

If there are ν molecules in the unit mass, and N per unit volume, we have $m\nu=Nmv$, each being $2\nu'$, where ν' is the number of molecules per unit mass in hydrogen; thus the free energy per molecule is $a'+R'T\log bN$, where $b=m/2\nu'$, $R'=R/2\nu'$, and a' is a function of T alone. It is customary to avoid introducing the unknown molecular constant ν' by working with the available energy per "gramme-molecule," that is, for a number of grammes expressed by the molecular weight of the substance; this is a constant multiple of the available energy per molecule, and is $a+RT\log\rho$, ρ being the density equal to bN where $b=m/2\nu'$. This formula may now be extended by simple summation to a mixture of gases, on the ground of Dalton's experimental principle that each of the components behaves in presence of the others as it would do in a vacuum. The components are, in fact, actually separable wholly or partially in reversible ways which may be combined into cycles, for example, either (i.) by diffusion through a porous partition, taking account of the work of the pressures, or (ii.) by utilizing the modified constitution towards the top of a long column of the mixture arising from the action of gravity, or (iii.) by reversible absorption of a single component.

If we employ in place of available energy the form of characteristic equation which gives the pressure in terms of the temperature and potentials, the pressure of the mixture is expressed as the sum of those belonging to its components: this equation was made by Gibbs the basis of his analytical theory of gas mixtures, which he tested by its application to the only data then available, those of the equilibrium of dissociation of nitrogen peroxide ($2NO_2 \rightleftarrows N_2O_4$) vapour.

Van 't Hoff's Osmotic Principle: Theoretical Explanation.—We proceed to examine how far the same formulae as hold for gases apply to the available energy of matter in solution which is so dilute that each molecule of the dissolved substance, though possibly the centre of a complex of molecules of the solvent, is for nearly all the time beyond the sphere of direct influence of the other molecules of the dissolved substance. The available energy is a function only of the co-ordinates of the matter in bulk and the temperature; its change on further dilution, with which alone we are concerned in the transformations of dilute solutions, can depend only on the further separation of these molecular complexes in space that is thereby produced, as no one of them is in itself altered. The change is therefore a function only of the number N of the dissolved molecules per unit volume, and of the temperature, and is per molecule, expressible in a form entirely independent of their constitution and of that of the medium in which they are dissolved. This suggests that the expression for the change on dilution is the same as the known one for a gas, in which the same molecules would exist free and in the main outside each other's spheres of influence; which confirms and is verified by the experimental principle of van 't Hoff, that osmotic pressure obeys the laws of gaseous pressure with identically the same physical constants as those of gases. It can be held, in fact, that this suggestion does not fall short of a demonstration, on the basis of Carnot's principle, and independent of special molecular theory, that in all cases where the molecules of a component, whether it be of a gas or of a solution, are outside each other's spheres of influence, the available energy, so far as regards dilution, must have a common form, and the physical constants must therefore be the known gas-constants. The customary exposition derives this principle, by an argument involving cycles, from Henry's law of solution of gases; it is sensibly restricted to such solutes as appear concomitantly in the free gaseous state, but theoretically it becomes general when it is remembered that no solute can be absolutely non-volatile.

Source of the Idea of Temperature.—The single new element that thermodynamics introduces into the ordinary dynamical specification of a material system is temperature. This conception is akin to that of potential, except that it is given to us directly by our sense of heat. But if that were not so, we could still demonstrate, on the basis of Carnot's principle, that there is a definite function of the state of a body which must be the same for all of a series of connected bodies, when thermal equilibrium has become established so that there is no tendency for heat to flow from one to another. For we can by mere geometrical displacement change the order of the bodies so as to bring different ones into direct contact. If this disturbed the thermal equilibrium, we could construct cyclic processes to take advantage of the resulting flow of heat to do mechanical work, and such processes might be carried on without limit. Thus it is proved that if a body A is in temperature-equilibrium with B, and B with C, then A must be in equilibrium with C directly. This argument can be applied, by aid of adiabatic partitions, even when the bodies are in a field of force so that mechanical work is required to change their geometrical arrangement; it was in fact employed by Maxwell to extend from the case of a gas to that of any other system the proposition that the temperature is the same all along a vertical column in equilibrium under gravity.

It had been shown from the kinetic theory by Maxwell that in a gas-column the mean kinetic energy of the molecules is the same at all heights. If the only test of equality of temperature consisted in bringing the bodies into contact, this would be rather a proof that thermal temperature is of the same physical nature in all parts of the field of force; but temperature can also be equalized across a distance by radiation, so that this law for gases is itself already necessitated by Carnot's general principle, and merely confirmed or verified by the special gas-theory. But without introducing into the argument the existence of radiation, the uniformity of temperature throughout all phases in equilibrium is necessitated by the doctrine of energetics alone, as otherwise, for example, the raising of a quantity of gas to the top of the gravitational column in an adiabatic enclosure together with the lowering of an equal mass to the bottom would be a source of power, capable of unlimited repetition.

Laws of Chemical Equilibrium based on Available Energy.—The complete theory of chemical and physical equilibrium in gaseous mixtures and in very dilute solutions may readily be developed in terms of available energy (cf. *Phil. Trans.*, 1897, A, pp. 266-280), which forms perhaps the most vivid and most direct procedure. The available energy per molecule of any kind, in a mixture of perfect gases in which there are N molecules of that kind per unit volume, has been found to be $a + R'T \log bN$ where R′ is the universal physical constant connected with R above. This expression represents the marginal increase of available energy due to the introduction of one more molecule of that kind into the system as actually constituted. The same formula also applies, by what has already been stated, to substances in dilute solution in any given solvent. In any isolated system in a mobile state of reaction or of internal dissociation, the condition of chemical equilibrium is that the available energy at constant temperature is a minimum, therefore that it is stationary, and slight change arising from fresh reaction would not sensibly alter it. Suppose that this reaction, per molecule affected by it, is equivalent to introducing n_1 molecules of type N_1, n_2 of type N_2, &c., into the system, $n_1, n_2, \ldots$ being the numbers of molecules of the different types that take part in the reaction, as shown by its chemical equation, reckoned positive when they appear, negative when they disappear. Then in the state of equilibrium

$$n_1(a'_1 + R'T \log b_1 N_1) + n_2(a'_2 + R'T \log b_2 N_2) + \ldots.$$

must vanish. Therefore $N_1^{n_1} N_2^{n_2} \ldots$ must be equal to K, a function of the temperature alone. This law, originally based by Guldberg and Waage on direct statistics of molecular interaction, expresses for each temperature the relation connecting the densities of the interacting substances, in dilution comparable as regards density with the perfect gaseous state, when the reaction has come to the state of mobile equilibrium.

All properties of any system, including the heat of reaction, are expressible in terms of its available energy A, equal to $E - T\phi + \phi_0 T$. Thus as the constitution of the system changes with the temperature, we have

$$\frac{dA}{dT} = \frac{dE}{dT} - T\frac{d\phi}{dT} - (\phi - \phi_0)$$

where

$$\delta E = \delta H + \delta W, \quad \delta H = T\delta\phi,$$

δH being heat and δW mechanical and chemical energy imparted to the system at constant temperature; hence

$$\frac{d(A-W)}{dT} = -(\phi - \phi_0), \text{ so that } A = E + T\frac{d(A-W)}{dT},$$

which is equivalent to

$$E - W = -T^2 \frac{d}{dT}\left(\frac{A-W}{T}\right).$$

This general formula, applied differentially, expresses the heat $\delta E - \delta W$ absorbed by a reaction in terms of δA, the change produced by it in the available energy of the system, and of δW, the mechanical and electrical work done on the system during its progress.

In the problem of reaction in gaseous systems or in very dilute solution, the change of available energy per molecule of reaction has just been found to be

$$\delta A = \delta A_0 + R'T \log K', \text{ where } K' = b_1^{n_1} b_2^{n_2} \ldots K;$$

thus, when the reaction is spontaneous without requiring external work, the heat absorbed per molecule of reaction is

$$-T^2 \frac{d}{dT}\frac{\delta A_0}{T}, \text{ or } -R'T^2 \frac{d}{dT} \log K.$$

This formula has been utilized by van 't Hoff to determine, in terms of the heat of reaction, the displacement of equilibrium in various systems arising from change of temperature; for K, equal to $N_1^{n_1} N_2^{n_2} \ldots$, is the reaction-parameter through which alone the temperature affects the law of chemical equilibrium in dilute systems.

Interfacial Phenomena: Liquid Films.—The characteristic equation hitherto developed refers to the state of an element of mass in the interior of a homogeneous substance: it does not apply to matter in the neighbourhood of the transition between two adjacent phases. A remarkable analysis has been developed by J. W. Gibbs in which the present methods concerning matter in bulk are extended to the phenomena at such an interface, without the introduction of any molecular theory; it forms the thermodynamic completion of Gauss's mechanical theory of capillarity, based on the early form of the principle of total energy. The validity of the fundamental doctrine of available energy, so far as regards all mechanical actions in bulk such as surface tensions, is postulated, even when applied to interfacial layers so thin as to be beyond our means of measurement; the argument from perpetual motions being available here also, as soon as we have experimentally ascertained that the said tensions are definite physical properties of the state of the interface and not merely accidental phenomena. The procedure will then consist in assuming a definite excess of energy, of entropy, and of the masses of the various components, each per unit surface, at the interface, the potential of each component being of necessity, in equilibrium, the same as it is in the adjacent masses. The interfacial transition layer thus provides in a sense a new surface-phase coexistent with those on each side of it, and having its own characteristic equation. It is only the extent of the interface and not its curvatures that need enter into this relation, because any slight influence of the latter can be eliminated from the equation by slightly displacing the position of the surface which is taken to represent the interface geometrically. By an argument similar to one given above, it is shown that one of the forms of the characteristic equation is a relation expressing the surface tension as a function of the temperature and the potentials of the various components present on the two sides of the interface; and from the differentiation of this the surface densities of the superficial distributions of these components (as above defined) can be obtained. The conditions that a specified new phase may become developed when two other given ones are brought into contact, *i.e.* that a chemical reaction may start at the interface, are thence formally expressed in terms of the surface tensions of the three transition layers and the pressures in the three phases. In the case of a thin soap-film, sudden extension of any part reduces the interfacial density of each component at each surface of the film, and so alters the surface tension, which requires time to recover by the very slow diffusion of dissolved material from other parts of the thin film; the system being stable, this change must be an increase of tension, and constitutes a species of elasticity in the film. Thus in a vertical film the surface tension must be greater in the higher parts, as they have to sustain the weight of the lower parts; the upper parts, in fact, stretch until the superficial densities of the components there situated are reduced to the amounts that correspond to the tension required for this purpose. Such a film could not therefore consist of pure water. But there is a limit to these processes: if the film becomes so thin that there is no water in bulk between its surfaces, the tensions cannot adjust themselves in this slow way by migration of components from one part of the film to another; if the film can survive at all after it has become of molecular thickness, it must be as a definite molecular structure all across its thickness. Of such type are the black spots that break out in soap-films (suggested by Gibbs and proved by the measures of Reinold and Rücker) the spots increase in size because their tension is less than that of the surrounding film, but their indefinite increase is presumably stopped in practice by some clogging or viscous agency at their boundary.

Transition to Molecular Theory.—The subject of energetics, based on the doctrine of available energy, deals with matter in bulk and is not concerned with its molecular constitution, which it is expressly designed to eliminate from the problem. This analysis of the phenomena of surface tension shows how far the principle of negation of perpetual motions can carry us, into regions which at first sight might be classed as molecular. But, as in other cases, it is limited to pointing out the general scheme of relations within which the phenomena can have their play There is now a considerable body of knowledge correlating surface tension with chemical constitution, especially to a certain extent with the numerical density of the distribution of molecules; thus R. Eötvös has shown that a law of proportionality exists for wide classes of substances between the temperature-gradient of the surface tension and the density of the molecules over the surface layer, which varies as the two-thirds power of the number per unit volume (see CHEMISTRY: *Physical*). This takes us into the sphere of molecular science, where at present we have only such indications largely derived from experiment, if we except the mere notion of inter-atomic forces of unknown character on which the older theories of capillarity, those of Laplace and Poisson, were constructed.

In other topics the same restrictions on the scope of the simple statical theory of energy appear. From the ascertained behaviour in certain respects of gaseous media we are able to construct their characteristic equation, and correlate their remaining relations by means of its consequences. Part of the experimental knowledge required for this purpose is the values of the gas-constants, which prove to be the same for all nearly perfect gases. The doctrine of energetics by itself can give no clue as to why this should be so, it can only construct a scheme for each simple or complex medium on the basis of its own experimentally determined characteristic equation. The explanation of uniformities in the intrinsic constitutions of various media belongs to molecular theory, which is a distinct and in the main more complex and more speculative department of knowledge When we proceed further and find, with van 't Hoff, that these same universal gas-constants reappear in the relations of very dilute solutions, our demand for an explanation such as can only be provided by molecular theory (as *supra*) is intensely stimulated. But except in respects such as these the doctrine of energetics gives a complete synthesis of the course and relations of the chemical reactions of matter in bulk, from which we can eliminate atomism altogether by restating the merely numerical atomic theory of Dalton as a principle of equivalent combining proportions. Of recent years there has been a considerable school of chemists who insist on this procedure as a purification of their science from the hypothetical ideas as to atoms and molecules, in terms of which its experimental facts have come to be expressed A complete system of doctrine can be developed in this manner, but its scope will be limited. It makes use of one principle of correlation, the doctrine of available energy, and discards another such principle, the atomic theory. Nor can it be said that the one principle is really more certain and definite than the other. This may be illustrated by what has sometimes by German writers been called Gibbs's paradox: the energy that is available for mechanical effect in the inter-diffusion of given volumes of two gases depends only on these volumes and their pressures, and is independent of what the gases are; if the gases differed only infinitesimally in constitution it would still be the same, and the question arises where we are to stop, for we cannot suppose the inter-diffusion of two identical gases to be a source of power. This then looks like a real failure, or rather limitation, of the principle, and there are other such, that can only be satisfactorily explained by aid of the complementary doctrine of molecular theory. That theory, in fact, shows that the more nearly identical the gases are, the slower will be the process of inter-diffusion, so that the mechanical energy will indeed be available, but only after a time that becomes indefinitely prolonged. It is a case in which the simple doctrine of energetics becomes inadequate before the limit is reached. The phenomena of highly rarefied gases provide other cases. And in fact the only reason hitherto thought of for the invariable tendency of available energy to diminish, is that it represents the general principle that in the kinetic play of a vast assemblage of independent molecules individually beyond our control, the normal tendency is for the regularities to diminish and the motions to become less correlated: short of some such reason, it is an unexplained empirical principle. In the special departments of dynamical physics on the other hand, the molecular theory, there dynamical and therefore much more difficult and less definite, is an indispensable part of the framework of science; and even experimental chemistry now leans more and more on new physical methods and instruments. Without molecular theory the clue which has developed into spectrum analysis, bringing with it stellar chemistry and a new physical astronomy, would not have been available; nor would the laws of diffusion and conduction in gases have attained more than an empirical form; nor would it have been possible to weave the phenomena of electrodynamics and radiation into an entirely rational theory.

The doctrine of available energy, as the expression of thermodynamic theory, is directly implied in Carnot's *Essai* of 1824, and constitutes, in fact, its main theme, it took a fresh start, in the light of fuller experimental knowledge regarding the nature of heat, in the early memoirs of Rankine and Lord Kelvin, which may be found in their Collected Scientific Papers, a subsequent exposition occurs in Maxwell's *Theory of Heat*; its most familiar form of statement is Lord Kelvin's principle of the dissipation of available energy. Its principles were very early applied by James Thomson to a physico-chemical problem, that of the influence of stress on the growth of crystals in their mother liquor. The "thermodynamic function" introduced by Rankine into its development is the same as the "entropy" of the material system, independently defined by Clausius about the same time. Clausius's form of the principle, that in an adiabatic system the entropy tends continually to increase, has been placed by Professor Willard Gibbs, of Yale University, at the foundation of his magnificent but complex and difficult development of the theory. His monumental memoir "On the Equilibrium of Heterogeneous Substances," first published in *Trans Connecticut Academy* (1876–1878), made a clean sweep of the subject; and workers in the modern experimental science of physical chemistry have returned to it again and again to find their empirical principles forecasted in the light of pure theory, and to derive fresh inspiration for new departures. As specially preparatory to Gibbs's general discussion may be mentioned Lord Rayleigh's memoir on the thermodynamics of gaseous diffusion (*Phil Mag.*, 1876), which was expounded by Maxwell in the 9th edition of the *Ency Brit.* (art DIFFUSION). The fundamental importance of the doctrine of dissipation of energy for the theory of chemical reaction had already been insisted on in general terms by Rayleigh; subsequent to, but independently of, Gibbs's work it had been elaborated by von Helmholtz (*Gesamm. Abhandl* ii. and iii.) in connexion with the thermodynamics of voltaic cells, and more particularly in the calculation of the free or available energy of solutions from data of vapour-pressure, with a view to the application to the theory of concentration cells, therein also coming close to the doctrine of osmotic pressure. This form of the general theory has here been traced back substantially to Lord Kelvin under date 1855. Expositions and developments on various lines will be found in papers by Riecke and by Planck in

Annalen der Physik between 1890 and 1900, in the course of a memoir by Larmor, *Phil. Trans.*, 1897, A, in Voigt's *Compendium der Physik* and his more recent *Thermodynamik*, in Planck's *Vorlesungen über Thermodynamik*, in Duhem's elaborate *Traité de mécanique chimique* and *Le Potential thermodynamique*, in Whetham's *Theory of Solution* and in Bryan's *Thermodynamics*. Numerous applications to special problems are expounded in van 't Hoff's *Lectures on Theoretical and Physical Chemistry*.

The theory of energetics, which puts a diminishing limit on the amount of energy available for mechanical purposes, is closely implicated in the discovery of natural radioactive substances by H. Becquerel, and their isolation in the very potent form of radium salts by M. and Mme Curie. The slow degradation of radium has been found by the latter to be concomitant with an evolution of heat, in amount enormous compared with other chemical changes. This heat has been shown by E. Rutherford to be about what must be due to the stoppage of the α and β particles, which are emitted from the substance with velocities almost of the same scale as that of light. If they struck an ideal rigid target, their lost kinetic energy must all be sent away as radiation; but when they become entangled among the molecules of actual matter, it will, to a large extent, be shared among them as heat, with availability reduced accordingly. In any case the particles that escape into the surrounding space are so few and their velocity so uniform that we can, to some extent, treat their energy as directly available mechanically, in contradistinction to the energy of individual molecules of a gas (cf Maxwell's "demons"), *e.g.* for driving a vane, as in Crookes's experiment with the cathode rays. Indeed, on account of the high velocity of projection of the particles from a radium salt, the actions concerned would find their equilibrium at such enormously high temperatures that any influence of actually available differences of temperature is not sensibly a feature of the phenomena. Such actions, however, like explosive actions in general, are beyond our powers of actual *direct* measurement as regards the degradation of availability of the energy. It has been pointed out by Rutherford, R. J. Strutt and others, that the energy of degradation of even a very minute admixture of *active* radium would entirely dominate and mask all other cosmical modes of transformation of energy, for example, it far outweighs that arising from the exhaustion of gravitational energy, which has been shown by Helmholtz and Kelvin to be an ample source for all the activities of our cosmical system, and to be itself far greater than the energy of any ordinary chemical rearrangements consequent on a fall of temperature a circumstance that makes the existence and properties of this substance under settled cosmic conditions still more anomalous (see RADIOACTIVITY). Theoretically it is possible to obtain unlimited concentration of availability of energy at the expense of an equivalent amount of degradation spread over a wider field, the potency of electric furnaces, which have recently opened up a new department of chemistry, and are limited only by the refractoriness of the materials of which they are constituted, forms a case in point. In radium we have the very remarkable phenomenon of far higher concentration occurring naturally in very minute permanent amounts, so that merely chemical sifting is needed to produce its aggregation. Even in pitchblende only one molecule in 10^8 seems to be of radium, renewable, however, when lost, by internal transformation.

The energetics of RADIATION is treated under that heading See also THERMODYNAMICS. (J. L.*)

ENERGICI, or ENERGUMENS (Gr ·"possessed by a spirit"), the name given in the early Church to those suffering from different forms of insanity, who were popularly supposed to be under the control of some indwelling spirit other than their own. Among primitive races everywhere disease is explained in this way, and its removal supposed to be effected by priestly prayers and incantations. They were sometimes called χειμαζόμενοι, as being "tossed by the waves" of uncontrollable impulse. Persons afflicted in this way were restricted from entering the church, but might share the shelter of the porch with lepers and persons of offensive life (Hefele, *Conciliengeschichte*, vol. i. § 16). After the prayers, if quiet, they might come in to receive the bishop's blessing (*Apost. Const.* viii. 6, 7, 32) and listen to the sermon. They were daily fed and prayed over by the exorcists, and, in case of recovery, after a fast of from 20 to 40 days, were admitted to the eucharist, and their names and cures entered in the church records.

A note on the New Testament use of the word ἐνεργεῖν and its cognates will be found in J. A. Robinson's edition of *The Epistle to the Ephesians*, pp. 241-247; an excursus on "The Conflict with Demons" in A. Harnack, *The Expansion of Christianity*, i. 152-180. Cf. EXORCISM.

ENERGY (from the Gr. ἐνέργεια; ἐν, in, ἔργον, work), in physical science, a term which may be defined as accumulated mechanical work, which, however, may be only partially available for use. A bent spring possesses energy, for it is capable of doing work in returning to its natural form, a charge of gunpowder possesses energy, for it is capable of doing work in exploding; a Leyden jar charged with electricity possesses energy, for it is capable of doing work in being discharged. The motions of bodies, or of the ultimate parts of bodies, also involve energy, for stopping them would be a source of work.

All kinds of energy are ultimately measured in terms of work. If we raise 1 lb of matter through a foot we do a certain amount of work against the earth's attraction; if we raise 2 lb through the same height we do twice this amount of work, and so on. Also, the work done in raising 1 lb through 2 ft. will be double of that done in raising it 1 ft. Thus we recognise that the work done varies as the resistance overcome and the distance through which it is overcome conjointly.

Now, we may select any definite quantity of work we please as our unit, as, for example, the work done in lifting a pound a foot high from the sea-level in the latitude of London, which is the unit of work generally adopted by British engineers, and is called the "foot-pound." The most appropriate unit for scientific purposes is one which depends only on the fundamental units of length, mass and time, and is hence called an absolute unit. Such a unit is independent of gravity or of any other quantity which varies with the locality. Taking the centimetre, gramme and second as our fundamental units, the most convenient unit of force is that which, acting on a gramme for a second, produces in it a velocity of a centimetre per second; this is called a Dyne. The unit of work is that which is required to overcome a resistance of a dyne over a centimetre, and is called an Erg. In the latitude of Paris the dyne is equal to the weight of about $\frac{1}{981}$ of a gramme, and the erg is the amount of work required to raise $\frac{1}{981}$ of a gramme vertically through one centimetre.

Energy is the capacity for doing work. The unit of energy should therefore be the same as that of work, and the centimetre-gramme-second (C G.S) unit of energy is the erg.

The forms of energy which are most readily recognized are of course those in which the energy can be most directly employed in doing mechanical work; and it is manifest that masses of matter which are large enough to be seen and handled are more readily dealt with mechanically than are smaller masses. Hence when useful work can be obtained from a system by simply connecting visible portions of it by a train of mechanism, such energy is more readily recognized than is that which would compel us to control the behaviour of molecules before we could transform it into useful work. This leads up to the fundamental distinction, introduced by Lord Kelvin, between "available energy," which we can turn to mechanical effect, and "diffuse energy," which is useless for that purpose.

The conception of work and of energy was originally derived from observation of purely mechanical phenomena, that is to say, phenomena in which the relative positions and motions of visible portions of matter were all that were taken into consideration. Hence it is not surprising that, in those more subtle forms in which energy cannot be readily or completely converted into work, the universality of the principle of energy, its conservation, as regards amount, should for a long while have escaped recognition after it had become familiar in pure dynamics.

If a pound weight be suspended by a string passing over pulley, in descending through 10 ft. it is capable of raising nearly a pound weight attached to the other end of the string, through the same height, and thus can do nearly 10 foot-pounds of work. The smoother we make the pulley the more nearly does the amount of useful work which the weight is capable of doing approach 10 foot-pounds, and if we take into account the work done against the friction of the pulley, we may say that the work done by the descending weight is 10 foot-pounds, and hence when the weight is in its elevated position we have at disposal 10 foot-pounds more energy than when it is in the lower position. It should be noticed, however, that this energy is possessed by the system consisting of the earth and pound together, in virtue of their separation, and that neither could do work without the other to attract it. The system consisting of the earth and the pound therefore possesses an amount of energy which depends on the relative positions of its two parts, on account of the latent physical connexion existing between them In most mechanical systems the working stresses acting between the parts can be determined when the relative positions of all the parts are known; and the energy which a system possesses in virtue of the relative positions of its parts, or its *configuration*, is classified as "potential energy," to distinguish it from energy of motion which we shall presently consider The word potential does not imply that this energy is not real, it exists in potentiality only in the sense that it is stored away in some latent manner; but it can be drawn upon without limit for mechanical work.

It is a fundamental result in dynamics that, if a body be projected vertically upwards *in vacuo*, with a velocity of v centimetres per second, it will rise to a height of $v^2/2g$ centimetres, where g represents the numerical value of the acceleration produced by gravity in centimetre-second units. Now, if m represent the mass of the body in grammes its weight will be mg dynes, for it will require a force of mg dynes to produce in it the acceleration denoted by g Hence the work done in raising the mass will be represented by $mg \cdot v^2/2g$, that is, $\frac{1}{2}mv^2$ *ergs*. Now, whatever be the direction in which a body is moving, a frictionless constraint, like a string attached to the body, can cause its velocity to be changed into the vertical direction without any change taking place in the magnitude of the velocity. Thus it is merely in virtue of the velocity that the mass is capable of rising against the resistance of gravity, and hence we recognize that on account of its motion the body possessed $\frac{1}{2}mv^2$ units of energy. Energy of motion is usually called "kinetic energy."

A simple example of the transformation of kinetic energy into potential energy, and vice versa, is afforded by the pendulum. When at the limits of its swing, the pendulum is for an instant at rest, and all the energy of the oscillation is static or potential When passing through its position of equilibrium, since gravity can do no more work upon it without changing its fixed point of support, all the energy of oscillation is kinetic At intermediate positions the energy is partly kinetic and partly potential.

Available kinetic energy is possessed by a system of two or more bodies in virtue of the relative motion of its parts. Since our conception of velocity is essentially relative, it is plain that any property possessed by a body in virtue of its motion can be effectively possessed by it only in relation to those bodies with respect to which it is moving. If a body whose mass is m grammes be moving with a velocity of v centimetres per second relative to the earth, the available kinetic energy possessed by the system is $\frac{1}{2}mv^2$ ergs if m be small relative to the earth. But if we consider two bodies each of mass m and one of them moving with velocity v relative to the other, only $\frac{1}{4}mv^2$ units of work is available from this system alone Thus the estimation of kinetic energy is intimately affected by the choice of our base of measurement.

When the stresses acting between the parts of a system depend *only* on the relative positions of those parts, the sum of the kinetic energy and potential energy of the system is always the same, provided the system be not acted upon by anything outside it. Such a system is called "conservative," and is well illustrated by the swinging pendulum above referred to. But there are stresses which depend on the relative *motion* of the visible bodies between which they appear to act. When work is done against these forces no full equivalent of potential energy may be produced, this applies especially to frictional forces, for if the motion of the system be reversed the forces will be also reversed and will still oppose the motion. It was long believed that work done against such forces was lost, and it was not till the 19th century that the energy thus transformed was traced; the conservation of energy has become the master-key to unlock the connexions in inanimate nature.

It was pointed out by Thomson (Lord Kelvin) and P G Tait that Newton had divined the principle of the conservation of energy, so far as it belongs purely to mechanics. But what became of the work done against friction and such non-conservative forces remained obscure, while the chemical doctrine that heat was an indestructible substance afterwards led to the idea that it was lost There was, however, even before Newton's time, more than a suspicion that heat was a form of energy. Francis Bacon expressed his conviction that heat consists of a kind of motion or "brisk agitation" of the particles of matter. In the *Novum Organum*, after giving a long list of the sources of heat, he says. "From these examples, taken collectively as well as singly, the nature whose limit is heat appears to be motion . . . It must not be thought that heat generates motion or motion heat (though in some respects this is true), but the very essence of heat, or the substantial self of heat, is motion and nothing else"

After Newton's time the first vigorous effort to restore the universality of the doctrine of energy was made by Benjamin Thompson, Count Rumford, and was published in the *Phil. Trans* for 1798. Rumford was engaged in superintending the boring of cannon in the military arsenal at Munich, and was struck by the amount of heat produced by the action of the boring bar upon the brass castings. In order to see whether the heat came out of the chips he compared the capacity for heat of the chips abraded by the boring bar with that of an equal quantity of the metal cut from the block by a fine saw, and obtained the same result in the two cases, from which he concluded that "the heat produced could not possibly have been furnished at the expense of the latent heat of the metallic chips."

Rumford then turned up a hollow cylinder which was cast in one piece with a brass six-pounder, and having reduced the connexion between the cylinder and cannon to a narrow neck of metal, he caused a blunt borer to press against the bollow of the cylinder with a force equal to the weight of about 10,000 lb, while the casting was made to rotate in a lathe By this means the mean temperature of the brass was raised through about 70° Fahr, while the amount of metal abraded was only 837 grains. In order to be sure that the heat was not due to the action of the air upon the newly exposed metallic surface, the cylinder and the end of the boring bar were immersed in 18·77 lb. of water contained in an oak box. The temperature of the water at the commencement of the experiment was 60° Fahr, and after two horses had turned the lathe for 2½ hours the water boiled. Taking into account the heat absorbed by the box and the metal, Rumford calculated that the heat developed was sufficient to raise 26·58 lb of water from the freezing to the boiling point, and in this calculation the heat lost by radiation and conduction was neglected. Since one horse was capable of doing the work required, Rumford remarked that one horse can generate heat as rapidly as nine wax candles burning in the ordinary manner.

Finally, Rumford reviewed all the sources from which the heat might have been supposed to be derived, and concluded that it was simply produced by the friction, and that the supply was inexhaustible. "It is hardly necessary to add," he remarks, "that anything which any insulated body or system of bodies can continue to furnish *without limitation* cannot possibly be *a material substance*; and it appears to me to be extremely difficult, if not quite impossible, to form any distinct idea of anything capable of being excited and communicated in the manner that heat was excited and communicated in these experiments, except it be *motion*."

About the same time Davy showed that two pieces of ice could be melted by rubbing them together in a vacuum, although everything surrounding them was at a temperature below the freezing point. He did not, however, infer that since the heat could not have been supplied by the ice, for ice absorbs heat in melting, this experiment afforded conclusive proof against the substantial nature of heat.

Though we may allow that the results obtained by Rumford and Davy demonstrate satisfactorily that heat is in some way due to motion, yet they do not tell us to what particular dynamical quantity heat corresponds. For example, does the heat generated by friction vary as the friction and the time during which it acts, or is it proportional to the friction and the distance through which the rubbing bodies are displaced—that is, to the work done against friction—or does it involve any other conditions? If it can be shown that, however the duration and all other conditions of the experiment may be varied, the same amount of heat can in the end be always produced when the same amount of *energy* is expended, then, and only then, can we infer that heat is a form of energy, and that the energy consumed has been really transformed into heat. This was left for J. P. Joule to achieve, his experiments conclusively prove that heat and energy are of the same nature, and that all other forms of energy can be transformed into an equivalent amount of heat.

The quantity of energy which, if entirely converted into heat, is capable of raising the temperature of the unit mass of water from 0° C. to 1° C. is called the mechanical equivalent of heat. One of the first who took in hand the determination of the mechanical equivalent of heat was Marc. Séguin, a nephew of J. M. Montgolfier. He argued that, if heat be energy, then, when it is employed in doing work, as in a steam-engine, some of the heat must itself be consumed in the operation. Hence he inferred that the amount of heat given up to the condenser of an engine when the engine is doing work must be less than when the same amount of steam is blown through the engine without doing any work. Séguin was unable to verify this experimentally, but in 1857 G. A. Hirn succeeded, not only in showing that such a difference exists, but in measuring it, and hence determining a tolerably approximate value of the mechanical equivalent of heat. In 1839 Séguin endeavoured to determine the mechanical equivalent of heat from the loss of heat suffered by steam in expanding, *assuming* that the whole of the heat so lost was consumed in doing external work against the pressure to which the steam was exposed. This assumption, however, cannot be justified, because it neglected to take account of work which might possibly have to be done *within the steam itself* during the expansion.

In 1842 R. Mayer, a physician at Heilbronn, published an attempt to determine the mechanical equivalent of heat from the heat produced when air is compressed. Mayer made an assumption the converse of that of Séguin, asserting that the whole of the work done in compressing the air was converted into heat, and neglecting the possibility of heat being consumed in doing work within the air itself or being produced by the transformation of internal potential energy. Joule afterwards proved (see below) that Mayer's assumption was in accordance with fact, so that his method was a sound one as far as experiment was concerned; and it was only on account of the values of the specific heats of air at constant pressure and at constant volume employed by him being very inexact that the value of the mechanical equivalent of heat obtained by Mayer was very far from the truth.

Passing over L. A. Colding, who in 1843 presented to the Royal Society of Copenhagen a paper entitled "Theses concerning Force," which clearly stated the "principle of the perpetuity of energy," and who also performed a series of experiments for the purpose of determining the heat developed by the compression of various bodies, which entitle him to be mentioned among the founders of the modern theory of energy, we come to Dr James Prescott Joule of Manchester, to whom we are indebted more than to any other for the establishment of the principle of the conservation of energy on the broad basis on which it has since stood. The best-known of Joule's experiments was that in which a brass paddle consisting of eight arms rotated in a cylindrical vessel of water containing four fixed vanes, which allowed the passage of the arms of the paddle but prevented the water from rotating as a whole. The paddle was driven by weights, and the temperature of the water was observed by thermometers which could indicate $\frac{1}{200}$th of a degree Fahrenheit. Special experiments were made to determine the work done against resistances outside the vessel of water, which amounted to about ·006 of the whole, and corrections were made for the loss of heat by radiation, the buoyancy of the air affecting the descending weights, and the energy dissipated when the weights struck the floor with a finite velocity. From these experiments Joule obtained 72·692 foot-pounds in the latitude of Manchester as equivalent to the amount of heat required to raise 1 lb of water through 1° Fahr, from the freezing point. Adopting the centigrade scale, this gives 1390·846 foot-pounds.

With an apparatus similar to the above, but smaller, made of iron and filled with mercury, Joule obtained results varying from 772·814 foot-pounds when driving weights of about 58 lb were employed to 775·352 foot-pounds when the driving weights were only about 19½ lb. By causing two conical surfaces of cast-iron immersed in mercury and contained in an iron vessel to rub against one another when pressed together by a lever, Joule obtained 776·045 foot-pounds for the mechanical equivalent of heat when the heavy weights were used, and 774·93 foot-pounds with the small driving weights. In this experiment a great noise was produced, corresponding to a loss of energy, and Joule endeavoured to determine the amount of energy necessary to produce an equal amount of sound from the string of a violoncello and to apply a corresponding correction.

The close agreement between the results at least indicates that "the amount of heat produced by friction is proportional to the work done and independent of the nature of the rubbing surfaces." Joule inferred from them that the mechanical equivalent of heat is probably about 772 foot-pounds, or, employing the centigrade scale, about 1390 foot-pounds.

Previous to determining the mechanical equivalent of heat by the most accurate experimental method at his command, Joule established a series of cases in which the production of one kind of energy was accompanied by a disappearance of some other form. In 1840 he showed that when an electric current was produced by means of a dynamo-magneto-electric machine the heat generated in the conductor, when no external work was done by the current, was the same as if the energy employed in producing the current had been converted into heat by friction, thus showing that electric currents conform to the principle of the conservation of energy, since energy can neither be created nor destroyed by them. He also determined a roughly approximate value for the mechanical equivalent of heat from the results of these experiments. Extending his investigations to the currents produced by batteries, he found that the total voltaic heat generated in any circuit was proportional to the number of electrochemical equivalents electrolysed in each cell multiplied by the electromotive force of the battery. Now we know that the number of electrochemical equivalents electrolysed is proportional to the whole amount of electricity which passed through the circuit, and the product of this by the electromotive force of the battery is the work done by the latter, so that in this case also Joule showed that the heat generated was proportional to the work done.

In 1844 and 1845 Joule published a series of researches on the compression and expansion of air. A metal vessel was placed in a calorimeter and air forced into it, the amount of energy expended in compressing the air being measured. Assuming that the whole of the energy was converted into heat, when the air was subjected to a pressure of 21·5 atmospheres Joule obtained for the mechanical equivalent of heat about 824·8 foot-pounds, and when a pressure of only 10·5 atmospheres was employed the result was 796·9 foot-pounds.

In the next experiment the air was compressed as before, and then allowed to escape through a long lead tube immersed in the water of a calorimeter, and finally collected in a bell jar. The amount of heat absorbed by the air could thus be measured, while the work done by it in expanding could be readily calculated. In allowing the air to expand from a pressure of 21 atmospheres to that of 1 atmosphere the value of the mechanical equivalent of heat obtained was 821·89 foot-pounds. Between 10 atmospheres and 1 it was 815·875 foot-pounds, and between 23 and 14 atmospheres 761·74 foot-pounds.

But, unlike Mayer and Séguin, Joule was not content with assuming that when air is compressed or allowed to expand the heat generated or absorbed is the equivalent of the work done and of that only, no change being made in the internal energy of the air itself when the temperature is kept constant. To test this two vessels similar to that used in the last experiment were placed in the same calorimeter and connected by a tube with a stop-cock. One contained air at a pressure of 22 atmospheres, while the other was exhausted On opening the stop-cock no work was done by the expanding air against external forces, since it expanded into a vacuum, and it was found that no heat was generated or absorbed. This showed that Mayer's assumption was true. On repeating the experiment when the two vessels were placed in different calorimeters, it was found that heat was absorbed by the vessel containing the compressed air, while an equal quantity of heat was produced in the calorimeter containing the exhausted vessel. The heat absorbed was consumed in giving motion to the issuing stream of air, and was reproduced by the impact of the particles on the sides of the exhausted vessel. The subsequent researches of Dr Joule and Lord Kelvin (*Phil. Trans.*, 1853, p 357, 1854, p. 321, and 1862, p 579) showed that the statement that no *internal work* is done when a gas expands or contracts is not quite true, but the amount is very small in the cases of those gases which, like oxygen, hydrogen and nitrogen, can only be liquefied by intense cold and pressure.

For a long time the final result deduced by Joule by these varied and careful investigations was accepted as the standard value of the mechanical equivalent of heat. Recent determinations by H. A. Rowland and others, necessitated by modern requirements, have shown that it is in error, but by less than 1%. The writings of Joule, which thus occupy the place of honour in the practical establishment of the conservation of energy, have been collected into two volumes published by the Physical Society of London. On the theoretical side the greatest stimulus came from the publication in 1847, without knowledge of Mayer or Joule, of Helmholtz's great memoir, *Über die Erhaltung der Kraft*, followed immediately (1848–1852) by the establishment of the science of thermodynamics (*q.v.*), mainly by R. Clausius and Lord Kelvin on the basis of "Carnot's principle" (1824), modified in expression so as to be consistent with the conservation of energy (see ENERGETICS).

Though we can convert the whole of the energy possessed by any mechanical system into heat, it is not in our power to perform the inverse operation, and to utilize the whole of the heat in doing mechanical work. Thus we see that different forms of energy are not equally valuable for conversion into work. The ratio of the portion of the energy of a system which can under given conditions be converted into mechanical work to the whole amount of energy operated upon may be called the "availability" of the energy. If a system be removed from all communication with anything outside of itself, the whole amount of energy possessed by it will remain constant, but will of its own accord tend to undergo such transformations as will diminish its availability. This general law, known as the principle of the "dissipation of energy," was first adequately pointed out by Lord Kelvin in 1852; and was applied by him to some of the principal problems of cosmical physics. Though controlling all phenomena of which we have any experience, the principle of the dissipation of energy rests on a very different foundation from that of the conservation of energy; for while we may conceive of no means of circumventing the latter principle, it seems that the actions of intelligent beings are subject to the former only in consequence of the rudeness of the machinery which they have at their disposal for controlling the behaviour of those ultimate portions of matter, in virtue of the motions or positions of which the energy with which they have to deal exists. If we have a weight capable of falling through a certain distance, we can employ the mutual forces of the system consisting of the earth and weight to do an amount of useful work which is less than the full amount of potential energy possessed by the system only in consequence of the friction of the constraints, so that the limit of availability in this case is determined only by the friction which is unavoidable. Here we have to deal with a transformation with which we can grapple, and which can be controlled for our purposes. If, on the other hand, we have to deal with a system of molecules of whose motions in the aggregate we become conscious only by indirect means, while we know absolutely nothing either of the motions or positions of any individual molecule, it is obvious that we cannot grasp single molecules and control their movements so as to derive the full amount of work from the system. All we can do in such cases is to place the system under certain conditions of transformation, and be content with the amount of work which it is, as it were, willing to render up under those conditions. Thus the principle of Carnot involves the conclusion that a greater proportion of the heat possessed by a body at a high temperature can be converted into work than in the case of an equal quantity of heat possessed by a body at a low temperature, so that the availability of heat increases with the temperature.

Clerk Maxwell supposed two compartments, A and B, to be filled with gas at the same temperature, and to be separated by an ideal, infinitely thin partition containing a number of exceedingly small trap-doors, each of which could be opened or closed without any expenditure of energy. An intelligent creature, or "demon," possessed of unlimited powers of vision, is placed in charge of each door, with instructions to open the door whenever a particle in A comes towards it with more than a certain velocity V, and to keep it closed against all particles in A moving with less than this velocity, but; on the other hand, to open the door whenever a particle in B approaches it with less than a certain velocity v, which is not greater than V, and to keep it closed against all particles in B moving with a greater velocity than this. By continuing this process every unit of mass which enters B will carry with it more energy than each unit which leaves B, and hence the temperature of the gas in B will be raised and that of the gas in A lowered, while no heat is lost and no energy expended; so that by the application of intelligence alone a portion of gas of uniform pressure and temperature may be sifted into two parts, in which both the temperature and the pressure are different, and from which, therefore, work can be obtained at the expense of heat. This shows that the principle of the dissipation of energy has control over the actions of those agents only whose faculties are too gross to enable them to grapple individually with the minute portions of matter which are the seat of energy.

In 1875 Lord Rayleigh published an investigation on "the work which may be gained during the mixing of gases." In the preface he states the position that "whenever, then, two gases are allowed to mix without the performance of work, there is dissipation of energy, and an opportunity of doing work at the expense of low temperature heat has been for ever lost." He shows that the amount of work obtainable is equal to that which can be done by the first gas in expanding into the space occupied by the second (supposed vacuous) together with that done by the second in expanding into the space occupied by the first. In the experiment imagined by Lord Rayleigh a porous diaphragm takes the place of the partition and trap-doors imagined by Clerk Maxwell, and the molecules sort themselves automatically on account of the difference in their average velocities for the two gases. When the pressure on one side of the diaphragm thus becomes greater than that on the other, work may be done at the expense of heat in pushing the diaphragm, and the operation carried on with continual gain of work until the gases are uniformly diffused. There is this difference, however, between this experiment and the operation imagined by Maxwell, that when the gases have diffused the experiment cannot be repeated; and it is no more contrary to the dissipation of energy than is the fact that work may be derived at the expense of heat when a gas expands into a vacuum, for the working substance is not finally restored to its original condition; while Maxwell's "demons" may operate without limit.

In such experiments the molecular energy of a gas is converted into work only in virtue of the molecules being separated into classes in which their velocities are different, and these classes then allowed to act upon one another through the intervention of a suitable heat-engine. This sorting can occur spontaneously to a limited extent; while if we could carry it out as far as we pleased we might transform the whole of the heat of a body into work. The theoretical availability of heat is limited only by our power of bringing those particles whose motions constitute heat in bodies to rest relatively to one another; and we have precisely similar practical limits to the availability of the energy due to the motion of visible and tangible bodies, though theoretically we can then trace all the stages.

If a battery of electromotive force E maintain a current C in a conductor, and no other electromotive force exist in the circuit, the whole of the work done will be converted into heat, and the amount of work done per second will be EC. If R denote the resistance of the whole circuit, $E = CR$, and the heat generated per second is C^2R. If the current drive an electromagnetic engine, the reaction of the engine will produce an electromotive force opposing the current. Suppose the current to be thus reduced to C'. Then the work done by the battery per second will be EC' or $CC'R$, while the heat generated per second will be C'^2R, so that we have the difference $(C-C')C'R$ for the energy consumed in driving the engine. The ratio of this to the whole work done by the battery is $(C-C')/C$, so that the efficiency is increased by diminishing C'. If we could drive the engine so fast as to reduce C' to zero, the whole of the energy of the battery would be available, no heat being produced in the wires, but the horse-power of the engine would be indefinitely small. The reason why the whole of the energy of the current is not available is that heat must always be generated in a wire in which a finite current is flowing, so that, in the case of a battery in which the whole of the energy of chemical affinity is employed in producing a current, the availability of the energy is limited only on account of the resistance of the conductors, and may be increased by diminishing this resistance. The availability of the energy of electrical separation in a charged Leyden jar is also limited only by the resistance of conductors, in virtue of which an amount of heat is necessarily produced, which is greater the less the time occupied in discharging the jar. The availability of the energy of magnetization is limited by the coercive force of the magnetized material, in virtue of which any change in the intensity of magnetization is accompanied by the production of heat.

In all cases there is a general tendency for other forms of energy to be transformed into heat on account of the friction of rough surfaces, the resistance of conductors, or similar causes, and thus to lose availability. In some cases, as when heat is converted into the kinetic energy of moving machinery or the potential energy of raised weights, there is an ascent of energy from the less available form of heat to the more available form of mechanical energy, but in all cases this is accompanied by the transfer of other heat from a body at a high temperature to one at a lower temperature, thus losing availability to an extent that more than compensates for the rise.

It is practically important to consider the rate at which energy may be transformed into useful work, or the horse-power of the agent. It generally happens that to obtain the greatest possible amount of work from a given supply of energy, and to obtain it at the greatest rate, are conflicting interests. We have seen that the *efficiency* of an electromagnetic engine is greatest when the current is indefinitely small, and then the rate at which it works is also indefinitely small. M. H. von Jacobi showed that for a given electromotive force in the battery the horse-power is greatest when the current is reduced to one-half of what it would be if the engine were at rest. A similar condition obtains in the steam-engine, in which a great rate of working necessitates the dissipation of a large amount of energy. (W. G.; J. L.*)

ENFANTIN, BARTHÉLEMY PROSPER (1796–1864), French social reformer, one of the founders of Saint-Simonism, was born at Paris on the 8th of February 1796. He was the son of a banker of Dauphiny, and after receiving his early education at a lyceum, was sent in 1813 to the École Polytechnique. In March 1814 he was one of the band of students who, on the heights of Montmartre and Saint-Chaumont, attempted resistance to the armies of the allies then engaged in the investment of Paris. In consequence of this outbreak of patriotic enthusiasm, the school was soon after closed by Louis XVIII., and the young student was compelled to seek some other career instead of that of the soldier. He first engaged himself to a country wine merchant, for whom he travelled in Germany, Russia and the Netherlands. In 1821 he entered a banking-house newly established at St Petersburg, but returned two years later to Paris, where he was appointed cashier to the Caisse Hypothecaire. At the same time he became a member of the secret society of the Carbonari. In 1825 a new turn was given to his thoughts and his life by the friendship which he formed with Olinde Rodriguez, who introduced him to Saint-Simon. He embraced the new doctrines with ardour, and by 1829 had become one of the acknowledged heads of the sect (see SAINT-SIMON).

After the Revolution of 1830 Enfantin resigned his office of cashier, and devoted himself wholly to his cause. Besides contributing to the *Globe* newspaper, he made appeals to the people by systematic preaching, and organized centres of action in some of the principal cities of France. The headquarters in Paris were removed from the modest rooms in the Rue Taranne, and established in large halls near the Boulevard Italien. Enfantin and Bazard (*q.v.*) were proclaimed "Pères Suprêmes." This union of the supreme fathers, however, was only nominal. A divergence was already manifest, which rapidly increased to serious difference and dissension. Bazard had devoted himself to political reform, Enfantin to social and moral change; Bazard was organizer and governor, Enfantin was teacher and consoler; the former attracted reverence, the latter love. A hopeless antagonism arose between them, which was widened by Enfantin's announcement of his theory of the relation of man and woman, which would substitute for the "tyranny of marriage" a system of "free love." Bazard now separated from his colleague, and in his withdrawal was followed by all those whose chief aim was philosophical and political. Enfantin thus became sole "father," and the few who were chiefly attracted by his religious pretensions and aims still adhered to him. New converts joined them, and Enfantin assumed that his followers in France numbered 40,000. He wore on his breast a badge with his title of "Père," was spoken of by his preachers as "the living law," declared, and probably believed, himself to be the chosen of God, and sent out emissaries in a quest of a woman predestined to be the "female Messiah," and the mother of a new Saviour. The quest was very costly and altogether fruitless. No such woman was discoverable. Meanwhile believers in Enfantin and his new religion were multiplying in all parts of Europe. His extravagances and success at length brought down upon him the hand of the law. Public morality was in peril, and in May 1832 the halls of the new sect were closed by the government, and the father, with some of his followers, appeared before the tribunals. He now retired to his estate at Menilmontant, near Paris, where with forty disciples, all of them men, he continued to carry out his socialistic views. In August of the same year he was again arrested, and on his appearance in court he desired his defence to be undertaken by two women who were with him, alleging that the matter was of special concern to women. This was of course refused. The trial occupied two days and resulted in a verdict of guilty, and a sentence of imprisonment for a year with a small fine.

This prosecution finally discredited the new society. Enfantin was released in a few months, and then, accompanied by some of his followers, he went to Egypt. He stayed there two years, and might have entered the service of the viceroy if he would have professed himself, as a few of his friends did, a Mahommedan. On his return to France, a sadder and practically a wiser man, he settled down to very prosaic work. He became first a postmaster near Lyons, and in 1841 was appointed, through the influence of some of his friends who had risen to posts of power, member of a scientific commission on Algeria, which led him to engage in researches concerning North Africa and colonization in general.

in 1845 he was appointed a director of the Paris & Lyons railway. Three years later he established, in conjunction with Duveyrier, a daily journal, entitled *Le Crédit*, which was discontinued in 1850. He was afterwards attached to the administration of the railway from Lyons to the Mediterranean. Father Enfantin held fast by his ideal to the end, but he had renounced the hope of giving it a local habitation and a name in the degenerate obstinate world. His personal influence over those who associated with him was immense. "He was a man of a noble presence, with finely formed and expressive features. He was gentle and insinuating in manner, and possessed a calm, graceful and winning delivery" (*Gent. Mag.*, Jan. 1865). His evident sincerity, his genuine enthusiasm, gave him his marvellous ascendancy. Not a few of his disciples ranked afterwards amongst the most distinguished men of France. He died suddenly at Paris on the 1st of September 1864.

Amongst his works are—*Doctrine de Saint-Simon* (written in conjunction with several of his followers), published in 1830, and several times republished; *Économie politique et politique Saint-Simonienne* (1831); *Correspondance politique* (1835–1840); *Corresp. philos. et religieuse* (1843–1845); and *La Vie éternelle passée, présente, future* (1861). A large number of articles by his hand appeared in *Le Producteur*, *L'Organisateur*, *Le Globe*, and other periodicals. He also wrote in 1832 *Le Livre nouveau*, intended as a substitute for the Christian Scriptures, but it was not published.

See G. Weill, *L'École Saint-Simonienne, son histoire, son influence, jusqu' à nos jours* (Paris, 1896).

ENFIDAVILLE [*Dar-el-Bey*], a town of Tunisia, on the railway between Tunis and Susa, 30 m. N.E. of the last-named place and 5 m. inland from the Gulf of Hammamet. Enfidaville is the chief settlement on the Enfida estate, a property of over 300,000 acres in the Sahel district of Tunisia, forming a rectangle between the towns of Hammamet, Susa, Kairawan and Zaghwan. On this estate, devoted to the cultivation of cereals, olives, vines and to pasturage, are colonies of Europeans and natives. At Enfidaville, where was, as its native name indicates, a palace of the beys of Tunis, there is a large horse-breeding establishment and a much-frequented weekly market. About 5 m. N. of Enfidaville is Henshir Fraga (anc. *Uppenna*), where are ruins of a large fortress and of a church in which were found mosaics with epitaphs of various bishops and martyrs.

The Enfida estate was granted by the bey Mahommed-es-Sadok to his chief minister Khaireddin Pasha (*q.v.*) in return for the confirmation by the sultan of Turkey in 1871, through the instrumentality of the pasha, of the right of succession to the beylik of members of Es-Sadok's family. When, some years later, Khaireddin left Tunisia for Constantinople he sold the estate to a Marseilles company, which resold it to the Société Franco-africaine.

ENFIELD, a township of Hartford county, Connecticut, U.S.A., in the N. part of the state, on the E. bank of the Connecticut river, 20 m. N. of Hartford. It has an area of 35 sq. m., with three villages—Thompsonville, Hazardville and Enfield. Pop. (1890) 7199; (1900) 6699 (1812 foreign-born); (1910) 9719. Its principal manufactures are gunpowder, carpets, brick, cotton press machinery, and coffin hardware. In Enfield and its vicinity much tobacco is grown. First settled in 1679, Enfield was a part of the township of Springfield, Massachusetts, until 1683, when it was made a separate township; in 1749 it became a part of Connecticut. At a town meeting on the 11th of July 1774 it was resolved that "a firm and inviolable union of our colonies is absolutely necessary for the defence of our civil rights," and that "the most effectual measures to defeat the machinations of the enemies of His Majesty's government and the liberties of America is to break off all commercial intercourse with Great Britain and the West Indies until these oppressive acts for raising a revenue in America are repealed." A Shaker community was established in the township in 1781, at what is now called Shaker Station.

See Francis Olcutt Allen, *History of Enfield* (Lancaster, Pa., 1900).

ENFIELD, a market town in the Enfield parliamentary division of Middlesex, England, 11 m. N. of London Bridge, on the Great Northern and Great Eastern railways. Pop. of urban district, (1891) 31,536, (1901) 42,738. It is picturesquely situated on the western slope of the Lea valley, with a considerable extension towards the river, mainly consisting of artisans' dwellings (Churchbury, Ponder's End, and Enfield Highway on the Old North Road). Great numbers of villas occupied by those whose work lies in London have grown up; and many of the inhabitants are employed in the Royal Small Arms factory at Enfield Lock. The church of St Andrew is mainly Perpendicular, but has Early English portions; it contains several ancient monuments and brasses, and flanks the market-place, with its modern cross. Enfield Palace fronts the High Street; it retains portions of the building of Edward VI., but has been greatly altered. The grammar school, near the church, was founded in 1557. The New River flows through the parish, and Sir Hugh Myddleton, its projector, was for some time resident here. Middleton House, named after him, is one of several fine mansions in the vicinity. Of these, Forty Hall, in splendidly timbered grounds, is from the designs of Inigo Jones; and a former mansion occupying the site of White Webbs House was suspected as the scene of the hatching of Gunpowder Plot. The parish is of great extent (12,653 acres).

An Anglo-Saxon derivation, signifying "forest clearing," is indicated for the name. Enfield Chase was a royal preserve, disafforested in 1777. The principal manor of Enfield, which was held by Asgar, Edward the Confessor's master of horse, was in the hands of the Norman baron Geoffrey de Mandeville at the time of Domesday, and belonged to the Bohun family in the 12th and 13th centuries. It came, by succession and marriage, into the possession of the crown under Henry IV., and was included in the duchy of Lancaster. There were, however, seven other manors, and of these one, Worcesters, came to the crown in the time of Henry VIII., whose children resided at the manor-house, Elsynge Hall. Edward VI., settling both manors upon the princess Elizabeth, rebuilt Enfield Palace for her. She was a frequent resident here not only before but after her accession to the throne. About 1664 the palace was occupied as a school by Robert Uvedale (1642–1722), who was also an eminent horticulturist, planted the magnificent cedar still standing in the palace grounds, and formed a herbarium now in the Sloane collection at the British Museum. The town received grants of markets from Edward I. and James I.

ENFILADE (a French word, from *enfiler*, to thread, and so to pass through from end to end), a military term used to express the direction of fire along an enemy's line, or parapet. This species of fire is most demoralizing and destructive, since, from its direction, very few guns or rifles can be brought to bear to meet it. If any considerable body of men changes front, it immediately lays itself open to enfilade from the enemy whom it originally faced. Against entrenchments, or the parapets of fortifications, enfilade is still more effective, as the enemy is deprived of the protection given by his works and is no better covered than if he were in the open. Banks of earth, built perpendicular to the line of defence (called *traverses*), are usually employed to protect parapets or trenches against enfilade.

ENGADINE (Ger. *Engadin*; Ital. *Engadina*; Ladin, *Engiadina*), the name of the upper or Swiss portion of the valley of the Inn, which forms part of the Swiss canton of the Grisons. Its length by carriage road from the Maloja plateau (5935 ft.) at its south-western end to Martinsbruck (3406 ft.) at its north-eastern extremity is about 59 m. It is to be noted that up to and including St Moritz (6037 ft., the highest) all the villages (save Sils-Baseglia) at its south-western end are higher than the Maloja plateau itself. The uppermost portion of the valley contains several lakes, which, as one descends, gradually diminish in size, those of Sils, Silvaplana and St Moritz. But both the Maloja plateau and the south-western half of the lake of Sils belong to the commune of Stampa in the Val Bregaglia, and are included in the Bregaglia administrative district, so that, from a political point of view, Sils is the first village that is included in the Engadine. The rest of the Engadine forms the districts of the Upper Engadine with eleven communes, and of the Inn (*i.e.* the Lower Engadine), subdivided into the Ob Tasna, Remüs, and Unter Tasna circles, and containing twelve communes.

In 1900 the total population of the Engadine was 11,712, of whom 5429 were in the Upper Engadine and 6283 in the Lower Engadine. In point of religion 8594 were Protestants (4923 in the Lower Engadine and 3671 in the Upper Engadine), and 3086 Romanists (1728 in the Upper Engadine and 1358 in the Lower Engadine), while there were 12 Jews in the Upper Engadine and 2 in the Lower Engadine: in the Upper Engadine the majority in each commune was Protestant (the Romanists strongest in St Moritz), as also in the case of the Lower Engadine, save Tarasp and Samnaun, where the Romanists prevail. In point of language 7609 inhabitants (5010 in the Lower Engadine and 2599 in the Upper Engadine) spoke the curious Ladin dialect (a survival of a primitive Romance tongue), and 2221 German (1265 in the Upper Engadine and 956 in the Lower Engadine). The capital of the Upper Engadine is Samaden (967 inhabitants), and that of the Lower Engadine, Schuls (1117 inhabitants). In 1908 there were no railways in the Engadine, save about 8 m. (from the mouth of the tunnel past Bevers and Samaden to St Moritz village) of the railway pierced (1898–1902) beneath (5987 ft.) the Albula Pass (7595 ft.), which now affords the easiest means of access from Coire to St Moritz (56 m.); but many railways in and to the Engadine have been planned. The valley is reached by many passes (over which excellent carriage roads were constructed 1820–1872). The Maloja (5935 ft.) is the route from Chiavenna and the Lake of Como to the Upper Engadine, which is also reached from Coire by the Julier (7504 ft.) and the Albula Passes (7595 ft.) as well as from Tirano in the Valtellina by the Bernina Pass (7645 ft.). On the other hand, the Lower Engadine is accessible from Davos over the Flüela Pass (7838 ft.) and from Mals at the head of the Adige valley (or the Vintschgau) by the Ofen Pass (7071 ft.), while from Martinsbruck, the last Swiss village, a carriage road leads up to Nauders (5 m.), whence it is 27 m. by road down the Inn valley to Landeck on the Arlberg railway, or 17½ m. over the Reschen Scheideck Pass (4902 ft.) to Mals in the Vintschgau.

The Upper Engadine consists of a long, straight, nearly level trough of 26 m., varying from a mile to half a mile in breadth, through which flows the Inn. On the south-east this trough is limited by the lofty glacier-clad Bernina group (culminating in the Piz Bernina, 13,304 ft.) and the range rising between the Inn valley and that of Livigno to the south-east, while on the north-west the boundary is the extensive Albula group (culminating in Piz Kesch, 11,228 ft.). The Lower Engadine is far more picturesque and romantic than the Upper Engadine, the Inn valley being here much narrower and the fall greater. On its north-west rises the last bit of the Albula group (culminating in Piz Vadret, 10,584 ft.), and on the north the Silvretta group (culminating in Piz Linard, 11,201 ft.), while to the east and south are the ranges on either side of the Ofen Pass (culminating in Piz Sesvenna, 10,568 ft.). In the Upper Engadine the villages are on the floor of the valley, but in the Lower Engadine many are perched high above the bed of the river on terraces, and are cut off from each other by deep ravines.

The Upper Engadine is far better known to foreign visitors than the Lower Engadine, and is consequently much richer and more prosperous. The mineral waters of St Moritz (*q.v.*) were known and employed in the 16th century, and long formed the great attraction of the region. But about the middle of the 19th century the Upper Engadine came into fashion as a great "air-cure," and now Maloja, Sils, Silvaplana, Campfer and St Moritz are all well known, those who desire to explore the glaciers of the Bernina group mostly resort to Pontresina, on the Flatzbach, the stream descending from the Bernina Pass. Yet, owing to its great elevation, the scenery of the Upper Engadine has a bleak, northern aspect. Pines and larches alone flourish, garden vegetables are grown only in sunny spots, and there is no tillage. The Alpine flora is very rich and varied. But snow falls even in August, and the climate is well described in the proverb, "nine months winter, and three months cold weather." The villages are built entirely of stone (as also in the Lower Engadine), chiefly to guard against destructive fires that were formerly frequent in this narrow, wind-swept valley. The wealth of the inhabitants consists in their hay meadows and pastures. The lower pastures support large herds of cows, while the higher are let out (in both parts of the valley) to Bergamasque shepherds, who come thither every summer with their flocks. In the Lower Engadine the chief attraction is formed by the mineral springs at Schuls below Tarasp, which are much frequented during the summer. The wild gorge of Finstermünz separates the last Swiss village, Martinsbruck, from the first Tirolese village, Pfunds, the gorge being passable only on foot, while the carriage road makes a great detour by way of Nauders, so that the two villages named are 13 m. by road from each other. The earliest full description of the country by an English traveller is that by Archdeacon W. Coxe, in *Travels in Switzerland* (London, 1789).

The Upper Engadine is not mentioned in authentic documents till 1139, the bishop of Coire being then the great lord, and, from the 13th century, having as his bailiffs the family of Planta, the original seat of which was at Zuz. The valley obtained its freedom from both in 1486 (Planta) and in 1526, when the temporal powers of the bishop were abolished. In 1367 it (as well as the bishop's vassals in the Lower Engadine) joined the newly founded League of God's House or *Gotteshausbund* (see GRISONS), one of the 3 Raetian Leagues, which lasted till 1799–1801, when the whole Engadine became part of Canton Raetia of the Helvetic Republic, which, in 1803, altered its name to that of Grisons or Graubünden, and then first entered the Swiss Confederation. In the Upper Engadine the "Referendum" existed as between the different villages composing a bailiwick (*Hochgericht*). The history of the Lower Engadine is for long quite different. Though always comprised in the diocese of Coire, it formed from the early 9th century onwards (with the Vintschgau) a separate county, which was gradually absorbed in that which, later, took the name of the county of Tirol. The limit between the Upper Engadine and the Tirolese Lower Engadine was definitively fixed in 1282 at the Punt' Ota (the high bridge) just above Brail, and mentioned in 1139 already. In 1363 Tirol came into the possession of the Habsburgers, who were troublesome neighbours both to the Upper Engadine and to the League of God's House. Their power was stemmed in 1499 at the battle of the Calven gorge (above Mals), though it was only in 1652 that the Lower Engadine bought up the remaining rights of the Habsburgers. But the castle of Tarasp (acquired by them in 1464) was excepted: the lordship was given by them in 1687 to the Dietrichstein family, and held by it till 1801, when Austria ceded it to France, which, in 1803, handed it over to the Swiss Confederation, by which it was incorporated in 1809 with the Canton of the Grisons. This long connexion with Tirol accounts for the fact that Tarasp is still mainly Romanist, while the lonely Swiss valley of Samnaun (above Martinsbruck) has given up its Protestantism and its Ladin speech owing to communications with Tirol being easier than with Switzerland. The bears in the bear pit at Bern come from the forests in the lower Spöl valley, above Zernez, in the Lower Engadine, on the way to the Ofen Pass. The upper Spöl valley (Livigno) is Italian (see VALTELLINA).

AUTHORITIES.—M. Caviezel, *Das Oberengadin*, 7th edition (Coire, 1896); C. Decurtius, *Ratoromanische Chrestomathie*, vols. v.-ix. (Erlangen, 1899–1908), deals with the two divisions of the Engadine from the 16th century to modern times; Mrs H. Freshfield, *A Summer Tour in the Grisons and the Italian Valleys of the Bernina* (London, 1862); E. Imhof, *Itinerarium des S.A.C. fur die Albulagruppe* (Bern, 1893), and *Itinerarium des S.A.C. fur die Silvretta- und Ofenpassgruppe* (Mountains of the Lower Engadine) (Bern, 1898); E. Lechner, *Das Oberengadin in der Vergangenheit und Gegenwart* (Leipzig, 1900); A. Lorria and E. A. Martel, *Le Massif de la Bernina* (complete monograph on the Upper Engadine, with full bibliography) (Zurich, 1894); P. C. von Planta, *Die Curratischen Herrschaften in der Feudalzeit* (Bern, 1881); Z. and E. Pallioppi, *Dizionari dels Idioms Romauntschs d'Engiadina ota e bassa, &c.* (Samaden, 1895); F. de B. Strickland, *The Engadine*, 2nd edition (London and Samaden, 1891); J. Ulrich, *Ratoromanische Chrestomathie*, vol. ii. (Halle, 1882). (W. A. B. C.)

ENGAGED COLUMN, in architecture, a form of column, sometimes defined as semi or three-quarter detached according to its projection; the term implies that the column is partly attached to a pier or wall. It is rarely found in Greek work, and then only in exceptional cases, but it exists in profusion in Roman architecture. In the temples it is attached to the cella walls, repeating the columns of the peristyle, and in the theatres and amphitheatres, where they subdivided the arched openings: in all these cases engaged columns are utilized as a decorative feature, and as a rule the same proportions are maintained as if they had been isolated columns. In Romanesque work the classic proportions are no longer adhered to; the engaged column, attached to the piers, has always a special function to perform, either to support subsidiary arches, or, raised to the vault, to carry its transverse or diagonal ribs. The same constructional object is followed in the earlier Gothic styles, in which they become merged into the mouldings. Being virtually always ready made, so far as their design is concerned, they were much affected by the Italian revivalists.

ENGEL, ERNST (1821–1896), German political economist and statistician, was born in Dresden on the 21st of March 1821. He studied at the famous mining academy of Freiberg, in Saxony, and on completing his curriculum travelled in Germany and France. Immediately after the revolution of 1848 he was attached to the royal commission in Saxony appointed to determine the relations between trade and labour. In 1850 he was directed by the government to assist in the organization of the German Industrial Exhibition of Leipzig (the first of its kind). The success which crowned his efforts was so great that in 1854 he was induced to enter the government service, as chief of the newly instituted statistical department. He retired, however, from the office in 1858. He founded at Dresden the first Mortgage Insurance Society (Hypotheken-Versicherungsgesellschaft), and as a result of the success of his work was summoned in 1860 to Berlin as director of the statistical department, in succession to Karl Friedrich Wilhelm Dieterici (1790–1859). In his new office he made himself a name of world-wide reputation. Raised to the rank of *Geheimer Regierungsrat*, he retired in 1882 and lived henceforward in Radebeul near Dresden, where he died on the 8th of December 1896. Engel was a voluminous writer on the subjects with which his name is connected, but his statistical papers are mostly published in the periodicals which he himself established, viz. *Preuss. Statistik* (in 1861); *Zeitschrift des Statistischen Bureaus*, and *Zeitschrift des Statistischen Bureaus des Königreichs Sachsen.*

ENGEL, JOHANN JAKOB (1741–1802), German author, was born at Parchim, in Mecklenburg, on the 11th of September 1741. He studied theology at Rostock and Bützow, and philosophy at Leipzig, where he took his doctor's degree. In 1776 he was appointed professor of moral philosophy and belles-lettres in the Joachimstal gymnasium at Berlin, and a few years later he became tutor to the crown prince of Prussia, afterwards Frederick William III. The lessons which he gave his royal pupil in ethics and politics were published in 1798 under the title *Fürstenspiegel*, and are a favourable specimen of his powers as a popular philosophical writer. In 1787 he was admitted a member of the Academy of Sciences of Berlin, and in the same year he became director of the royal theatre, an office he resigned in 1794. He died on the 28th of June 1802.

Besides numerous dramas, some of which had a considerable success, Engel wrote several valuable books on aesthetic subjects. His *Anfangsgründe einer Theorie der Dichtungsarten* (1783) showed fine taste and acute critical faculty if it lacked imagination and poetic insight. The same excellences and the same defects were apparent in his *Ideen zu einer Mimik* (1785), written in the form of letters. His most popular work was *Der Philosoph für die Welt* (1775), which consists chiefly of dialogues on men and morals, written from the utilitarian standpoint of the philosophy of the day. His last work, a romance entitled *Herr Lorenz Stark* (1795), achieved a great success, by virtue of the marked individuality of its characters and its appeal to middle-class sentiment.

Engel's *Sämtliche Schriften* were published in 12 volumes at Berlin in 1801–1806; a new edition appeared at Frankfort in 1851. See K. Schröder, *Johann Jakob Engel* (Vortrag) (1897).

ENGELBERG, an Alpine village and valley in central Switzerland, much frequented by visitors in summer and to some extent in winter. It is 14 m. by electric railway from Stansstad, on the Lake of Lucerne, past Stans. The village (3343 ft.) is in a mountain basin, shut in on all sides by lofty mountains (the highest is the Titlis, 10,627 ft. in the south-east), so that it is often hot in summer. It communicates by the Surenen Pass (7563 ft.) with Wassen, on the St Gotthard railway, and by the Joch Pass (7267 ft.) past the favourite summer resort of the Engstlen Alp (6034 ft.), with Meiringen in the Bernese Oberland. The village has clustered round the great Benedictine monastery which gives its name to the valley, from the legend that its site was fixed by angels, so that the spot was named "Mons Angelorum." The monastery was founded about 1120 and still survives, though the buildings date only from the early 18th century. Its library suffered much at the hands of the French in 1798. From 1462 onwards it was under the protectorate of Lucerne, Schwyz, Unterwalden and Uri. In 1798 the abbot lost all his temporal powers, and his domains were annexed to the Obwalden division of Unterwalden, but in 1803 were transferred to the Nidwalden division. However, in 1816, in consequence of the desperate resistance made by the Nidwalden men to the new Federal Pact of 1815, they were punished by the fresh transfer of the valley to Obwalden, part of which it still forms. As the pastures forming the upper portion of the Engelberg valley have for ages belonged to Uri, the actual valley itself is politically isolated between Uri and Nidwalden. The monastery is still directly dependent on the pope. In 1900 the valley had 1973 inhabitants, practically all German-speaking and Romanists. (W. A. B. C.)

ENGELBRECHTSDATTER, DORTHE (1634–1716), Norwegian poet, was born at Bergen on the 16th of January 1634; her father, Engelbrecht Jörgensen, was originally rector of the high school in that city, and afterwards dean of the cathedral. In 1652 she married Ambrosius Hardenbech, a theological writer famous for his flowery funeral sermons, who succeeded her father at the cathedral in 1659. They had five sons and four daughters. In 1678 her first volume appeared, *Sjælens aandelige Sangoffer* ("The Soul's Spiritual Offering of Song") published at Copenhagen. This volume of hymns and devotional pieces, very modestly brought out, had an unparalleled success. The fortunate poetess was invited to Denmark, and on her arrival at Copenhagen was presented at Court. She was also introduced to Thomas Kingo, the father of Danish poetry, and the two greeted one another with improvised couplets, which have been preserved, and of which the poetess's reply is incomparably the neater. In 1683 her husband died, and before 1698 she had buried all her nine children. In the midst of her troubles appeared her second work, the *Taareoffer* ("Sacrifice of Tears"), which is a continuous religious poem in four books. This was combined with the *Sangoffer*, and no fewer than three editions of the united works were published before her death, and many after it. In 1698 she brought out a third volume of sacred verse, *Et kristeligt Valet fra Verden* ("A Christian Farewell to the World"), a very tame production. She died on the 19th of February 1716. The first verses of Dorthe Engelbrechtsdatter are the best; her *Sangoffer* was dedicated to Jesus, the *Taareoffer* to Queen Charlotte Amalia; this is significant of her changed position in the eyes of the world.

ENGELHARDT, JOHANN GEORG VEIT (1791–1855), German theologian, was born at Neustadt-on-the-Aisch on the 12th of November 1791, and was educated at Erlangen, where he afterwards taught in the gymnasium (1817), and became professor of theology in the university (1821). His two great works were a *Handbuch der Kirchengeschichte* in 4 vols. (1833–1834), and a *Dogmengeschichte* in 2 vols. (1839). He died at Erlangen on the 13th of September 1855.

ENGHIEN, LOUIS ANTOINE HENRI DE BOURBON CONDÉ, DUC D' (1772–1804), was the only son of Henri Louis Joseph, prince of Condé, and of Louise Marie Thérèse Mathilde, sister of the duke of Orleans (Philippe Égalité), and was born at Chantilly on the 2nd of August 1772. He was educated privately by the abbé Millot, and received a military training from the commodore de Virieux. He early showed the warlike spirit of the house of Condé, and began his military career in 1788. On the outbreak of the French Revolution he "emigrated" with very many of the nobles a few days after the fall of the Bastille, and remained in exile, seeking to raise forces for the invasion of France and the restoration of the old monarchy. In 1792, on the outbreak of war, he held a command in the force of *émigrés* (styled the "French royal army") which shared in the duke of Brunswick's unsuccessful invasion of France. He continued to serve under his father and grandfather in what was known as the Condé army, and on several occasions distinguished himself by his bravery and ardour in the vanguard. On the dissolution of that force after the peace of Lunéville (February 1801) he married privately the princess Charlotte, niece of Cardinal de Rohan, and took up his residence at Ettenheim in Baden, near the Rhine. Early in the year 1804 Napoleon, then First Consul of France, heard news which seemed to connect the young duke with the Cadoudal-Pichegru conspiracy then being tracked by the French police. The news ran that the duke was in company with Dumouriez and made secret journeys into France. This was false; the acquaintance was Thuméry, a harmless old man, and the duke had no dealings with Cadoudal or Pichegru. Napoleon gave orders for the seizure of the duke. French mounted gendarmes crossed the Rhine secretly, surrounded his house and brought him to Strassburg (15th of March 1804), and thence to the castle of Vincennes, near Paris. There a commission of French colonels was hastily gathered to try him. Meanwhile Napoleon had found out the true facts of the case, and the ground of the accusation was hastily changed. The duke was now charged chiefly with bearing arms against France in the late war, and with intending to take part in the new coalition then proposed against France. The colonels hastily and most informally drew up the act of condemnation, being incited thereto by orders from Savary (*q.v.*), who had come charged with instructions. Savary intervened to prevent all chance of an interview between the condemned and the First Consul; and the duke was shot in the moat of the castle, near a grave which had already been prepared. With him ended the house of Condé. In 1816 the bones were exhumed and placed in the chapel of the castle. It is now known that Josephine and Mme de Rémusat had begged Napoleon for mercy towards the duke; but nothing would bend his will. The blame which the apologists of the emperor have thrown on Talleyrand or Savary is undeserved. On his way to St Helena and at Longwood he asserted that, in the same circumstances, he would do the same again; he inserted a similar declaration in his will.

See H. Welschinger, *Le Duc d'Enghien 1772–1804* (Paris, 1888); A. Nougaret de Fayet, *Recherches historiques sur le procès et la condamnation du duc d'Enghien*, 2 vols. (Paris, 1844); Comte A. Boulay de la Meurthe, *Les Dernières Années du duc d'Enghien 1801–1804* (Paris, 1886). For documents see *La Catastrophe du duc d'Enghien* in the edition of *Mémoires* edited by M. F. Barrière, also the edition of the duke's letters, &c., by Count Boulay de la Meurthe (tome i., Paris, 1904; tome ii., 1908). (J. Hl. R.)

ENGHIEN, a town in the province of Hainaut, Belgium, lying south of Grammont. Pop. (1904) 4541. It is the centre of considerable lace, linen and cotton industries. There is a fine park outside the town belonging to the duke of Arenberg, whose ancestor, Charles de Ligne, bought it from Henry IV. in 1607, but the château in which the duke of Arenberg of the 18th century entertained Voltaire no longer exists. Curiously enough the cottage, a stone building, built by the same duke for Jean Jacques Rousseau, still stands in the park, while the ducal residence was burnt down by the *sans-culottes*. A fine pavilion or kiosk, named de l'Étoile, has also survived. The great Condé was given, for a victory gained near this place, the right to use the style of Enghien among his subsidiary titles.

ENGINE (Lat. *ingenium*), a term which in the time of Chaucer had the meaning of "natural talent" or "ability," corresponding to the Latin from which it is derived (cf. "A man hath sapiences thre, Memorie, engin, and intellect also," *Second Nun's Tale*, 339); in this sense it is now obsolete. It also denoted a mechanical tool or contrivance, and especially a weapon of war; this use may be compared with that of *ingenium* in classical Latin to mean a clever idea or device, and in later Latin, as in Tertullian, for a warlike instrument or machine. In the 19th century it came to have, when employed alone, a specific reference to the steam-engine (*q.v.*), but it is also used of other prime movers such as the air-engine, gas-engine and oil-engine (*qq.v.*).

ENGINEERING, a term for the action of the verb "to engineer," which in its early uses referred specially to the operations of those who constructed engines of war and executed works intended to serve military purposes. Such military engineers were long the only ones to whom the title was applied. But about the middle of the 18th century there began to arise a new class of engineers who concerned themselves with works which, though they might be in some cases, as in the making of roads, of the same character as those undertaken by military engineers, were neither exclusively military in purpose nor executed by soldiers, and those men by way of distinction came to be known as civil engineers. No better definition of their aims and functions can be given than that which is contained in the charter (dated 1828) of the Institution of Civil Engineers (London), where civil engineering is described as the "art of directing the great sources of power in nature for the use and convenience of man, as the means of production and of traffic in states, both for external and internal trade, as applied in the construction of roads, bridges, aqueducts, canals, river navigation and docks for internal intercourse and exchange, and in the construction of ports, harbours, moles, breakwaters and lighthouses, and in the art of navigation by artificial power for the purposes of commerce, and in the construction and adaptation of machinery, and in the drainage of cities and towns." Wide as is this enumeration, the practice of a civil engineer in the earlier part of the 19th century might cover many or even most of the subjects it contains. But gradually specialization set in. Perhaps the first branch to be recognized as separate was *mechanical* engineering, which is concerned with steam-engines, machine tools, mill-work and moving machinery in general, and it was soon followed by *mining* engineering, which deals with the location and working of coal, ore and other minerals. Subsequently numerous other more or less strictly defined groups and subdivisions came into existence, such as *naval architecture* dealing with the design of ships, *marine* engineering with the engines for propelling steamers, *sanitary* engineering with water-supply and disposal of sewage and other refuse, *gas* engineering with the manufacture and distribution of illuminating gas, and *chemical* engineering with the design and erection of the plant required for the manufacture of such chemical products as alkali, acids and dyes, and for the working of a wide range of industrial processes. The last great new branch is *electrical* engineering, which touches on the older branches at so many points that it has been said that all engineers must be electricians.

ENGINEERS, MILITARY. From the earliest times engineers have been employed both in the field of war and on field defences. In modern times, however, the application of numerous scientific and engineering devices to warfare has resulted in the creation of many minor branches of military engineering, some of them almost rivalling in importance their primary duty of fortification and siegecraft, such as the field telegraph, the balloon service, nearly all demolitions, the building of pontoon and other bridges, and the construction and working of military roads, railways, piers, &c. All these branches requiring special knowledge, the modern tendency is to divide a corps of engineers in accordance with such requirements. The "field companies" and "fortress companies" of the R.E. represent the traditional tactical application of their arm to works of offence and defence in field and siege warfare. The balloon, telegraph, and other branches, also organized on a permanent footing, represent the modern application of scientific aids in warfare. (See FORTIFICATION AND SIEGECRAFT; TACTICS; INFANTRY, &c.)

History.—It is difficult to distinguish between military and civil engineers in the earlier ages of modern history, for all engineers acted as builders of castles and defensible strongholds, as well as manufacturers and directors of engines of war with which to attack or defend them. The annals of fortification show professors, artists, &c., as well as soldiers and architects, as designers and builders of innumerable systems of fortification. By the middle of the 13th century there was in England an organized body of skilled workmen employed under a "chief engineer." At the siege of Calais in 1347 this corps consisted of masons, carpenters, smiths, tentmakers, miners, armourers, gunners and artillerymen. At the siege of Harfleur in 1415 the chief engineer was designated Master of the King's Works, Guns and Ordnance, and the corps under him numbered 500 men, including 21 foot-archers. Headquarters of engineers existed at the Tower of London before 1350, and a century later developed into the Office of Ordnance (afterwards the Board of Ordnance), whose duty was to administer all matters connected with fortifications, artillery and ordnance stores.

Henry VIII. employed many engineers (of whom Sir Richard Lee is the best known) in constructing coast defences from Penzance to the Thames and thence to Berwick-on-Tweed, and in strengthening the fortresses of Calais and Guînes in France. He also added to the organization a body of pioneers under trenchmasters and a master trenchmaster. Charles II. increased the peace establishment of engineers and formed a separate one for Ireland, with a chief engineer who was also surveyor-general of the King's Works. In both countries only a small permanent establishment was maintained, a special ordnance train being enrolled in war-time for each expedition and disbanded on its termination. The commander of an ordnance train was frequently, but not necessarily, an engineer; but there was always a chief engineer of each train. At Blenheim (1704) Marlborough's ordnance train was commanded by Holcroft Blood, a distinguished engineer. But after the rebellion of 1715 it was decided to separate the artillery from the engineers, and the royal warrant of 26th May 1716 established two companies of artillery as a separate regiment, and an engineer corps composed of 1 chief engineer, 3 directors, 6 engineers-in-ordinary, 6 engineers extraordinary, 6 sub-engineers and 6 practitioner engineers.

Until the 14th of May 1757 officers of engineers frequently held, in addition to their military rank in the corps of engineers, commissions in foot regiments; but on and after that date all engineer officers were gazetted to army as well as engineer rank—the chief engineer as colonel of foot, directors as lieutenant-colonel, and so forth down to practitioners as ensigns. On the 18th of November 1782 engineer grades, except that of chief engineer, were abolished, and the establishment was fixed at 1 chief engineer and colonel, 6 colonels commandant, 6 lieutenant-colonels, 9 captains, 9 captain lieutenants (afterwards second captains), 22 first lieutenants, and 22 second lieutenants. Ten years later a small invalid corps was formed. In 1787 the designation "Royal" was conferred upon the engineers, and its precedence settled to be on the right of the army, with the royal artillery.

In 1802 the title of chief engineer was changed to inspector-general of fortifications. From this time to the conclusion of the Crimean War various augmentations took place, consequent on the increasing and widely extending duties thrown upon the officers. These, in addition to ordinary military duties, comprised the construction and maintenance of fortifications, barrack and ordnance store buildings, and all engineering services connected with them. The cadastral survey of the United Kingdom (called the "Ordnance Survey") had been entrusted to the engineers as far back as 1784, and absorbed many officers in its execution.

In 1772 the formation at Gibraltar of "The Company of Soldier Artificers," officered by Royal Engineers, was authorized, and a second company was added soon afterwards. In 1787 by royal warrant "The Corps of Royal Military Artificers" was established at home, consisting of six companies, with which the Gibraltar companies were amalgamated. In 1806 this corps was doubled, and in 1811 increased to 32 companies. In 1813 its title was changed to "The Royal Sappers and Miners." In 1856, at the close of the Crimean War, it was incorporated with "The Corps of Royal Engineers," by whom it had always been officered. At that date the corps numbered about 340 officers and 4000 non-commissioned officers and men, in 1 troop and 32 companies.

In 1770 the East India Company reorganized the engineer corps of the three presidencies, composed of officers only. Native corps of sappers or pioneers were formed later, and officered principally by engineers. The officers of engineers were employed in peacetime on the public works of the country, their services when required being placed at the disposal of the military authorities. The Indian Engineers have not only distinguished themselves in the operations of war, but have left monuments of engineering skill in the irrigation works, railways, surveys, roads, bridges, public buildings and defences of the country. When Indian administration was transferred to the crown (1862) the Indian Engineers became "Royal," so that there now exists but one corps, the Royal Engineers. This is composed of about 1000 officers and 7700 warrant and non-commissioned officers and men. Of the officers some 220 are attached to units, about 400 employed either at home or in the colonies on engineering duties in military commands, on the staff, or on special duty, and about 370 on the Indian establishment. The supreme technical control of the Royal Engineers is exercised from the War Office. See also UNITED KINGDOM; ARMY.

The history of the French engineers shows a somewhat similar line of development. Originally selected officers of infantry were given brevets as engineers, and these men performed military and also civil duties for the king's service by the aid of companies of workmen enlisted and discharged from time to time. Vauban (*q.v.*) was the founder of the famous *corps de Génie* (1690). Its members were selected officers and civilians, employed in all branches of military and naval services, and it soon achieved its European reputation as the first school of fortification and siegecraft. It received a special uniform in 1732. About 1755 it was for a time merged in the artillery. In 1766 the title of *Génie* was conferred upon the officers, and the same name (*troupes de Génie*) was given to the previously existing companies of sappers and miners in 1801.

In the United States the separate Corps of Engineers (since 1794 there had been a Corps of Artillerists and Engineers) was organized in 1802, starting with a small body stationed at West Point, which in 1838 and 1846 was gradually increased, and in 1861 given three additional companies. In 1866 they were formed into a battalion and stationed at Willets Point, N.Y. In 1901 they were reorganized in three battalions, with a total strength of 1282. The U.S. Engineer School, formerly at Willets Point, was transferred in 1901 to Washington. Until 1866 the military academy at West Point was under the supervision of the Corps of Engineers, but from that time its direction was thrown open; but the highest branch at West Point is still regarded as that of the engineers. The Corps of Engineers has done a great deal of highly important work in the United States, notably in building forts, and improving rivers and harbours for navigation.

See Maj.-Gen. R. W. Porter, *Hist. of the Corps of Royal Engineers* (Chatham, 1889); C. Lecomte, *Les Ingénieurs militaires de la France* (Paris, 1903); H. Frobenius, *Geschichte der K. preuss. Ingenieur- und Pionier-Korps* (Berlin, 1906).

ENGIS, a cave on the banks of the Meuse near Liége, Belgium, where in 1832 Dr P. C. Schmerling found human remains in deposits belonging to the Quaternary period. Bones of the cave-bear, mammoth, rhinoceros and hyena were discovered in association with parts of a man's skeleton and a human skull. This, known as "the Engis Skull," gave rise to much discussion among anthropologists, since it has characteristics of both high and low development, the forehead, low and narrow, indicating slight intelligence, while the abnormally large brain cavity contradicts this conclusion. Of it Huxley wrote: "There is no mark of degradation about any part of its structure. It is a fair average human skull, which might have belonged to a philosopher, or might have contained the thoughtless brains of a savage." Dr Schmerling concluded that the human remains were those of man who had been contemporary with the extinct mammals. As, however, fragments of coarse pottery were found in the cave which bore other evidence of having been used by neolithic man, by whom the cave-floor and its contents might have been disturbed and mixed, his arguments have not been regarded as conclusive. There is, however, no doubt as to the great age of the Engis Skull, Discoveries of a like nature were made by Dr Schmerling in the neighbourhood in the caves of Engihoul, Chokier and others.

See P. C. Schmerling, *Recherches sur les ossements découverts dans les cavernes de la province Liège* (1833); Huxley, *Man's Place in Nature*, p. 156; Lord Avebury, *Prehistoric Times*, p. 317 (1900).

ENGLAND. Geographical usage confines to the southern part of the island of Great Britain the name commonly given to the great insular power of western Europe.[1] In this restricted sense the present article deals with England, the predominant partner in the United Kingdom of Great Britain and Ireland, both as containing the seat of government and in respect of extent, population and wealth.

I. TOPOGRAPHY.

England extends from the mouth of the Tweed in 55° 46′ N. to Lizard Point in 49° 57′ 30″ N., in a roughly triangular form. The base of the triangle runs from the South Foreland to Land's End W. by S., a distance of 316 m. in a straight line, but 545 m. following the larger curves of the coast. The east coast runs N.N.W. from the South Foreland to Berwick, a distance of 348 m., or, following the coast, 640 m. The west coast runs N.N.E. from Land's End to the head of Solway Firth, a distance of 354 m., or following the much-indented coast, 1225 m. The total length of the coast-line may be put down as 2350 m.,[2] out of which 515 m. belong to the western principality of Wales.[3] The most easterly point is at Lowestoft, 1° 46′ E., the most westerly is Land's End, in 5° 43′ W. The coasts are nowhere washed directly by the ocean, except in the extreme south-west; the south coast faces the English Channel, which is bounded on the southern side by the coast of France, the two shores converging from 100 m. apart at the Lizard to 21 at Dover. The east coast faces the shallow North Sea, which widens from the point where it joins the Channel to 375 m. off the mouth of the Tweed, the opposite shores being occupied in succession by France, Belgium, Holland, Germany and Denmark. The west coast faces the Irish Sea, with a width varying from 45 to 130 m.

Counties.	Area Statute Acres.	Population. 1901.
Bedfordshire	298,494	171,240
Berkshire	462,208	256,509
Buckinghamshire	475,682	195,764
Cambridgeshire	549,723	190,682
Cheshire	657,783	815,099
Cornwall	868,220	322,334
Cumberland	973,086	266,933
Derbyshire	658,885	620,322
Devonshire	1,667,154	661,314
Dorsetshire	632,270	202,936
Durham	649,352	1,187,361
Essex	986,975	1,085,771
Gloucestershire	795,709	634,729
Hampshire	1,039,031	797,634
Herefordshire	537,363	114,386
Hertfordshire	406,157	250,152
Huntingdonshire	234,218	57,771
Kent	995,014	1,348,841
Lancashire	1,203,365	4,406,409
Leicestershire	527,123	434,019
Lincolnshire	1,693,550	498,847
Middlesex	181,320	3,585,323
Monmouthshire	341,688	292,317
Norfolk	1,308,439	460,120
Northamptonshire	641,992	338,088
Northumberland	1,291,530	603,498
Nottinghamshire	539,756	514,578
Oxfordshire	483,626	181,120
Rutland	97,273	19,709
Shropshire	859,516	239,324
Somersetshire	1,043,409	508,256
Staffordshire	749,602	1,234,506
Suffolk	952,710	384,293
Surrey	485,122	2,012,744
Sussex	933,887	605,202
Warwickshire	577,462	897,835
Westmorland	503,160	64,303
Wiltshire	879,943	273,869
Worcestershire	480,560	488,338
Yorkshire	3,882,328	3,584,762
Total	32,544,685	30,807,232

The area of England and Wales is 37,327,479 acres or 58,324 sq. m. (England, 50,851 sq. m.), and the population on this area in 1901 was 32,527,843 (England, 30,807,232). The principal territorial divisions of England, as of Wales, Scotland and Ireland, are the counties, of which England comprises 40. Their boundaries are not as a rule determined by the physical features of the land; but localities are habitually defined by the use of their names. A list of the English counties (excluding Wales) is given in the table above.[4]

Hills.—As an introduction to the discussion of the natural regions into which England is divided (Section II.), and for the sake of comparison of altitudes, size of rivers and similar details, the salient geographical features may be briefly summarized. The short land-frontier of England with Scotland (its length is only 100 m.) is in great measure a physical boundary, as considerable lengths of it are formed on the east side by the river Tweed, and on the west by Kershope Burn, Liddel Water, and the river Sark; while for the rest it follows pretty closely the summit of the Cheviot Hills, whose highest point is the Cheviot (2676 ft.). A narrow but well-marked pass or depression, known as the Tyne Gap, is taken to separate the Cheviot system from the Pennine Chain, which is properly to be described as a wide tract of hill-country, extending through two degrees of latitude, on an axis from N. by W. to S. by E. The highest point is Cross Fell (2930 ft.). On the north-west side of the Pennine system, marked off from it by the upper valleys of the rivers Eden and Lune, lies the circular hill-tract whose narrow valleys, radiating from its centre somewhat like wheel-spokes, contain the beautiful lakes which give it the celebrated name of the Lake District. In this tract is found the highest land in England, Scafell Pike reaching 3210 ft. East of the Pennines, isolated on three sides by lowlands and on the fourth side by the North Sea, lie the high moors of the North Riding of Yorkshire, with the Cleveland Hills, and, to the south, the Yorkshire Wolds of the East Riding. Neither of these systems has any great elevation; the moors, towards their north-western edge, reaching an extreme of 1489 ft. in Urra Moor. The tableland called the Peak of Derbyshire, in the south of the Pennine system, is 2088 ft. in extreme height, but south of this system an elevation of 2000 ft. is not found anywhere in England save at a few points on the south Welsh border and in Dartmoor, in the south-west. Wales, on the other hand, projecting into the western sea between Liverpool Bay and the estuary of the Dee on the north, and the Bristol Channel on the south, is practically all mountainous, and has in Snowdon, in the north-west, a higher summit than any in England—3560 ft. But the midlands, the west, and the south of England, in spite of an absence of great elevation, contain no plains of such extent as might make for monotony. The land, generally undulating, is further diversified with hills arranged in groups or ranges, a common characteristic of which is a bold face on the one hand and a long gentle slope, with narrow valleys deeply penetrating, on the other. Southward from the Pennines there may be mentioned, in the midlands, the small elevated tract of Charnwood Forest (Bardon Hill, 912 ft.) in Leicestershire, and Cannock Chase (775 ft.) and the Clent Hills (928 ft.), respectively north and south of the great manufacturing district of Birmingham and Wolverhampton. Of the western counties, the southern half of Shropshire, Herefordshire and Monmouthshire are generally hilly. Among the Shropshire Hills may be mentioned the isolated Wrekin (1335 ft.), Long Mynd (1674 ft.) and the Clee Hills (Brown Clee, 1805 ft.). The

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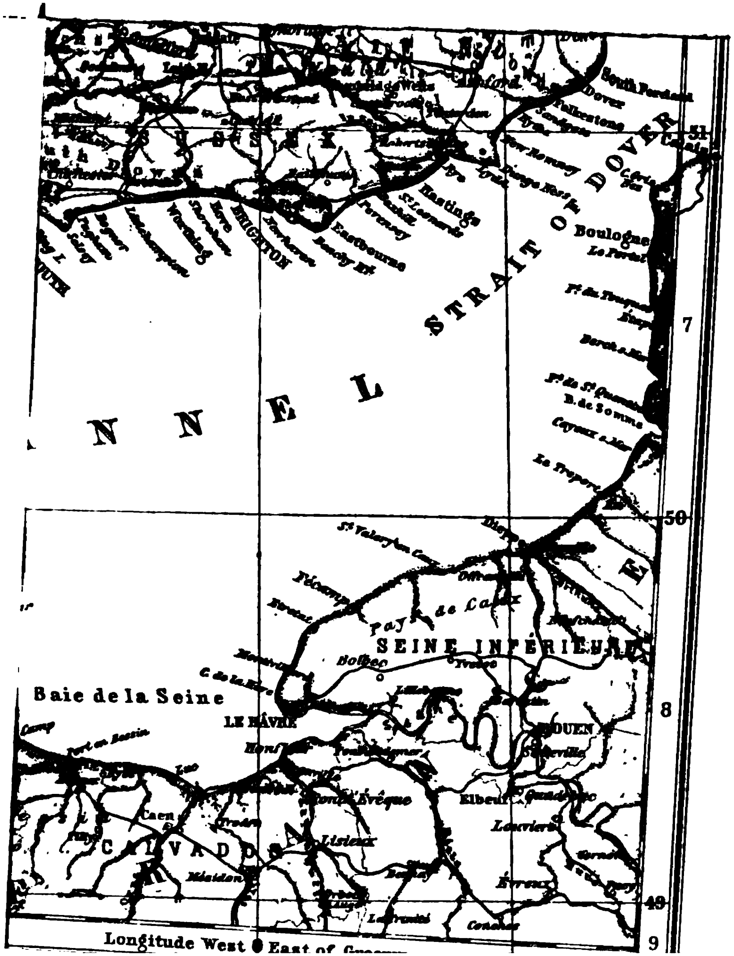
[1] The general questions capable of a single treatment for England, Scotland and Ireland are considered under UNITED KINGDOM.

[2] Measurements made on a map on the scale of 12½ m. to 1 in., the coast being assumed to run up estuaries until the breadth became 1 m., and no bays or headlands of less than 1 m. across being reckoned. The coast-line of Anglesea and the Isle of Wight, but of no other islands, is included.

[3] A separate topographical notice is given under the heading WALES, but the consideration of certain points affecting Wales as linked with England is essential in this article.

[4] The figures given here are for the ancient or geographical counties. Section IX., on *Territorial Divisions*, indicates the departures from the ancient county boundaries made for certain purposes of administration. Each county is treated in a separate article in the topographical, geological, economical and historical aspects. Further topographical details are given in separate articles on the more important hill-systems, rivers, &c.


STRAIT OF DOVER
C H A N N E L
South Foreland
Dover
Folkestone
Sandgate
Hythe
New Romney
Rye
Hastings
St. Leonards
Pevensey
Eastbourne
Beachy Hd.
Newhaven
BRIGHTON
Hove
Shoreham
Worthing
Littlehampton
Bognor
Selsey
SUSSEX
Tunbridge Wells
Calais
Boulogne
Le Portel
Étaples
Berck
B. de Somme
Cayeux
Le Tréport
Dieppe
St. Valery en Caux
Fécamp
Pays de Caux
SEINE INFÉRIEURE
Bolbec
Yvetot
LE HAVRE
Baie de la Seine
Honfleur
ROUEN
Elbeuf
Louviers
Évreux
Caen
CALVADOS
Lisieux
Pont l'Évêque
Trouville
Port en Bessin
Conches
51
50
49
7
8
9
Longitude West East of Greenw

long ridge of the Black Mountain reaches an extreme height of 2310 ft. on the Welsh border of Herefordshire. The Malvern Hills on the other side of the county, which, owing to their almost isolated position among lowlands, appear a far more prominent feature, reach only 1395 ft. In western Monmouthshire, again belonging to the south Welsh system, there are such heights as Sugar Loaf (1955 ft.) and Coity (1905 ft.).

In the south midlands of England there are two main ranges of hills, with axes roughly parallel. The western range is the Cotteswold Hills of Gloucestershire and the counties adjacent on the east running S.W. and N.E. Its highest point is Cleeve Cloud (1134 ft.). The uplands of Northamptonshire continue this range north-eastward, decreasing in elevation. The eastern range, beginning in Wiltshire, runs E.N.E. as the White Horse Hills (856 ft. at the highest point), and after the interruption caused by the gap or narrow valley by which the river Thames penetrates the hills near Goring, continues N.E. as the Chiltern Hills (850 ft.). The East Anglian ridge continues the line E.N.E., gradually decreasing in altitude. In the south-east of England, the North and South Downs are both well-defined ranges, but are characterized by a number of breaches through which rivers penetrate, on the one hand to the Thames or the North Sea and on the other to the English Channel. Leith Hill in the North Downs reaches 965 ft., and Butser Hill in the South Downs 889 ft.; Blackdown and Hindhead, two almost isolated masses of high ground lying between the two ranges of the Downs towards their western extremity, are respectively 918 and 895 ft. in height. In the north of Hampshire along its boundary with Surrey and Berkshire, in the southern half of Wiltshire (where rises the upland of Salisbury Plain), in Dorsetshire, and the south of Somersetshire, the hills may be said to run in a series of connected groups. They cannot be defined as a single range, nor are they named, as a rule, according to the groups into which they fall, but the general title of the Western Downs is applied to them. One point only in all these groups exceeds 1000 ft. in altitude, namely, Inkpen Beacon (1011 ft.) in the extreme south-west of Berkshire, but heights above 900 ft. are not infrequent. In the northern part of Somersetshire, two ranges, short but well defined, lie respectively east and west of a low plain which slopes to the Bristol Channel. These are the Mendips (Black Down, 1068 ft.) and the Quantocks (Will's Neck, 1261 ft.). The Blackdown Hills, in south-western Somersetshire and eastern Devonshire, reach 1035 ft. in Staple Hill in the first-named county. In western Somersetshire and north Devonshire the elevated mass of Exmoor reaches 1707 ft. in Dunkery Beacon; and in south Devonshire the highest land in southern England is found in the similar mass of Dartmoor (High Willhays, 2039 ft.). The westward prolongation of the great south-western promontory of England, occupied by the county of Cornwall, continues as a rugged ridge broken by a succession of depressions, and exceeds a height of 800 ft., nearly as far as the point where it falls to the ocean in the cliffs of Land's End.

Lowlands.—The localities of the more extensive lowlands of England may now be indicated in their relation to the principal hill-systems, and in this connexion the names of some of the more important rivers will occur. In the extreme north-west is the so-called Solway Plain, of no great extent, but clearly defined between the northern foothills of the Lake District and the shore of Solway Firth. In Lancashire a flat coastal strip occurs between the western front of the Pennine Chain and the Irish Sea, and, widening southward, extends into Cheshire and comprises the lower valleys of the Mersey and the Dee. In the preceding review of the English hill-systems it may have been observed that eastern England hardly enters into consideration. The reason now becomes clear. From Yorkshire to the flat indented sea-coast north of the Thames estuary, east of the Pennines and the slight hills indicated as the Northampton uplands, and in part demarcated southward by the East Anglian ridge in Huntingdonshire, Cambridgeshire and Suffolk, the land, although divided between a succession of river-systems, varies so little in level as to be capable of consideration as a single plain. Its character, however, varies in different parts. The Fens, the flat open levels in the lower basins of the Witham, Welland, Nene and Great Ouse, only kept from their former marshy conditions by an extensive system of artificial drainage, and the similar levels round the head of the Humber estuary, differ completely in appearance from the higher and firmer parts of the plain. The coast-land north of the mouth of the Thames is a low plain; and on the south coast somewhat similar tracts are found in Romney Marsh, and about the shallow inlets (Portsmouth Harbour and others) which open from Spithead. The vales of Kent and Sussex are rich undulating lowlands within the area of the Weald, separated by the Forest Ridges, and enclosed by the North and South Downs. In the south-west there is a fairly extensive lowland in south Devonshire watered by the Exe in its lower course. But the most remarkable plain is that in Somersetshire, enclosed by the Mendips, the Western Downs, Blackdown Hills and the Quantocks and entered by the Parrett and other streams. The midlands, owing to the comparatively slight elevation of the land, are capable of geographical consideration as a plain. But it is not a plain in the sense of that of East Anglia. There is no quite level tract of great extent, excepting perhaps the fertile and beautiful district watered by the lower Severn and its tributary the Upper or Warwickshire Avon, overlooked by the Cotteswolds on the one hand and the Malvern and other hills on the other.

Coast.—The coast-line of England is deeply indented by a succession of large inlets, particularly on the east and west. Thus, from north to south there are, on the east coast, the mouths of the Tyne and the Tees, the Humber estuary, the Wash (which receives the waters of the Witham, Welland, Nene and Great Ouse), the Orwell-Stour, Blackwater and Thames-Medway estuaries. On the west there are Solway Firth, Morecambe Bay, the estuaries of the Mersey and Dee, Cardigan Bay of the Welsh coast, and the Bristol Channel and Severn estuary. In this way the land is so deeply penetrated by the water that no part is more than 75 m. from the sea. Thus Buckingham appears to be the most inland town in England, being 75 m. from the estuaries of the Severn, Thames and Wash; Coleshill, near Birmingham, is also almost exactly 75 m. from the Mersey, Severn and Wash.

The east and south coasts show considerable stretches of uniform uninflected coast-line, and except for the Farne Islands and Holy Island in the extreme north, the flat islands formed by ramifications of the estuaries on the Essex and north Kent coasts, and the Isle of Wight in the south, they are without islands. The west coast, on the other hand, including both shores of the great south-western promontory, is minutely fretted into capes and bays, headlands and inlets of every size, and an island-group lies off each of the more prominent headlands from Land's End northward. The formation of the coast varies from low, shifting banks of shingle or sand to majestic cliffs, and its character in different localities has been foreshadowed in the previous consideration of the hill-systems and lowlands. Thus in the north-east the coast is generally of no great elevation, but the foothills of the Cheviot and Pennine systems approach it closely. On the Yorkshire coast the Cleveland Hills and the high moors are cut off on the seaward side in magnificent cliffs, which reach the greatest elevation of sea-cliffs on the English coast (666 ft.). The Yorkshire Wolds similarly terminate seaward in the noble promontory of Flamborough Head. From this point as far south as the North Foreland of Kent the coast, like the land, is almost wholly low, though there are slight cliffs at some points, as along the coasts of Norfolk and Suffolk, on which the sea constantly encroaches. On the south coast a succession of cliffs and low shores may be correlated with the main physical features of the land. Thus in succession there are the famous white cliffs about Dover, terminating the North Downs, the low coast of Romney Marsh, projecting seaward in Dungeness, the cliffs above Hastings, terminating an offshoot of the Forest Ridges, the low shore between Hastings and Eastbourne, to which succeeds the lofty Beachy Head, terminating the South Downs. A flat coast follows as far as Selsey Bill and Spithead, but the south coast of the Isle of Wight shows a succession of splendid cliffs. The shallow inlet of Poole Bay is followed by the eminence of St Alban's Head, and thereafter, right round the south-western promontory of England, the cliff-bound coast, with its bays and inlets closely beset with hills, predominates over the low shore-line, exhibits a remarkable series of different forms, and provides the finest scenery of its kind in England. The shores of the Severn estuary are low, but the Welsh coast, sharing the general character of the land, is more or less elevated throughout, though none of the higher mountain-masses directly approaches the sea. Low shores correspond to the plains of Cheshire, Lancashire and the Solway, while the intervening coast is of no great elevation, as only the foothills of the Lake District approach it with a gradual slope.

A great extent of the English coast is constantly undergoing visible alteration, the sea in some instances receding from the land, and in others gaining upon it. The whole of Romney Marsh, in Kent and Sussex, formerly constituted an arm of the sea, where vessels rode in deep water, carrying produce to ports no longer in existence. Lydd and Romney, though maritime still in name, retaining some of the ancient privileges of the Cinque Ports, have become, through changes in the coast-line, small inland towns; and the same has been the fate of Rye, Winchelsea, and other places in that district. Again, the Isle of Thanet, in the north-eastern corner of Kent, has practically ceased to be an island. The wide estuary of the sea separating it from the mainland, through which ships sailed from the English Channel into the Thames, using it as the shortest route from the south to London, has entirely disappeared, leaving only a flat lowland traversed by branches of the river Stour to mark its former existence. The sea is encroaching over a considerable extent of coast-line on the North Sea as well as on the English Channel. Ravenspur, once an important town of Yorkshire, where Bolingbroke, afterwards Henry IV., landed in 1399, is now submerged; and Dunwich and other ancient ports in East Anglia have met with the same fate. The process of destruction, slow in some places, is so rapid in others that it can be traced even from month to month—the incessant work of the waves washing away the soft strata at the base of the cliffs and leaving the summits unsupported. Many cliffs of the east coast, from the Humber to the mouth of the Thames, are suffering from this destructive action, and instances also occur on the south coast. A royal commission on Coast Erosion was appointed to inquire into this question in 1906 (see *Report*, 1907 sqq.).

Rivers.	Length Miles.	Drainage Area sq. m.
1. North-east—		
Tweed[1]	97	1870
Tyne	80	1130
Wear	60	458
Tees	85	708
2. East—		
Humber system[2]	..	9293
Witham	80	1079
Welland	70	760
Nene	90	1077
Ouse (Great)	160	2607
Yare	60	880
Stour (Suffolk-Essex)	60	407
Thames[3]	209	5924
3. South—		
Stour (Kent)	40	370
Rother	32	312
Arun	43	370
Avon (Hampshire)	60	1132
Exe	55	584
Tamar	58	384
4. Bristol Channel (south-west)—		
Torridge	45	336
Taw	48	455
Parrett	37	562
Severn[4] [5]	210	5850
Usk[5]	70	540
5. North-west—		
(*a*) Cheshire-Lancashire—		
Dee[5]	70	813
Mersey[6]	70	1596
Ribble	65	585
(*b*) Solway—		
Eden	70	1300

Except along the centre of the Irish Sea, at one point off the Tweed and one between Devon and Normandy, the depth of water between England and the nearest land nowhere exceeds 50 fathoms.

Rivers.—The variations in length of the general slope of the land towards successive natural divisions of the coast may be illustrated by a comparative table of the mileage and drainage areas of the principal English rivers. The mileage does not take account of the lesser sinuosities of rivers.

With the exception of those in the Lake District (*q.v.*) the lakes of England are few and insignificant. A number of small meres occur in a defined area in Cheshire. (O. J. R. H.)

II. Physical Geography

The object of this section is to give a physical description of England and Wales according to natural regions, which usually follow the geology of the country very closely; although the relationship of configuration and geology is not so simple or so clearly marked as in Scotland.

The land is highest in the west and north, where the rocks also are oldest, most disturbed, and hardest, and the land surface gradually sinks towards the east and south, where the rocks become successively less disturbed, more recent, and softer. The study of the scenery of England and Wales as a whole, or the study of orographical and geological maps of the country, allows a broad distinction to be drawn between the types of land-forms in the west and in the east. This distinction is essential, and applies to all the conditions of which geography takes account. The contrasted districts are separated by an intermediate area, which softens the transition between them, and may be described separately.

The Western Division is composed entirely of Archaean and Palaeozoic rocks, embracing the whole range from pre-Cambrian up to Carboniferous. The outcrops of these rocks succeed each other in order of age in roughly concentric belts, with the Archaean mass of the island of Anglesey as a centre, but the arrangement in detail is much disturbed and often very irregular. Contemporary igneous outbursts are extremely common in some of the ancient formations, and add, by their resistance to atmospheric erosion, to the extreme ruggedness of the scenery. The hills and uplands of ancient rocks do not form regular ranges, but rise like islands in four distinct groups from a plain of New Red Sandstone (Permian and Triassic), which separates them from each other and from the newer rocks of the Eastern Division. Each of the uplands is a centre for the dispersal of streams; but with only one prominent exception (the Humber) these reach the sea without crossing into the Eastern Division of the country.

The Eastern Division, lying to the east of the zone of New Red Sandstone, may be defined on the west by a slightly curved line drawn from the estuary of the Tees through Leicester and Stratford-on-Avon to the estuary of the Severn, and thence through Glastonbury to Sidmouth. It is built up of nearly uniform sheets of Mesozoic rock, the various beds of the Jurassic lying above the New Red Sandstone (Triassic), and dipping south-eastward under the successive beds of the Cretaceous system. In exactly the same way the whole of the south-east of the island appears to have been covered uniformly with gently dipping beds of Tertiary sands and clays, beneath which the Cretaceous strata dipped. At some period subsequent to this deposition there was a movement of elevation, which appears to have thrown the whole mass of rocks into a fold along an anticlinal axis running west and east, which was flanked to north and south by synclinal hollows. In these hollows the Tertiary rocks were protected from erosion, and remain to form the London and the Hampshire Basins respectively, while on the anticlinal axis the whole of the Tertiary and the upper Cretaceous strata have been dissected away, and a complex and beautiful configuration has been impressed on the district of the Weald. The general character of the landscape in the Eastern Division is a succession of steep escarpments formed by the edges of the outcropping beds of harder rock, and long gentle slopes or plains on the dip-slopes, or on the softer layers; clay and hard rock alternating throughout the series.

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[1] Partly belonging to Scotland.

[2] The principal members of the Humber-system are the Ouse of Yorkshire (121 m. long from the source of the Swale or Ure) and the Trent (170 m.), *qq.v.* for their numerous important tributaries.

[3] Including the Medway (680 sq. m.) in the drainage area.

[4] Including the Wye (1609 sq. m.) and the Lower Avon (891 sq. m.) in the drainage area.

[5] These rivers have their earlier courses in Wales, and flow at first to some point of east. Of wholly Welsh rivers only the Towy and the Teifi are comparable in length and drainage area with the smaller rivers in the above list (see Wales).

[6] From the source of its headstream the Goyt.

The contrast between the lower grounds of the Western and the Eastern Divisions is masked in many places by the general covering of the surface with glacial drift, which is usually a stiff clay composed on the whole of the detritus of the rocks upon which it rests, though containing fragments of rocks which have been transported from a considerable distance. This boulder clay covers almost all the low ground north of the Thames Basin, its southern margin fading away into washed sands and gravels.

The history of the origin of the land-forms of England, as far as they have been deduced from geological studies, is exceedingly complicated. The fact that every known geological formation (except the Miocene) is represented, proves of itself how long the history has been, and how multifarious the changes. It must suffice to say that the separation of Ireland from England was a comparatively recent episode, while the severance of the land-connexion between England and the continent by the formation of the Strait of Dover is still more recent and probably occurred with the human period.

The western division.

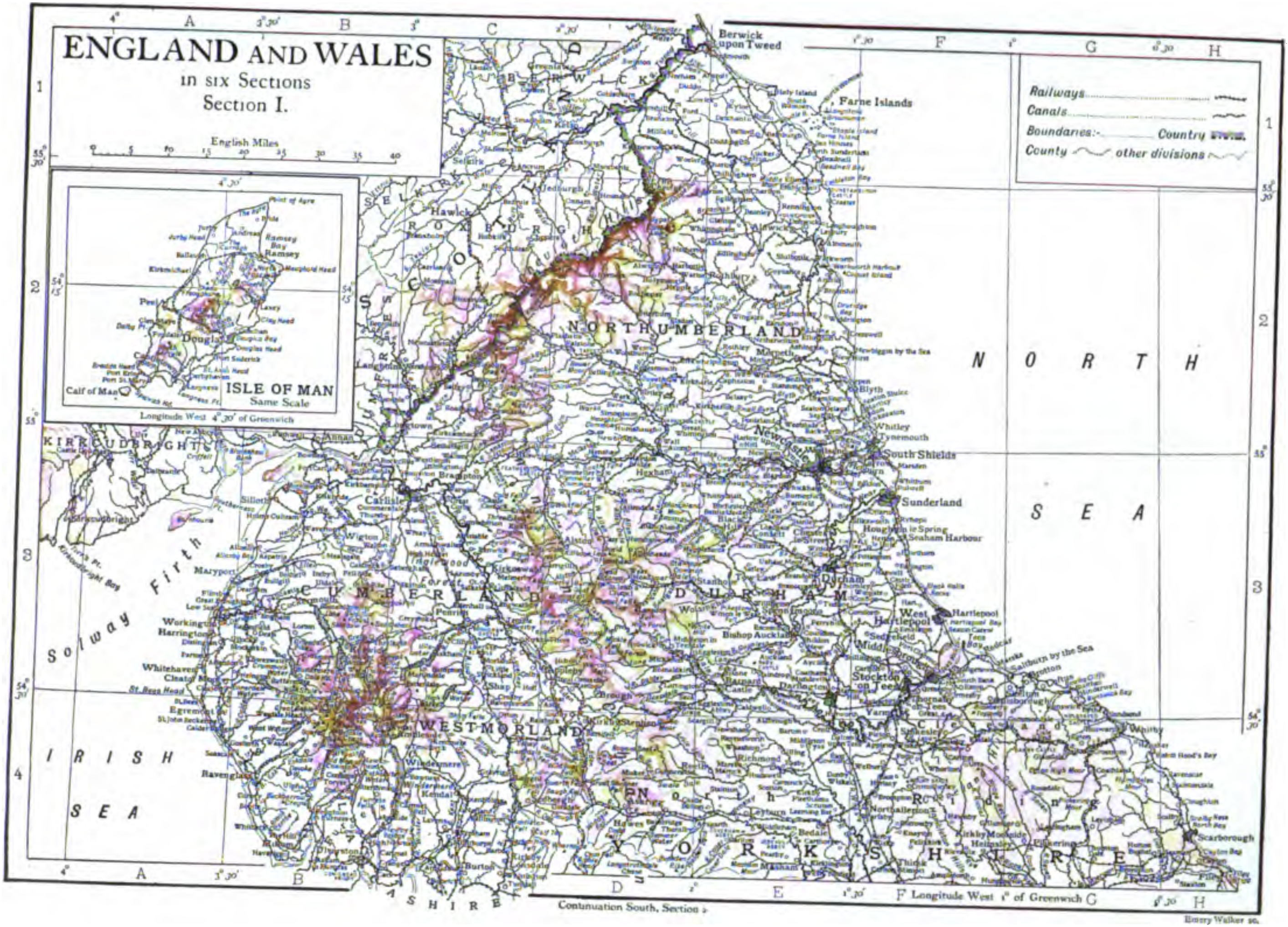
Natural Divisions.—The four prominent groups of high land rising from the plain of the Red Rocks are: (1) the *Lake District*, bounded by the Solway Firth, Morecambe Bay and the valleys of the Eden and the Lune; (2) the *Pennine Region*, which stretches from the Scottish border to the centre of England, running south; (3) *Wales*, occupying the peninsula between the Mersey and the Bristol Channel, and extending beyond the political boundaries of the principality to include Shropshire and Hereford; and (4) the peninsula of *Cornwall and Devon*. They are all similar in the great features of their land-forms, which have been impressed upon them by the prolonged action of atmospheric denudation rather than by the original order and arrangement of the rocks; but each group has its own geological character, which has imparted something of a distinctive individuality to the scenery. Taken as a whole, the Western Division depends for its prosperity on mineral products and manufactures rather than on farming; and the staple of the farmers is live-stock rather than agriculture. The people of the more rugged and remoter groups of this division are by race survivors of the early Celtic stock, which, being driven by successive invaders from the open and fertile country of the Eastern Division, found refuges in the less inviting but more easily defended lands of the west. Even where, as in the Pennine region and the Lake District, the people have been completely assimilated with the Teutonic stock, they retain a typical character, marked by independence of opinion approaching stubbornness, and by great determination and enterprise.

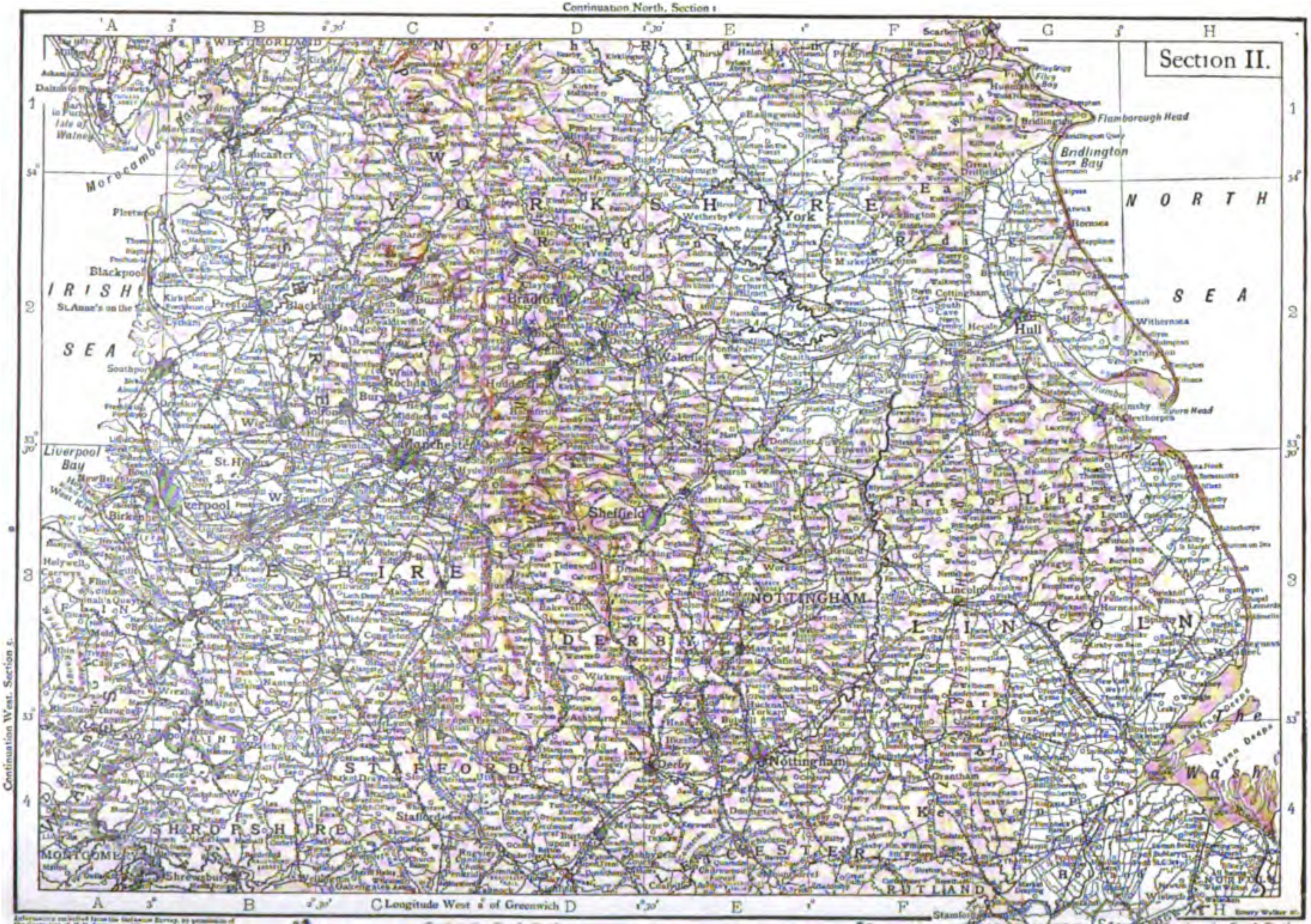
Lake District.—The Lake District occupies the counties of Cumberland, Westmorland and North Lancashire. It forms a roughly circular highland area, the drainage lines of which radiate outward from the centre in a series of narrow valleys, the upper parts of which cut deeply into the mountains, and the lower widen into the surrounding plain. Sheets of standing water are still numerous, and formerly almost every valley contained a single long narrow lake-basin; but some of these have been subdivided, drained or filled up by natural processes. The existing lakes include Windermere and Coniston, draining south; Wastwater, draining south-west, Ennerdale water, Buttermere and Crummock water (the two latter, originally one lake, are now divided by a lateral delta), draining north-west; Derwent water and Bassenthwaite water (which were probably originally one lake), and Thirlmere, draining north; Ullswater and Haweswater, draining north-east. There are, besides, numerous mountain tarns of small size, most of them in hollows barred by the glacial drift which covers a great part of the district. The central and most picturesque part of the district is formed of great masses of volcanic ashes and tuffs, with intrusions of basalts and granite, all of Ordovician (Lower Silurian) age. Scafell and Scafell Pike (3162 and 3210 ft.), at the head of Wastwater, and Helvellyn (3118), at the head of Ullswater, are the loftiest amongst many summits the grandeur of whose outlines is not to be estimated by their moderate height. Sedimentary rocks of the same age form a belt to the north, and include Skiddaw (3054 ft.); while to the south a belt of Silurian rocks, thickly covered with boulder clay, forms the finely wooded valleys of Coniston and Windermere. Round these central masses of early Palaeozoic rocks there is a broken ring of Carboniferous Limestone, and several patches of Coal Measures, while the New Red Sandstone appears as a boundary belt outside the greater part of the district. Where the Coal Measures reach the sea at Whitehaven, there are coal-mines, and the hematite of the Carboniferous Limestones has given rise to the active ironworks of Barrow-in-Furness, now the largest town in the district. Except in the towns of the outer border, the Lake District is very thinly peopled; and from the economic point of view, the remarkable beauty of its scenery, attracting numerous residents and tourists, is the most valuable of its resources. The very heavy rainfall of the district, which is the wettest in England, has led to the utilization of Thirlmere as a reservoir for the water supply of Manchester, over 80 m. distant.

Pennine Region.—The Pennine Region, the centre of which forms the so-called Pennine Chain, occupies the country from the Eden valley to the North Sea in the north, and from the lower Tees, Yorkshire Ouse and Trent, nearly to the Irish Sea, in the south. It includes the whole of Northumberland and Durham, the West Riding of Yorkshire, most of Lancashire and Derbyshire, the north of Staffordshire and the west of Nottinghamshire. The region is entirely composed of Carboniferous rocks, the system which transcends all others in the value of its economic minerals. The coal and iron have made parts of the region the busiest manufacturing districts, and the centres of densest population, in the country, or even in the world. The whole region may be looked upon as formed by an arch or anticline of Carboniferous strata, the axis of which runs north and south; the centre has been worn away by erosion, so that the Coal Measures have been removed, and the underlying Millstone Grit and Carboniferous Limestone exposed to the influences which form scenery. On both sides of the arch, east and west, the Coal Measures remain intact, forming outcrops which disappear towards the sea under the more recent strata of Permian or Triassic age. The northern part of the western side of the anticline is broken off by a great fault in the valley of the Eden, and the scarp thus formed is rendered more abrupt by the presence of a sheet of intrusive basalt. Seen from the valley, this straight line of lofty heights, culminating in Crossfell, presents the nearest approach in England to the appearance of a mountain range. In the north the Pennine region is joined to the Southern Uplands of Scotland by the Cheviot Hills, a mass of granite and Old Red Sandstone; and the northern part is largely traversed by dykes of contemporary volcanic or intrusive rock. The most striking of these dykes is the Great Whin Sill, which crosses the country from a short distance south of Durham almost to the source of the Tees, near Crossfell. The elevated land is divided into three masses by depressions, which furnish ready means of communication between east and west. The South Tyne and Irthing valleys cut off the Cheviots on the north from the Crossfell section, which is also marked off on the south by the valleys of the Aire and Ribble from the Kinder Scout or Peak section. The numerous streams of the region carry off the rainfall down long valleys or dales to the east and the south, and by shorter and steeper valleys to the west. The dales are separated from each other by high uplands, which for the most part are heathery moorland or, at best, hill pastures. The agriculture of the region is confined to the bottoms of the dales, and is of small importance. Crossfell and the neighbouring hills are formed from masses of Carboniferous Limestone, which received its popular name of Mountain Limestone from this fact. Farther south, such summits as High Seat, Whernside, Bow Fell, Penyghent and many others, all over 2000 ft. in height, are capped by portions of the grits and sandstones, which rest upon the limestone. The belt of Millstone Grit south of the Aire, lying between the great coal-fields of the West Riding and Lancashire, has a lower elevation, and forms grassy uplands and dales; but farther south, the finest scenery of the whole region occurs in the limestones of Derbyshire, in which the range terminates. The rugged beauty of the south-running valleys, and especially of Dovedale, is enhanced by the rich woods which still clothe the slopes. There are remarkable features underground as well as on the surface, the caverns and subterranean streams of Yorkshire and Derbyshire being amongst the deepest that have yet been explored. Compared with the rugged and picturesque scenery of the Lower Carboniferous rocks, that of the Coal Measures is, as a rule, featureless and monotonous. The coal-fields on the eastern side, from the Tyne nearly to the Trent, are sharply marked off on the east by the outcrop of Permian dolomite or Magnesian limestone, which forms a low terrace dipping towards the east under more recent rocks, and in many places giving rise to an escarpment facing westward towards the gentle slope of the Pennine dales. To the west and south the Coal Measures dip gently under the New Red Sandstone, to reappear at several points through the Triassic plain. The clear water of the upland becks and the plentiful supply of water-power led to the founding of small paper-mills in remote valleys before the days of steam, and some of these primitive establishments still exist. The prosperity and great population of the Pennine region date from the discovery that pit-coal could smelt iron as well as charcoal; and this source of power once discovered, the people bred in the dales developed a remarkable genius for mechanical invention and commercial enterprise, which revolutionized the economic life of the world and changed England from an agricultural to an industrial country. The staple industry of the district in ancient times was sheep-rearing, and the villages in nearly all the dales carried on a small manufacture of woollen cloth. The introduction of cotton caused the woollen manufactures on the western side to be superseded by the working up of the imported raw material; but woollen manufactures, themselves carried on now almost entirely with imported raw material, have continued to employ the energies of the inhabitants of the east. Some quiet market-towns, such as Skipton and Keighley, remain, but most of them have developed by manufactures into great centres of population, lying, as a rule, at the junction of thickly peopled valleys, and separated from one another by the empty uplands. Such are Leeds, Bradford, Sheffield, Huddersfield and Halifax on the great and densely peopled West Riding coal-field, which lies on the eastern slope of the Pennines. The iron ores of the Coal Measures have given rise to great manufactures of steel, from cutlery to machinery and armour-plates. High on the barren crest of the Pennines, where the rocks yield no mineral wealth, except it be medicinal waters, Harrogate, Buxton and Matlock are types of health resorts, prosperous from their pure air and fine scenery. Across the moors, on the western side of the anticline, the vast and dense population of the Lancashire coal-field is crowded in the manufacturing towns surrounding the great commercial centre, Manchester, which itself stands on the edge of the Triassic plain. Ashton, Oldham, Rochdale, Bury, Bolton and Wigan form a nearly confluent semicircle of great towns, their prosperity founded on the underlying coal and iron, maintained by imported cotton. The Lancashire coal-field, and the portion of the bounding plain between it and the seaport of Liverpool, contain a population greater than that borne by any equal area in the country, the county of London and its surroundings not excepted. In the south-west of the Pennine region the coal-field of North Staffordshire supports the group of small but active towns known collectively from the staple of their trade as "The Potteries." On the north-east the great coal-field of Northumberland and Durham, traversed midway by the Tyne, supports the manufactures of Newcastle and its satellite towns, and leaves a great surplus for export from the Tyne ports.

Wales.—The low island of Anglesey, which is built up of the fundamental Archaean rocks, is important as a link in the main line of communication with Ireland, because it is separated from the mainland by a channel narrow enough to be bridged, and lies not far out of the straight line joining London and Dublin. The mainland of Wales rises into three main highlands, the mountain groups of North, Mid and South Wales, connected together by land over 1000 ft. in elevation in most places, but separated by valleys affording easy highways. The streams of the southern and western slopes are short and many, flowing directly to the Bristol Channel and the Irish Sea; but the no less numerous streams of the eastern slopes gather themselves into three river systems, and reach the sea as the Dee, the Severn and the Wye. The mountain group of *North Wales* is the largest and loftiest; its scenery resembles that of the Scottish Highlands because of the juxtaposition of ancient Palaeozoic rocks—Cambrian and Ordovician, often altered into slate—and contemporaneous volcanic outbursts and igneous intrusions. Here rises the peak of Snowdon (3560 ft.), the culminating point of South Britain, and near it half a dozen summits exceed 3000 ft., while Cader Idris, farther south, though slightly lower, presents a singularly imposing outline. The mild winter climate has fringed the coast with seaside resorts, the rugged heights attract tourists in summer, and the vast masses of slate have given rise to the largest slate quarries in the world. The heavy rainfall of the upper valleys unfits them for agriculture, and the farms are poor. There are several lakes: that of Bala being the largest, except the old lake of Vyrnwy, reconstituted artificially to store the rainfall for the water-supply of Liverpool, 68 m. distant. The Vyrnwy is tributary to the Severn; but north of it the streams gather into the Dee, and flow eventually northward. *Mid Wales* is built up, for the most part, of Silurian or Ordovician rocks, practically free from igneous intrusions except in the south-west. There the resistance of a series of igneous dykes gives prominence to the Pembroke peninsula, in which the fine fjord-like harbour of Milford Haven lies far out towards the Atlantic. The coast north of Pembroke and Merioneth has been worked into the grand sweep of Cardigan Bay, its surface carved into gently rounded hills, green with rich grass, which sweep downward into wide rounded valleys. Plinlimmon (2468 ft.) is the highest of the hills, and forms a sort of hydrographic centre for the group, as from its eastern base the Severn and the Wye take their rise—the former describing a wide curve to east and south, the latter forming a chord to the arc in its southward course. Mid Wales is mainly a pastoral country, and very thinly peopled. A group of artificial lakes, one of them exceeded in area only by Windermere, has been formed in the valley of the Elan, a tributary of the Wye, for the supply of water to Birmingham. The group of heights of *South Wales*, running on the whole from west to east, marks the outcrops of the Old Red Sandstone and Carboniferous strata which lie within a vast syncline of the Silurian rocks. The Brecon Beacons of Old Red Sandstone are the highest (2907 ft.), but the Black Mountain bears a number of picturesque summits carved out of Millstone Grit and Carboniferous Limestone, which rise frequently over 2000 ft. Throughout Hereford, and in part of Monmouthshire, the Old Red Sandstone sinks to a great undulating plain, traversed by the exquisite windings of the Wye, and forming some of the richest pasture and fruit lands of England. This plain formed an easy passage from south to north, and since the time of the Romans was a strategical line of the greatest importance, a fact which has left its traces on the present distribution of towns. Around the western and northern edge of the Old Red Sandstone plain the underlying Silurian rocks (and even the Cambrian and Archaean in places) have been bent up so that their edges form hills of singular abruptness and beauty. Of these are the Malvern Hills, east of Hereford, and in particular the hills of Shropshire. Wenlock Edge, running from south-west to north-east, is an escarpment of Silurian limestone, while the broad upland of Long Mynd, nearly parallel to it on the north, is a mass of Archaean rock. The Wrekin, the Caradoc and Cardington Hills are isolated outbursts of pre-Cambrian volcanic rocks. The outer rim of the Welsh area contains a broken series of coal-fields, where patches of Carboniferous strata come to the surface on the edge of the New Red Sandstone plain. Such are the coal-fields of Flint in the north, the Forest of Wyre and the Forest of Dean, close to the Severn, on the east. The great coal-field on the south is a perfect example of a synclinal basin, the Millstone Grit and Carboniferous Limestone which underlie the Coal Measures appearing all round the margin. This coal-field occupies practically the whole of Glamorgan and part of Monmouth, and its surface slopes from the Black Mountain and Brecon Beacons to the sea as a gently inclined plateau, scored by deep valleys draining south. Each chief valley has a railway connecting a string of mining villages, and converging seaward to the busy ports of Newport, Cardiff and Barry (a town created on a sandy island by the excavation of a great dock to form an outlet for the mines). In the north of the field, where the limestone crops out and supplies the necessary flux, Merthyr Tydfil has become great through iron-smelting; and in the west Swansea is the chief centre in the world for copper and tin smelting. The unity and ruggedness of the highlands of Wales have proved sufficient to isolate the people from those of the rest of South Britain, and to preserve a purely Celtic race, still very largely of Celtic speech.

Cornwall and Devon.—The peninsula of Cornwall and Devon may be looked upon as formed from a synclinal trough of Devonian rocks, which appear as plateaus on the north and south, while the centre is occupied by Lower Carboniferous strata at a lower level. The northern coast, bordering the Bristol Channel, is steep, with picturesque cliffs and deep bays or short valleys running into the high land, each occupied by a little seaside town or village. The plateau culminates in the barren heathy upland of Exmoor, which slopes gently southward from a general elevation of 1600 ft., and is almost without inhabitants. The Carboniferous rocks of the centre form a soil which produces rich pasture under the heavy rainfall and remarkably mild and equable temperature, forming a great cattle-raising district. The Devonian strata on the south do not form such lofty elevations as those on the north, and are in consequence, like the plain of Hereford, very fertile and peculiarly adapted for fruit-growing and cider-making. The remarkable features of the scenery of South Devon and Cornwall are due to a narrow band of Archaean rock which appears in the south of the peninsulas terminating in Lizard Head and Start Point, and to huge masses of granite and other eruptive rocks which form a series of great bosses and dykes. The largest granite boss gives relief to the wild upland of Dartmoor, culminating in High Willhays and Yes Tor. The clay resulting from the weathering of the Dartmoor granite has formed marshes and peat bogs, and the desolation of the district has been emphasized by the establishment in its midst of a great convict prison, and in its northern portion of a range for artillery practice. The Tamar flows from north to south on the Devonian plain, which lies between Dartmoor on the east and the similar granitic boss of Bodmin Moor (where Brown Willy rises to 1345 ft.) on the west. There are several smaller granite bosses, of which the mass of Land's End is the most important. Most of the Lizard peninsula, the only part of England stretching south of 50° N., is a mass of serpentine. The great variety of the rocks which meet the sea along the south of Cornwall and Devon has led to the formation of a singularly picturesque coast—the headlands being carved from the hardest igneous rocks, the bays cut back in the softer Devonian strata. The fjord-like inlets of Falmouth, Plymouth and Dartmouth are splendid natural harbours, which would have developed great commercial ports but for their remoteness from the centres of commerce and manufactures. China clay from the decomposing granites; tin and copper ore, once abounding at the contacts between the granite and the rocks it pierced, were the former staples of wealth, and the mining largely accounts for the exceptional density of population in Cornwall. Fishing has always been important, the numerous good harbours giving security to fishing-boats; and the fact that this coast is the mildest and almost the sunniest, though by no means the driest, part of Great Britain has led to the establishment of many health


ENGLAND AND WALES
in six Sections
Section I.
English Miles
0 5 10 15 20 25 30 35 40
Railways
Canals
Boundaries:- Country
County other divisions
ISLE OF MAN
Same Scale
Longitude West 4° 30' of Greenwich
Point of Ayre
Ramsey
Peel
Douglas
Calf of Man
NORTH SEA
IRISH SEA
Solway Firth
SCOTLAND
BERWICK
ROXBURGH
SELKIRK
KIRKCUDBRIGHT
NORTHUMBERLAND
CUMBERLAND
DURHAM
WESTMORLAND
YORKSHIRE
LANCASHIRE
North Riding
Cleveland
Berwick upon Tweed
Farne Islands
Hawick
Jedburgh
Selkirk
Annan
Carlisle
Brampton
Hexham
Newcastle
Whitley
Tynemouth
South Shields
Sunderland
Seaham Harbour
Houghton le Spring
Durham
Hartlepool
West Hartlepool
Bishop Auckland
Middlesbrough
Stockton on Tees
Darlington
Saltburn by the Sea
Whitby
Scarborough
Maryport
Workington
Harrington
Whitehaven
St. Bees Head
Egremont
Ravenglass
Penrith
Kendal
Windermere
Richmond
Northallerton
Thirsk
Bedale
Filey
Blyth
Morpeth
Alnwick
Wigton
Silloth
Continuation South, Section 2
Longitude West 1° of Greenwich
A B C D E F G H
1 2 3 4
4° 3° 30' 3° 2° 30' 2° 1° 30' 1° 0° 30'
55° 30' 55° 54° 30'
Emery Walker sc.


Continuation North, Section 1
Section II.
NORTH SEA
IRISH SEA
YORKSHIRE
LANCASHIRE
CHESHIRE
DERBY
NOTTINGHAM
LINCOLN
STAFFORD
SHROPSHIRE
LEICESTER
RUTLAND
Flamborough Head
Bridlington Bay
Morecambe Bay
Liverpool Bay
The Wash
York
Hull
Leeds
Bradford
Wakefield
Sheffield
Manchester
Liverpool
Lancaster
Preston
Blackpool
Lincoln
Nottingham
Derby
Stafford
Shrewsbury
Longitude West 2° of Greenwich
Continuation West, Section 5.
Continuation South, Section 3.
NORTHAMPTON
Continuation South, Section

resorts, of which Torquay is the chief. The old Cornish language of the Celtic stock became extinct only in the 18th century, and the Cornish character remains as a heritage of the time when the land had leisure to mould the life and the habits of the man. Projecting farthest of all England into the Atlantic, it is not surprising that the West country has supplied a large proportion of the great naval commanders in British history, and of the crews of the navy.

The midland plain.

Between the separate uplands there extends a plain of Permian and Triassic rocks, which may conveniently be considered as an intermediate zone between the two main divisions. To the eye it forms an almost continuous plain with the belt of Lias clays, which is the outer border of the Eastern Division; for although a low escarpment marks the line of junction, and seems to influence the direction of the main rivers, there is only one plain so far as regards free movement over its surface and the construction of canals, roads and railways. The plain usually forms a distinct border along the landward margins of the uplands of more ancient rock, though to the east of the Cornwall-Devon peninsula it is not very clear, and its continuity in other places is broken by inliers of the more ancient rocks, which everywhere underlie it. One such outcrop of Carboniferous Limestone in the south forms the Mendip Hills; another of the Coal Measures increases the importance of Bristol, where it stands at the head of navigation on the southern Avon. In the north-west a tongue of the Red rocks forms the Eden valley, separating the Lake District from the Pennine Chain, with Carlisle as its central town. Farther south, these rocks form the low coastal belt of Lancashire, edged with the longest stretches of blown sand in England, and dotted here and there with pleasure towns, like Blackpool and Southport. The plain sweeps round south of the Lancashire coal-field, forms the valley of the Mersey from Stockport to the sea, and farther south in Cheshire the salt-bearing beds of the Keuper marls give rise to a characteristic industry. The plain extends through Staffordshire and Worcester, forming the lower valley of the Severn. The greater part of Manchester, all Liverpool and Birkenhead, and innumerable busy towns of medium size, which in other parts of England would rank as great centres of population, stand on this soil. Its flat surface and low level facilitate the construction of railways and canals, which form a closer network over it than in other parts of the country. The great junction of Crewe, where railways from south-east, south-west, east, west and north converge, is thus explained. South of the Pennines, the Red rocks extend eastward in a great sweep through the south of Derbyshire, Warwick, the west of Leicestershire, and the east of Nottingham, their margin being approximately marked by the Avon, flowing south-west, and the Soar and Trent, flowing north-east. South and east of these streams the very similar country is on the Lias clay. Several small coal-fields rise through the Red rocks—the largest, between Stafford and Birmingham, forms the famous "Black Country," with Wolverhampton and Dudley as centres, where the manufacture of iron has preserved a historic continuity, for the great Forest of Arden supplied charcoal until the new fuel from the pits took its place. This coal-field, ministering to the multifarious metal manufactures of Birmingham, constitutes the centre of the Midlands. Smaller patches of the Coal Measures appear near Tamworth and Burton, while deep shafts have been sunk in many places through the overlying Triassic strata to the coal below, thus extending the mining and manufacturing area beyond the actual outcrop of the Coal Measures. A few small outcrops occur where still more ancient strata have been raised to the surface, as, for instance, in Charnwood Forest, where the Archaean rocks, with intrusions of granite, create a patch of highland scenery in the very heart of the English plain; and in the Lickey Hills, near Birmingham, where the prominent features are due to volcanic rocks of very ancient date. The "Waterstones," or Lower Keuper Sandstones,—forming gentle elevations above the softer marls, and usually charged with an abundant supply of water, which can be reached by wells,—form the site of many towns, such as Birmingham, Warwick and Lichfield, and of very numerous villages. The plain as a whole is fertile and undulating, rich in woods and richer in pasture: the very heart of rural England. Cattle-grazing is the chief farm industry in the west, sheep and horse-rearing in the east; the prevalence of the prefix "Market" in the names of the rural towns is noticeable in this respect. The manufacture of woollen and leather goods is a natural result of the raising of live stock; Leicester, Coventry and Nottingham are manufacturing towns of the region. The historic castles, the sites of ancient battles, and the innumerable mansions of the wealthy, combine to give to central England a certain aesthetic interest which the more purely manufacturing districts of the west and north fail to inspire. The midland plain curves northward between the outcrop of the Dolomite on the west and the Oolitic heights on the east. It sinks lowest where the estuary of the Humber gathers in its main tributaries, and the greater part of the surface is covered with recent alluvial deposits. The Trent runs north in the southern half of this plain, the Ouse runs south through the northern half, which is known as the Vale of York, lying low between the Pennine heights on the west and the Yorkshire moors on the east. Where the plain reaches the sea, the soft rocks are cut back into the estuary of the Tees, and there Middlesbrough stands at the base of the Moors. The quiet beauty of the rural country in the south, where the barren Bunter pebble-beds have never invited agriculture, and where considerable vestiges of the old woodland still remain in and near Sherwood Forest, has attracted so many seats of the landed aristocracy as to earn for that part the familiar name of "the Dukeries." The central position of York in the north made it the capital of Roman Britain in ancient times, and an important railway junction in our own.

The eastern division.

Five natural regions may be distinguished in the Eastern Division of England, by no means so sharply marked off as those of the west, but nevertheless quite clearly characterized. The first is the Jurassic Belt, sweeping along the border of the Triassic plain from the south coast at the mouth of the Exe to the east coast at the mouth of the Tees. This is closely followed on the south-east by the Chalk country, occupying the whole of the rest of England except where the Tertiary Basins of London and Hampshire cover it, where the depression of the Fenland carries it out of sight, and where the lower rocks of the Weald break through it. Thus the Chalk appears to run in four diverging fingers from the centre or palm on Salisbury Plain, other formations lying wedge-like between them. Various lines of reasoning unite in proving that the Mesozoic rocks of the south rest upon a mass of Palaeozoic rocks, which lies at no very great depth beneath the surface of the anticlinal axis running from the Bristol Channel to the Strait of Dover. The theoretical conclusion has been confirmed by the discovery of Coal Measures, with workable coal seams, at Dover at a depth of 2000 ft. below the surface.

The Eastern Division is built up of parallel strata, the edges of the harder rocks forming escarpments, the sheets of clay forming plains; and on this account similar features are repeated in each of the successive geological formations. The rivers exhibit a remarkably close relation to the geological structure, and thus contrast with the rivers of the Western Division. There are two main classes of river-course—those flowing down the dip-slopes at right angles to the strike, and cutting through opposed escarpments by deep valleys, and those following the line of strike along a bed of easily eroded rock. A third class of streams, tributary to the second, flows down the steep face of the escarpments. By the study of the adjustment of these rivers to their valleys, and of the relation of the valleys to the general structure, Professor W. M. Davis has elaborated a theory of river classification, and a scheme of the origin of surface features which is attractive in its simplicity. The Thames is the one great river of the division, rising on the Jurassic Belt, crossing the Chalk country, and finishing its course in the Tertiary London Basin, towards which, in its prevailing west-to-east direction, it draws its tributaries from north and south. The other rivers are shorter, and flow either to the North Sea on the east, or to the English Channel on the south. With the exception of the Humber, they all rise and pursue their whole course within the limits of the Eastern Division itself.

The Eastern Division is the richest part of England agriculturally, it is the part most accessible to trade with the Continent, and that least adapted for providing refuges for small bodies of men in conflict with powerful invaders. Hence the latest of the conquerors, the Saxon and other Germanic tribes, obtained an easy mastery, and spread over the whole country, holding their own against marauding Northmen, except on the northern part of the east coast; and even after the political conquest by the Normans, continuing to form the great mass of the population, though influenced not a little by the fresh blood and new ideas they had assimilated. The present population is so distributed as to show remarkable dependence on the physical features. The chalk and limestone plateaus are usually almost without inhabitants, and the villages of these districts occur grouped together in long strings, either in drift-floored valleys in the calcareous plateaus, or along the exposure of some favoured stratum at their base. In almost every case the plain along the foot of an escarpment bears a line of villages and small towns, and on a good map of density of population the lines of the geological map may be readily discerned.

The Jurassic Belt.—The Jurassic belt is occupied by the counties of Gloucester, Oxford, Buckingham, Bedford, Northampton, Huntingdon, Rutland, Lincoln and the North Riding of Yorkshire. The rocks of the belt may be divided into two main groups: the Lias beds, which come next to the Triassic plain, and the Oolitic beds. Each group is made up of an alternation of soft marls or clays and hard limestones or sandstones. The low escarpments of the harder beds of the Lias are the real, though often scarcely perceptible, boundary between the Triassic plain and the Jurassic belt. They run along the right bank of the Trent in its northward course to the Humber, and similarly direct the course of the Avon southward to the Severn. The great feature of the region is the long line of the Oolitic escarpment, formed in different places by the edges of different beds of rock. The escarpment runs north from Portland Island on the English Channel, curves north-eastward as the Cotteswold Hills, rising abruptly from the Severn plain to heights of over 1000 ft.; it sinks to insignificance in the Midland counties, is again clearly marked in Lincolnshire, and rises in the North Yorkshire moors to its maximum height of over 1500 ft. Steep towards the west, where it overlooks the low Lias plain as the Oolitic escarpment, the land falls very gently in slopes of Oxford Clay towards the Cretaceous escarpments on the south and east. Throughout its whole extent it yields valuable building-stone, and in the Yorkshire moors the great abundance of iron ore has created the prosperity of Middlesbrough, on the plain below. The Lias plain is rich grazing country, the Oxford Clay forms valuable agricultural land, yielding heavy crops of wheat. The towns of the belt are comparatively small, not one attains a population of 75,000, and the favourite site is on the Lias plain below the great escarpment. They are for the most part typical rural market-towns, the manufactures, where such exist, being usually of agricultural machinery, or woollen and leather goods. Bath, Gloucester, Oxford, Northampton, Bedford, Rugby, Lincoln and Scarborough are amongst the chief. North of the gap in the low escarpment in which the town of Lincoln centres, a close fringe of villages borders the escarpment on the west; and throughout the belt the alternations of clay and hard rock are reflected in the grouping of population.

The Chalk Country.—The dominating surface-feature formed by the Cretaceous rocks is the Chalk escarpment, the northern edge of the great sheet of chalk that once spread continuously over the whole south-east. It appears as a series of rounded hills of no great elevation, running in a curve from the mouth of the Axe to Flamborough Head, roughly parallel with the Oolitic escarpment. Successive portions of this line of heights are known as the Western Downs, the White Horse Hills, the Chiltern Hills, the East Anglian Ridge, the Lincolnshire Wolds and the Yorkshire Wolds. The rivers from the gentle southern slopes of the Oolitic heights pass by deep valleys through the Chalk escarpments, and flow on to the Tertiary plains within. The typical scenery of the Chalk country is unrelieved by small streams of running water; the hills rise into rounded downs, often capped with fine clumps of beech, and usually covered with thin turf, affording pasture for sheep. The chalk, when exposed on the surface, is an excellent foundation for roads, and the lines of many of the Roman "streets" were probably determined by this fact. The Chalk country extends over part of Dorset, most of Wiltshire, a considerable portion of Hampshire and Oxfordshire, most of Hertfordshire and Cambridgeshire, the west of Norfolk and Suffolk, the east of Lincolnshire, and the East Riding of Yorkshire. From the upland of Salisbury Plain, which corresponds to the axis of the anticline marking the centre of the double fold into which the strata of the south of England have been thrown, the great Chalk escarpment runs north-eastward; fingers of Chalk run eastward one each side of the Weald, forming the North and South Downs, while the southern edge of the Chalk sheet appears from beneath the Tertiary strata at several places on the south coast, and especially in the Isle of Wight. Flamborough Head, the South Foreland, Beachy Head and the Needles are examples of the fine scenery into which chalk weathers where it fronts the sea, and these white cliffs gave to the island its early name of Albion. The Chalk is everywhere very thinly peopled, except where it is thickly covered with boulder clay, and so becomes fertile, or where it is scored by drift-filled valleys, in which the small towns and villages are dotted along the high roads. The thickest covering of drift is found in the Holderness district of Yorkshire, where, from the chalk cliffs of Flamborough Head to the sandspit of Spurn Point, the whole coast is formed of boulder-clay resting on chalk. Of the few towns in the Chalk country, the interest of which is largely historical or scholastic, Salisbury, Winchester, Marlborough and Cambridge are the most distinguished. Reading flourishes from its position on the edge of the London Tertiary Basin, Croydon is a suburb of London, and Hull, though on the Chalk, derives its importance from the Humber estuary, which cuts through the Chalk and the Jurassic belts, to drain the Triassic plain and the Pennine region. The narrow strip of Greensands appearing from beneath the Chalk escarpment on its northern side is crowded with small towns and villages on account of the plentiful water-supply. The distinction between the low grounds of the Jurassic belt and the Chalk country is not always very apparent on the surface, and from the historic point of view it is important to recognize the individuality of the Eastern plain which extends from the Vale of York across the Humber and the Wash into Essex. The Eastern plain thus includes a portion of the Triassic plain in the north, a portion of the Jurassic and Chalk belts in the middle, and a portion of the Tertiary plain of the London Basin in the south.

The Fenland.—The continuity of the belts of Chalk and of the Middle and Upper Oolites in the Eastern Plain is broken by the shallow depression of the Wash and the Fenland. The Fenland comprises a strip of Norfolk, a considerable part of Cambridgeshire, and the Holland district of Lincoln. Formerly a great inlet with vague borders of lagoons and marshes, the Fenland has been reclaimed partly by natural processes, partly by engineering works patiently continued for centuries. The whole district is flat and low, for the most part within 15 ft. of sea-level; the seaward edge in many places is below the level of high tide, and is protected by dykes as in Holland, while straight canals and ditches carry the sluggish drainage from the land. The soil is composed for the most part of silt and peat. A few small elevations of gravel, or of underlying formations, rise above the level of 25 ft.; these were in former times islands, and now they form the sites of the infrequent villages. Boston and King's Lynn are memorials of the maritime importance of the Wash in the days of small ships. The numerous ancient churches and the cathedrals of Ely and Peterborough bear witness to the share taken by religious communities in the reclamation and cultivation of the land.

The Weald.—The dissection of the great east and west anticline in the south-east of England has resulted in a remarkable piece of country, occupying the east of Hampshire and practically the whole of Sussex, Surrey and Kent, in which each geological stratum produces its own type of scenery, and exercises its own specific influence on every natural distribution. The sheet of Chalk shows its cut edges in the escarpments facing the centre of the Weald, and surrounding it in an oval ring, the eastern end of which is broken by the Strait of Dover, so that its completion must be sought in France. From the crest of the escarpment, all round on south, west and north, the dip-slope of the Chalk forms a gentle descent outwards, the escarpment a very steep slope inwards. The cut edges of the escarpment forming the Hog's Back and North Downs on the north, and the South Downs on the south, meet the sea in the fine promontories of the South Foreland and Beachy Head. The Downs are almost without population, waterless and grass-covered, with patches of beech wood. Their only important towns are on the coast, *e.g.* Brighton, Eastbourne, Dover, Chatham, or in the gaps where rivers from the centre pierce the Chalk ring, as at Guildford, Rochester, Canterbury, Lewes and Arundel. Within the Chalk ring, and at the base of the steep escarpment, there is a low terrace of the Upper Greensand, seldom so much as a mile in width, but in most places crowded with villages scarcely more than a mile apart, and ranged like beads on a necklace. Within the Upper Greensand an equally narrow ring of Gault is exposed, its stiff clay forming level plains of grazing pasture, without villages, and with few farmhouses even; and from beneath it the successive beds of the Lower Greensand rise towards the centre, forming a wider belt, and reaching a considerable height before breaking off in a fine escarpment, the crest of which is in several points higher than the outer ring of Chalk. Leith Hill and Hindhead are parts of this edge in the west, where the exposure is widest. Several towns have originated in the gaps of the Lower Greensand escarpment which are continuous with those through the Chalk: such are Dorking, Reigate, Maidstone and Ashford. Folkestone and Pevensey stand where the two ends of the broken ring meet the sea. It is largely a region of oak and pine trees, in contrast to the beech of the Chalk Downs. The Lower Greensand escarpment looks inwards in its turn over the wide plain of Weald Clay, along which the Medway flows in the north, and which forms a fertile soil, well cultivated, and particularly rich in hops and wheat. The primitive forests have been largely cleared, the primitive marshes have all been drained, and now the Weald Clay district is fairly well peopled and sprinkled with villages. From the middle of this plain the core of Lower Cretaceous sandstones known as the Hastings Beds emerges steeply, and reaches in the centre an elevation of 796 ft. at Crowborough Beacon. It is on the whole a region with few streams, and a considerable portion of the ancient woodland still remains in Ashdown Forest. The greater part of the Forest Ridges is almost without inhabitants. Towns are found only round the edge bordering the Weald Clay, such as Tonbridge, Tunbridge Wells and Horsham; and along the line where it is cut off by the sea, *e.g.* Hastings and St Leonards. The broad low tongue of Romney Marsh running out to Dungeness is a product of shore-building by the Channel tides, attached to the Wealden area, but not essentially part of it.

The London Basin.—The London Basin occupies a triangular depression in the Chalk which is filled up with clays and gravels of Tertiary and later age. It extends from the eastern extremity of Wiltshire in a widening triangle to the sea, which it meets along an irregular line from Deal to Cromer. It thus occupies parts of Wiltshire, Hampshire, Surrey, Kent, Berkshire, Hertfordshire, the whole of Middlesex, the county of London and Essex, and the eastern edge of Suffolk and Norfolk. The scenery is quiet in its character, but the gravel hills are often prominent features, as at Harrow and in the northern suburbs of London; the country is now mainly under grass or occupied with market and nursery gardens, and many parts, of which Epping Forest is a fine example, are still densely wooded, the oak being the prevailing tree. The coast is everywhere low and deeply indented by ragged and shallow estuaries, that of the Thames being the largest. Shallow lagoons formed along the lower courses of the rivers of Norfolk have given to that part of the country the name of the Broads, a district of low and nearly level land. Apart from the huge area of urban and suburban London, the London Basin has few large towns. Norwich and Ipswich, Yarmouth, Lowestoft, Harwich and Colchester may be mentioned in the north-eastern part, all depending for their prosperity on agriculture or on the sea; and a fringe of summer resorts on the low coast has arisen on account of the bracing climate. Reading and Windsor lie in the western portion, beyond the suburban sphere of London. The Bagshot Beds in the west form infertile tracts of sandy soil, covered with heath and pine, where space is available for the great camps and military training-grounds round Aldershot, and for the extensive cemeteries at Woking. The London Clay in the east is more fertile and crowded with villages, while the East Anglian portion of the basin consists of the more recent Pliocene sands and gravels, which mix with the boulder clay to form the best wheat-growing soil in the country.

The Hampshire Basin.—The Hampshire Basin forms a triangle with Dorchester, Salisbury and Worthing near the angles, and the rim of Chalk to the south appears in broken fragments in the Isle of Purbeck, the Isle of Wight, and to the east of Bognor. On the infertile Bagshot Beds the large area of the New Forest remains untilled under its ancient oaks. The London Clay of the east is more fertile, but the greatness of this district lies in its coast-line, which is deeply indented, like that of the London Basin. Southampton and Portsmouth have gained importance through their fine natural harbours, improved by engineering works and fortifications; Bournemouth and Bognor, from their favourable position in the sunniest belt of the country, as health resorts.

Communications.—The configuration of England, while sufficiently pronounced to allow of the division of the country into natural regions, is not strongly enough marked to exercise any very great influence upon lines of communication. The navigable rivers are all connected by barge-canals, even across the Pennine Chain. Although the waterways are much neglected, compared with those of France or of Germany, they might still be very useful if they were enlarged and improved and if free competition with railways could be secured. The main roads laid out as arteries of intercommunication by the Romans, suffered to fall into neglect, and revived in the coaching days of the beginning of the 19th century, fell into a second period of comparative neglect when the railway system was completed; but they have recovered a very large share of their old importance in consequence of the development of motor-traffic. Following the Roman roads, the high roads of the Eastern Division very frequently run along the crests of ridges or escarpments; but in the Western Division they are, as a rule, forced by the more commanding relief of the country to keep to the river valleys and cross the rougher districts through the dales and passes. The railways themselves, radiating from the great centres of population, and especially from London, are only in a few instances much affected by configuration. The Pennine Chain has always separated the traffic from south to north into an east coast route through the Vale of York, and a west coast route by the Lancashire plain. The Midland railway, running through the high and rugged country between the two, was the last to be constructed. The most notable bridges over navigable water affording continuous routes are those across Menai Strait, the Tyne at Newcastle, the Severn at Severn Bridge and the Manchester Ship Canal. It is more usual to tunnel under such channels, and the numerous Thames tunnels, the Mersey tunnel between Liverpool and Birkenhead, and the Severn tunnel, the longest in the British Islands (4¼ m.), on the routes from London to South Wales, and from Bristol to the north of England, are all important. The Humber estuary is neither bridged nor tunnelled below Goole.

Density of Population.—The present distribution of population over England and Wales shows a dense concentration at all large seaports, in the neighbourhood of London, and on the coal-fields where manufactures are carried on. Agricultural areas are very thinly peopled; purely pastoral districts can hardly be said to have any settled population at all. There are very few dwellings situated at a higher level than 1000 ft., and on the lower ground the Chalk and the Oolitic limestones, where they crop out on the surface, are extremely thinly peopled, and so as a rule are areas of alluvial deposits and the Tertiary sands. But, on the other hand, the broad clay plains of all formations, the Cretaceous sandstones, and the Triassic plain, are peopled more densely than any other district without mineral wealth or sea trade.

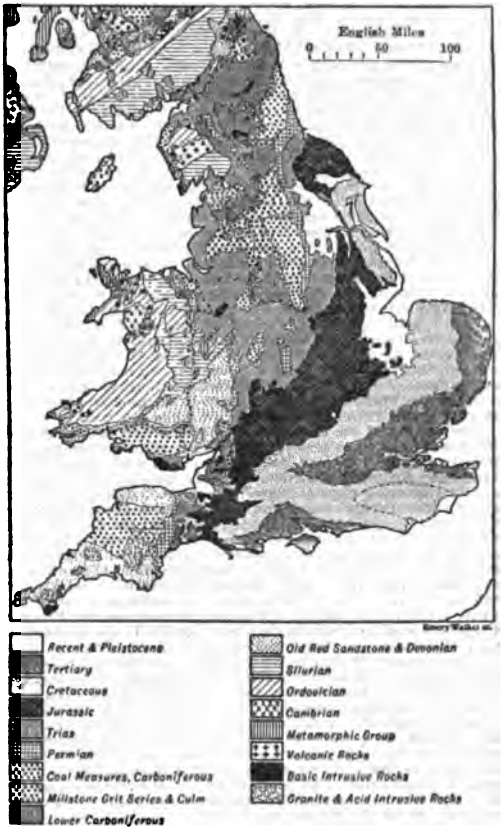
Political Divisions.—In the partition of England and Wales into counties, physical features play but a small part. The forty ancient counties, remnants of various historical groupings and partings, are occasionally bounded by rivers. Thus the Thames divides counties along nearly its whole length, forming the southern boundary of four and the northern boundary of three. Essex and Suffolk, Suffolk and Norfolk, Cornwall and Devon, Durham and Yorkshire, Lancashire and Cheshire, are all separated by rivers, while rivers form some part of the boundaries of almost every county. Still, it is noteworthy that the Severn and Trent nowhere form continuous county boundaries. Watersheds are rarely used as boundaries for any distance; but, although slightly overlapping the watershed on all sides, Yorkshire is very nearly coincident with the basin of the Ouse. The boundaries of the parishes, the fundamental units of English political geography, are very often either rivers or watersheds, and they frequently show a close relation to the strike of the geological strata. The hundreds, or groups of parishes, necessarily share their boundaries, and groups of hundreds are often aggregated to form larger subdivisions of counties. A wider grouping according to natural characteristics may now be recognized only in the cases of Wales, East Anglia, Wessex and such less definite groups as the Home Counties around London or the Midlands around Birmingham. Configuration is only one out of many conditions modifying distributions, and its effects on England as a whole appear to be suggestive rather than determinative.

(H. R. M.)

III. GEOLOGY

For an area so small, England is peculiarly rich in geological interest. This is due in some degree to the energy of the early British geologists, whose work profoundly influenced all subsequent thought in the science, as may be seen by the general acceptation of so many of the English stratigraphical terms; but the natural conditions were such as to call forth and to stimulate this energy in an unusual way. Almost every one of the principal geological formations may be studied in England with comparative ease.

If we lay aside for the moment all the minor irregularities, we find, upon examination of a geological map of England, two structural features of outstanding importance. (1) The first is the great anticline of the Pennine Hills which dominates the northern half of England from the Scottish border to Derby. Its central core of



Lower Carboniferous rock is broadly displayed towards the north, while southward it contracts; on either side lie the younger rocks, the coal-fields, the Permian strata and the Triassic formations; the last-named, while sweeping round the southern extremity of the Carboniferous axis of the uplift from its eastern and western flanks, spread out in a large sheet over the midland counties. (2) The second striking feature is the regular succession of Jurassic and Cretaceous rocks which crop out in almost unbroken lines from the coast of Dorsetshire, whither they appear to converge, to the Cleveland Hills and the Yorkshire coast. Lying upon the Cretaceous rocks in the S.E. of England are the two Tertiary basins of London and Hampshire, separated by the dissected anticline of the Weald.

The older rocks in England occupy relatively small areas. Pre-Cambrian rocks are represented by the gneisses of Primrose Hill and schists of Rushton in Shropshire; by the gneisses forming the core of the Malvern Hills, and by the ancient volcanic and other rocks of the Wrekin, Charnwood Forest and Nuneaton. The slates of the Long Mynd, on the Shropshire border, belong to this system. Cambrian strata appear in Shropshire in the form of sandstones and quartzites; in the Malvern Hills they are black shales, while in the

Lake District they are represented by the Skiddaw slates. Next in point of age comes the Ordovician system, which is well developed upon the Shropshire border and in the Lake District. In the same two areas we find the Silurian rocks, shales and limestones with grits and flags. In N. and S. Devon are the Devonian limestones, grits and shales; the corresponding Old Red Sandstone type of the system (marls and sandstones) being exposed over a large part of Herefordshire, stretching also into Shropshire and Monmouth. Next in order of succession comes the Carboniferous system, with shales and limestones in the lower members, grits, sandstones and shales—the Millstone Grit series—in the middle of the system, followed by the Coal Measures—a great series of shales with coal, sandstones and ironstone at the top. This important system occupies a large area in England. The limestones and shales are well exposed in Derbyshire, Yorkshire, Northumberland, the Mendip Hills and at Clifton. The Millstone Grit series is prominent in Lancashire, Derbyshire, N. Staffordshire, Yorkshire and in the Forest of Dean. The Coal Measures rest upon the Millstone Grits in most places, generally in synclinal basins. On the eastern side of the Pennine range are the conterminous coal-fields of Yorkshire, Derbyshire and Nottinghamshire, and the coal-field of Durham and Northumberland; on the western side are the Whitehaven, Burnley, S. Lancashire and N. Staffordshire coal-fields. Farther south are the S. Staffordshire, Warwickshire, Coalbrook Dale, Forest of Wyre, Forest of Dean and Bristol and Somerset coal-fields; while much concealed coal lies under younger formations in the south-east of England, as has been proved at Dover. A large part of N. Devon is occupied by the Culm shales, limestones and grits of Carboniferous age. The principal development of Permian rocks is the narrow strip which extends from Nottingham to Tynemouth; here the Magnesian limestone is the characteristic feature. On the other side of the Pennine Hills we find the Penrith sandstone of the Vale of Eden and the Brockram beds of the Lake District. Red sandstones and conglomerates of this age constitute some of the red rocks which form the picturesque scenery about Dawlish and Teignmouth.

The Triassic rocks, red sandstones, marls and conglomerates cover a broad area in the Midlands in Worcestershire, Warwickshire and Leicestershire, whence they may be followed south-westward through Somerset to the coast at Sidmouth, and northward, round either flank of the Pennine Hills, through Nottinghamshire and Yorkshire to Middlesbrough on the one hand, and upon the other through Staffordshire, Cheshire and Lancashire to Carlisle.

The outcrop of the Lias, mainly clay with thin limestones and ironstones, runs in an almost continuous band across the country from Lyme Regis, through Bath, Cheltenham, near Leicester, and Lincoln to Redcar in Yorkshire. Closely following the same line are the alternating clays and limestones of the Oolitic series. Next in order come the Greensands and Gault, which lie at the base of the Chalk escarpment, between that formation and the Oolites. The Chalk occupies all the remaining portion of the south-east of England, save the Wealden area, and extends northward as far as Flamborough in Yorkshire, forming the Yorkshire Wolds, the Lincolnshire Wolds, the Chiltern Hills, the N. and S. Downs, the Dorsetshire heights and Salisbury Plain. But in the eastern and southern counties the Chalk is covered by younger deposits of Tertiary age; the Pliocene Crags of Norfolk and Suffolk, the Lower London Tertiaries (London Clay, Woolwich and Reading Beds, &c.) of the London Basin comprising parts of Essex, Hertfordshire, Middlesex, Bucks and Berks, and northern Kent. Again, in the Hampshire Basin and Isle of Wight, Eocene and Oligocene formations rest upon the Chalk.

When we attempt to decipher the physical history of the country from the complicated record afforded by the stratigraphical palimpsest, we are checked at the outset by the dearth of information from being able to picture the geographical condition in the older Palaeozoic periods. All we can say is, that in those remote times what is now England had no existence; its site was occupied by seas which were tenanted by marine invertebrates, long since extinct. As for the boundaries of these ancient seas, we can say nothing with certainty, but it is of interest to note the evidence we possess of still older land conditions, such as we have in the old rocks of Shropshire, &c. In the Devonian period it is clear that an elevatory movement had set in towards the north, which gave rise to the formation of inland lakes and narrow estuaries in which the Old Red Sandstone rocks were formed, while in the south of England lay the sea with a vigorous coral fauna. This condition led up to the Carboniferous period, which began with fairly open sea over the south and north of England, but in the centre there rose an elevated land mass from which much of the Millstone Grit was derived; other land lay towards the north. Slowly this sea shallowed, giving rise to the alternating estuarine marine and freshwater deposits of the Coal Measures. Continual elevation of the land brought about the close of the coal-forming period and great changes ensued. Desert conditions, with confined inland seas, marked the Permian and Triassic periods. It was about this time that the Pennine Hills, the Lake District mountain mass, and the Mendip Hills were being most vigorously uplifted, while the granite masses of Cornwall and Devon were perhaps being injected into the Carboniferous and Devonian rocks. From this period, more or less of the Pennine ridge has always remained above the sea, along with much of Cornwall and parts of Devonshire.

In early Jurassic times the sea probably again occupied most of England with the exception of the above-mentioned areas, the Lake District and eastern part of the London Basin; Wales, too, and much of Scotland were land. Elevation gradually caused more land to appear in later Jurassic and early Cretaceous times when a river system, now entirely obliterated, drained into the Purbeck estuary and Wealden lake; but a subsequent depression led to the wide extension of the Chalk sea. By the beginning of the Eocene period we find the sea limited to the S.E. of England, where the London Clay, &c., were being laid down. It was not until quite late in Tertiary time that these islands began to assume anything like their present form. In the earlier part of the Pleistocene period, England and Ireland were still incompletely severed, and the combined activity of certain extinct rivers and the sea had not yet cut through the land connexion with the continent. The last well-marked lowering of the land took place in the Pleistocene period, when it was accompanied by glacial conditions, through which the greater part of northern England and the Midlands was covered by ice; a state of things which led directly and indirectly to the deposition of those extensive boulder clays, sands and gravels which obscure so much of the older surface of the country in all but the southern counties.

Throughout the whole period of its geological history, volcanic activity has found expression with varying degrees of intensity along what is now the western side of the island, with the exception that in the Mesozoic era this activity was in abeyance. We may note the pre-Cambrian lavas and tuffs of the Wrekin district in Shropshire and the somewhat later volcanic rocks of Charnwood; the porphyrites, andesites, tuffs and rhyolites of the Borrowdale volcanic centre, erupted in the Ordovician period, and the Silurian granites of the same region. The volcanic outbursts which followed became feebler in the Devonian and Carboniferous periods and ceased with the Permian. When again the volcanic forces became active, it was in the early Tertiary era; the evidences for this lie outside the English border.

The principal directions of crust movement in England are: (1) north and south, by which the Pennine folds and faults, and the Malvern Hills have been produced; (2) east and west, by which the folds of the Weald and the Mendip Hills, and those of Devonshire have been formed. Another less important direction is N.W. and S.E., as in the Charnwood folding.

Further details of the geology are given under the heads of the counties. (J. A. H.)

IV. CLIMATE

Climate.

Temperature.—The mean annual temperature of the whole of England and Wales (reduced to sea-level) is about 50° F., varying from something over 52° in the Scilly Isles to something under 48° at the mouth of the Tweed The mean annual temperature diminishes very regularly from south-west to north-east, the west coast being warmer than the east, so that the mean temperature at the mouth of the Mersey is as high as that at the mouth of the Thames. During the coldest month of the year (January) the mean temperature of all England is about 40°. The influence of the western ocean is very strongly marked, the temperature falling steadily from west to east. Thus while the temperature in the west of Cornwall is 44°, the temperature on the east coast from north of the Humber to the Thames is under 38°, the coldest winters being experienced in the Fenland. In the hottest month (July) the mean temperature of England and Wales is about 61·5°, and the westerly wind then exercises a cooling effect, the greatest heat being found in the Thames basin immediately around London, where the mean temperature of the month exceeds 64°: the mean temperature along the south coast is 62°, and that at the mouth of the Tweed a little under 59°. In the centre of the country along a line drawn from London to Carlisle the mean temperature in July is found to diminish gradually at an average rate of 1° per 60 m. The coasts are cooler than the centre of the country, but the west coast is much cooler than the east, modified continental conditions prevailing over the North Sea. The natural effect of the heating of the air in summer and the cooling of the air in winter by contact with the land is largely masked in England on account of the strength of the prevailing south-westerly wind carrying oceanic influence into the heart of the country. This effect is well seen in the way in which the wind blowing directly up the Severn estuary is directed along the edges of the Oolitic escarpment north-eastward, thus displacing the centre of cold in winter to the east coast, and the centre of heat in summer to the lower Thames, from the position which both centres would occupy, if calms prevailed, in a belt running from Birmingham to Buckingham. As to how far the narrow portion of the North Sea modifies the influence of the European continent, there seems reason to believe that the prevailing winds blowing up the English Channel carry oceanic conditions some distance inland, along those parts of the continent nearest to England. The Mersey estuary, being partly sheltered by Ireland and North Wales, does not serve as an inlet for modifying influences to the same extent as the Bristol Channel; and as the wind entering by it blows squarely against the slope of the Pennine Chain, it does not much affect the climate of the midland plain.

Winds.—The average barometric pressure over England is about

29·94 in., and normally diminishes from south-west to north-east at all seasons, the mean pressure on the south coast being 29·97 and that on the northern border 29·88. The pressure at any given latitude is normally highest in the centre of the country and on the east coast, and lowest on the west coast. The direction of the mean annual isobars shows that the normal wind in all parts of England and Wales must be from the south-west on the west coast, curving gradually until in the centre of the country, and on the east coast it is westerly, without a southerly component. The normal seasonal march of pressure-change produces a maximum gradient in December and January, and a minimum gradient in April; but for every month in the year the mean gradient is for winds from southerly and westerly quarters. In April the gradient is so slight that any temporary fall of pressure to the south of England or any temporary rise of pressure to the north, which would suffice in other months merely to reduce the velocity of the south-westerly wind, is sufficient in that month to reverse the gradient and produce an east wind over the whole country. The liability to east wind in spring is one of the most marked features of the English climate, the effect being naturally most felt on the east coast. The southerly component in the wind is as a rule most marked in the winter months, the westerly component predominating in summer. The west end of a town receives the wind as it blows in fresh from the country at all seasons, and consequently the west end of an English town is with few exceptions the residential quarter, while smoke-producing industries are usually relegated to the east end.

Storms.—On account of the great frequency of cyclonic disturbances passing in from the Atlantic, the average conditions of wind over the British Islands give no idea of the frequency of change in direction and force. The chief paths of depressions are from south-west to north-east across England; one track runs across the south-east and eastern counties, and is that followed by a large proportion of the summer and autumn storms, thereby perhaps helping to explain the peculiar liability of the east of England to damage from hail accompanying thunderstorms. A second track crosses central England, entering by the Severn estuary and leaving by the Humber or the Wash; while a third crosses the north of England from the neighbourhood of Morecambe Bay to the Tyne. While these are tracks frequently followed by the centres of barometric depressions, individual cyclones may and do cross the country in all directions, though very rarely indeed from east to west or from north to south.

Rainfall.—The rainfall of England, being largely due to passing cyclones, can hardly be expected to show a very close relation to the physical features of the country, yet looked at in a general way the relation between prevailing winds and orographic structure is not obscure. The western or mountainous division is the wettest at all seasons, each orographic group forming a centre of heavy precipitation. There are few places in the Western Division where the rainfall is less than 35 in., while in Wales, the Cornwall-Devon peninsula, the Lake District and the southern part of the Pennine Region the precipitation exceeds 40 in., and in Wales and the Lake District considerable areas have a rainfall of over 60 in. In the Eastern Division, on the other hand, an annual rainfall exceeding 30 in. is rare, and in the low ground about the mouth of the Thames estuary and around the Wash the mean annual rainfall is less than 25 in. In the Western Division and along the south coast the driest month is usually April or May, while in the Eastern Division it is February or March. The wettest month for most parts of England is October, the most noticeable exception being in East Anglia, where, on account of the frequency of summer thunderstorms, July is the month in which most rain falls, although October is not far behind. In the Western Division there is a tendency for the annual maximum of rainfall to occur later than October. It may be stated generally that the Western Division is mild and wet in winter, and cool and less wet in summer; while the Eastern Division is cold and dry in winter and spring, and hot and less dry in summer and autumn. The south coast occupies an intermediate position between the two as regards climate. Attention has been called to the fact that the bare rocks and steep gradients which are common in the Western Division allow of the heavy rainfall running off the surface rapidly, while the flat and often clayey lands of the Eastern Division retain the scantier rainfall in the soil for a longer time, so that for agricultural purposes the effect of the rainfall is not very dissimilar throughout the country.

Sunshine.—The distribution of sunshine is not yet fully investigated, but it appears that the sunniest part is the extreme south coast, where alone the total number of hours of bright sunshine reaches an average of more than 1600 per annum. The north-east, including the Pennine Region and the whole of Yorkshire, has less than 1300 hours of sunshine, and a portion of North Wales is equally cloudy. Although little more than a guess, 1375 hours may be put down as approximately the average duration of bright sunshine for England as a whole, which may be compared with 2600 hours for Italy, and probably about 1200 hours for Norway.

For the purpose of forecasting the weather, the meteorological office divides England into six districts, which are known as England N.E., Midland Counties, England East, London and Channel, England N.W. and North Wales, and England S.W. and South Wales. (H. R. M.)

V. English Place-Names

English place-names are of diverse origin and often extremely corrupt in their modern form, so that the real etymology of the names can often be discovered only by a careful comparison of the modern form with such ancient forms as are to be found in charters, ancient histories, and other early documents. By the aid of these a certain amount of work has been done in the subject, but it is still largely an unworked field. The most satisfactory method of characterizing English place-nomenclature is to deal with it historically and chronologically, showing the influence of the successive nations who have borne sway in this island. The Celtic influence is to be found scattered evenly up and down the country so far as names of rivers and mountains are concerned; in names of towns it is chiefly confined to the west. Roman influence is slight but evenly distributed. English influence is all-pervading, though in the northern and north-midland counties this influence has been encroached upon by Scandinavian influence. Norman influence is not confined to any particular district.

Celtic.—Though scattered notices of towns, cities and rivers in Britain are to be found in various early Roman writers, it is not till the time of Ptolemy (2nd century), who constructed a map of the island, and of the itinerary of Antonine (beginning of the 3rd century) that we have much information as to the cities and towns of Britain. We there learn that the following place-names are ultimately of Celtic origin—Brougham, Catterick, York, Lincoln (*Lindum*), Manchester (*Mancunium*), Doncaster (*Danum*), Wroxeter (*Viroconium*), Lichfield (*Letocetum*), Gloucester (*Glevum*), Cirencester (*Corinium*), Colchester (*Camulodunum*), London, Reculver, Richborough (*Rutupiae*), Dover, Lymne, Isle of Wight, Dorchester (*Durnovaria*), Sarum, Exeter (*Isca*), Brancaster (*Branodunum*), Thanet. We also have the names of the following rivers:—Eden, Dee, Trent, Yare, Colne, Thames, Kennet, Churne, Exe, Severn, Tamar. Gildas, writing in the 6th century, speaks of the twenty-eight cities of the Britons. Nennius' *Historia Britonum* gives what purports to be a list of these cities. Of these, excluding Welsh ones, we may with some certainty identify Canterbury (*Caint*), Caerleon-on-Usk, Leicester (*Lerion*), Penzelwood, Carlisle, Colchester, Grantchester (*Granth*), London, Worcester (*Guveirangon*), Doncaster (*Daun*), Wroxeter (*Guoricon*), Chester (*Legion*—this is Roman), Lichfield (*Licilcsith*) and Gloucester (*Gloui*). Others less certain are Preston-on-Humber and Manchester (*Manchguid*).

In modern place-names the suffix *don* often goes back to the Celtic *dun*, a hill, *e.g.* Bredon, Everdon, but the suffix was still a living one in Saxon times. Of river-names the vast majority are Celtic (possible exceptions will be named later), and the same is true of mountains and hills. The forests of Wyre, Elmet and Sel (wood), and the districts of the Wrekin and the Peak are probably Celtic.

Roman.—We do not owe entire place-names to Roman influence, with the exception of a few such as Chester, Chester-le-Street (L. *strata* [*via*], a road) and Caistor, but Roman influence is to be found in many names compounded of Celtic and Roman elements. The chief of these is the element *chester*—(L. *castrum*, a fort), *e.g.* Ebchester, Silchester, Grantchester. Porchester is entirely Latin, but may not have been formed till Saxon times. The form *caster* is found in the north and east, under Scandinavian influence, *e.g.* Tadcaster, Lancaster; and in the south-west and in the midlands we have a group of towns with the form *cester*:—Bicester, Gloucester, Cirencester, Worcester, Alcester, Leicester, Towcester. Exeter, Wroxeter and perhaps Uttoxeter show the suffix in slightly different form. In names like Chesterton, Chesterford, Chesterholm, Woodchester, the second element shows that the names are of later English or Scandinavian formation. In Lincoln we have a compound of the Celtic *Lindum* and the Latin *colonia*.

Saxon.—The chief suffixes of Saxon origin to be found in English place-names are as follows (some of them being also used independently): *-burgh*, *-borough*, *-bury* (O.E. *burh*, fortified town), *e.g.* Burgh, Bamborough, Aylesbury, Bury; *-bourne*, *-borne*, *-burn* (O.E. *burne*, *-a*, a stream), *e.g.* Ashbourne, Sherborne, Sockburn; *-bridge*, *e.g* Weybridge, Bridge; *-church*, *e.g.* Pucklechurch; *-den*, *-dean* (O.E. *denu*, a valley), *e.g.* Gaddesden, Rottingdean; *-down*, *-don*, *-ton* (O.E. *dūn* [Celtic], a hill), *e.g.* Huntingdon, Seckington, Edington; *-ey*, *-ea*, *-y* (O.E *īg*, an island), *e.g.* Thorney, Mersea, Ely; *-fleet* (O.E. *fleot*, an estuary) *e.g.* Benfleet; *-field*, *e.g* Lichfield; *-ford*, *e.g.* Bradford; *-ham* (O.E. *hām*, a home, and *hamm*, an enclosure); these are not distinguished in modern English, *e.g* Bosham, Ham; *-hall* (O.E. *healh*, a corner), *e.g.* Riccall, Tettenhall, *-head*, *e.g.* Gateshead; *-hill*, *e.g.* Tickhill; *-hurst* (O.E. *hyrst*, copse, wood), *e.g.* Deerhurst; *-ing* (patronymic suffix, plural form in O.E.), *e.g.* Basing, Reading; *-leigh*, *-ley*, *-lea* (O.E *lēah*, meadow), *e.g.* Leigh, Stoneleigh, Whalley; *-lade* (O.E. *lōd*, path, course), *e.g.* Cricklade; *-land*, *e.g* Crowland; *-lock* (O.E. *loca*, enclosure), *e.g.* Porlock; *-minster* (O.E. *mynster*, L. *monasterium*), *e.g.* Axminster, Minster; *-mouth*, *e.g.* Exmouth; *-port* (O.E. *port*, market-town, a word of Latin

in the former and 604·5 in the latter year. The marriage-rate per thousand has ranged since 1841 from 14·2 in 1886 to 17·6 in 1873, and is evidently closely associated with the general prosperity of the country, for in the latter year the value of the total imports and exports per head of the population of the United Kingdom was at its highest, and in the former year at its lowest. The five years 1895–1899 exhibited a remarkable sequence illustrative of this:—

Years.	Marriage-Rate.	Value, Exports and Imports.		
		£	s.	d.
1895	15·0	17	19	3
1896	15·8	18	14	1
1897	16·0	18	14	3
1898	16·3	19	0	5
1899	16·5	20	1	8

The marriage-rate declined, subsequently to the year last quoted in this table, to 15·6 in 1903. (O. J. R. H.)

Religion.—In attempting to give a concise account of the religious conditions of England we are confronted from the outset with the absence of any trustworthy statistics. A religious census, such as is customary in other countries, has not been taken since 1851; nor is it probable that such a census would be any true indication of the actual religious beliefs of the population. Still less satisfactory, from this standpoint, is the attempt to compile statistics of religious belief from the registrar-general's report on the number of marriages celebrated in the places of worship of the various denominations, for among those who are practically attached to no religious body, and even some Nonconformists, a prejudice survives in favour of having their marriages celebrated and their funerals conducted by the clergy of the Established Church. Nor is the test of "sittings" provided by the various denominations, nor even the number of their communicants, a trustworthy test of the relative number of their adherents. In Wales, for instance, the rivalry of the sects has multiplied chapel accommodation out of all proportion to the population; while everywhere it happens that churches, at one time crowded every Sunday, have been emptied by the shifting of population or other causes. As for the test of communicancy, it is untrustworthy because the insistence on communion as the pledge of membership varies with the different denominations and even with different sections of opinion within those denominations. Any statistics of this nature, then, however useful they may be as a general indication, must not be treated as conclusive.

The Church of England.

Whatever disputes there may be as to the relative strength of the various churches and sects, there can be no questioning the fact that the dominant religion in England is Protestant Christianity. Protestantism, indeed, since the Act of Settlement in 1689, has been of the essence of the Constitution, the sovereign forfeiting his or her crown *ipso facto* by acknowledging the authority of the pope, by accepting "the Romish religion," or by marrying a Roman Catholic, and though of late years efforts have been made to modify or to abrogate this provision, the fact that such efforts have met with widespread opposition shows that it still represents the general attitude of the British nation. Protestantism, however, is a generic term which in England covers a great variety of opinions, and a large number of rival religious organizations. The state church, the Church of England as by law established, represents the tradition of a time when church and state were regarded as two aspects of one divinely ordered organism. In law every subject of the state is also a member of the Established Church, and can lay claim to its ministrations so long as he or she obeys the ecclesiastical law, which is also the law of the state. No Englishman, whatever his opinions, can be excommunicated without due process of law. The Church of England is thus theoretically coextensive with the English nation, each unit of which is legally assumed to belong to it unless proof be brought to the contrary. To state the theory is, however, to risk giving an entirely false impression of the facts. In practice the Church of England is no longer regarded as coextensive with the state; nor is nonconformity any longer, as it once was, an offence against the law. Since the abolition of the Test Acts and the emancipation of the Catholics no Englishman has suffered any civil disability owing to his religion[1]; and the progress of democracy has given to the great so-called "Free Churches" a political power that rivals that of the Established Church. In the matter of the estimation of their relative strength the main grievance of the Nonconformists is that the law classes as members of the Church of England that enormous floating population which is really conscious of no ecclesiastical allegiance at all.

The Church of England, both in constitution and doctrine, represents in general the mean between Roman Catholicism on the one hand and the more advanced forms of Protestantism on the other (see EPISCOPACY). Though its doctrine was reformed in the 16th century and the spiritual supremacy of the pope was repudiated, the continuity of its organic life was not interrupted, and historically as well as legally it is the same church as that established before the Reformation. The ecclesiastical system is episcopal, the whole of England (including for this purpose Wales) being divided into two provinces, Canterbury and York, and 37 bishoprics (including the primatial sees of Canterbury and York). These again are subdivided into 14,080 parishes (1901), the smallest ecclesiastical units, which are grouped for certain administrative purposes into 810 rural deaneries. The sovereign is by law the supreme governor of the church, both in things spiritual and temporal, and he has the right to nominate to vacant sees. In the case of sees of old foundation this is done by means of the *congé d'élire* (*q.v.*), in that of others by letters patent.[2] The bishops hold their temporalities as baronies, for which they do homage in the ancient form, and are spiritual peers of parliament. Only 26, however, have the right to seats in the House of Lords, of whom five—viz. the two archbishops and the bishops of London, Durham and Winchester—always sit, the others taking their seats in order of seniority of consecration. Under the bishops the affairs of the dioceses are managed by archdeacons (*q.v.*) and rural deans (see ARCHPRIEST and DEAN). The cathedral churches are governed by chapters consisting of a dean, canons and prebendaries (see CATHEDRAL). The deaneries are in the gift of the crown, canonries and prebends sometimes in that of the crown, sometimes in that of the bishops. The parish clergy, with a few rare exceptions (when they are elected by the ratepayers), are appointed by patronage. The right of presentation to some 8500 benefices or "livings" is in the hands of private persons; the right is regarded in law as property and is, under certain restrictions for the avoidance of gross simony, saleable (see ADVOWSON). The patronage of the remaining benefices belongs in the main to the crown, the bishops and cathedral chapters, the lord chancellor, and the universities of Oxford and Cambridge.

In spite of the fact that the Church of England is collectively one of the wealthiest in Christendom, a large proportion of the "livings" are extremely poor. To understand this and other anomalies it is necessary to bear in mind that the church is not, like the established Protestant churches of Germany, an elaborately organized state department, nor is it a single corporation with power to regulate its internal polity. It is a conglomeration of corporations. Even the incumbent of a parish is in law a "corporation sole," his benefice a freehold; and until the establishment in 1836, by act of parliament, of the Ecclesiastical Commissioners (*q.v.*) nothing could be done to adjust the inequalities in the emoluments of the clergy resulting from the natural rise and fall of the value of property in various parts of the country. Even more extraordinary is the effect of the singular constitution of the church on its discipline. An incumbent, once inducted, can only be disturbed by complicated and extremely costly processes of law; in effect, except in cases of gross

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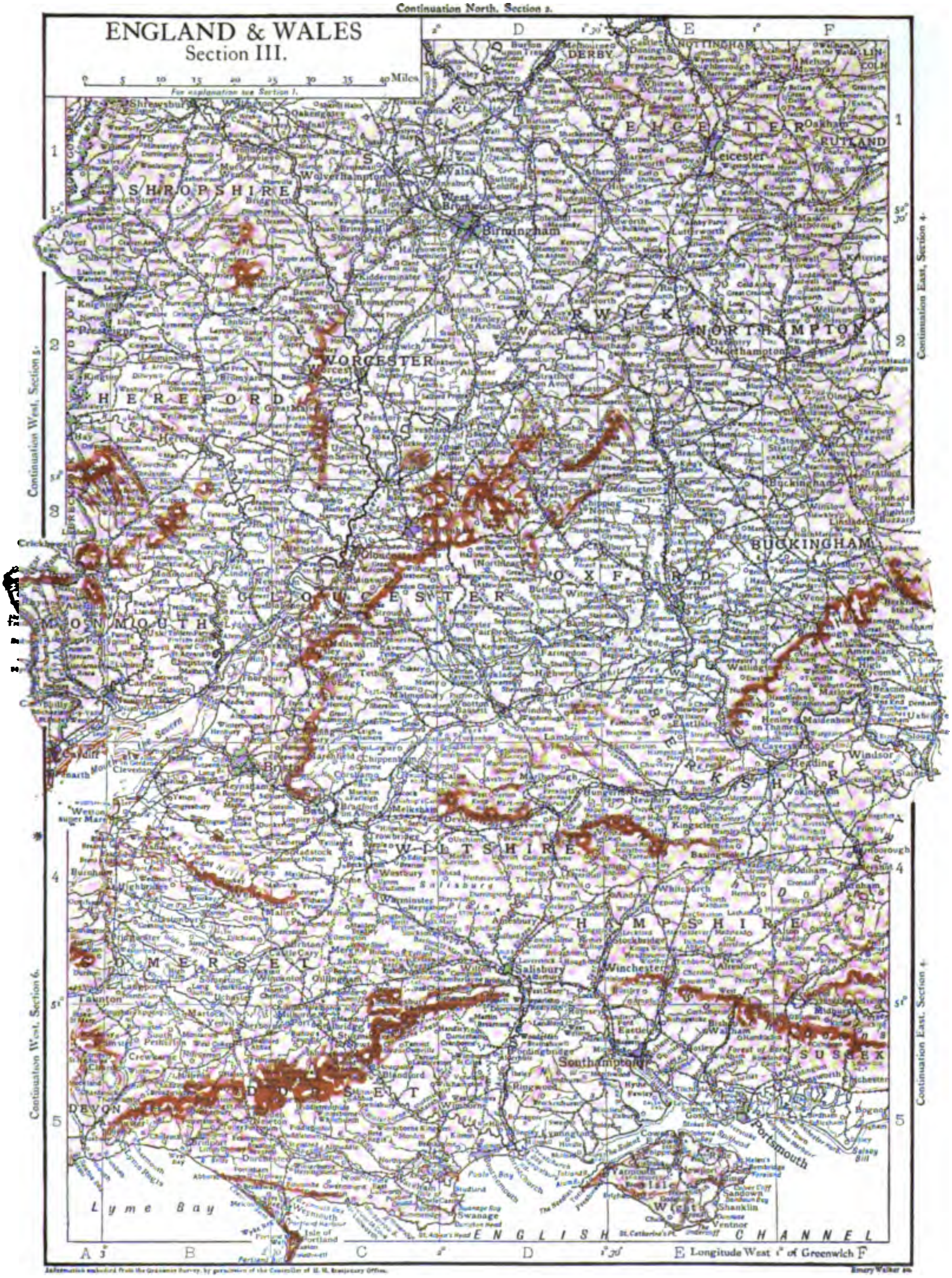
[1] Certain great offices of state are closed to Roman Catholics.

[2] The actual selection of the bishops is in practice in the hands of the prime minister for the time being. This formerly led to purely political appointments; but it is usual now to select clergymen approved by public opinion.



ENGLAND & WALES
Section III.

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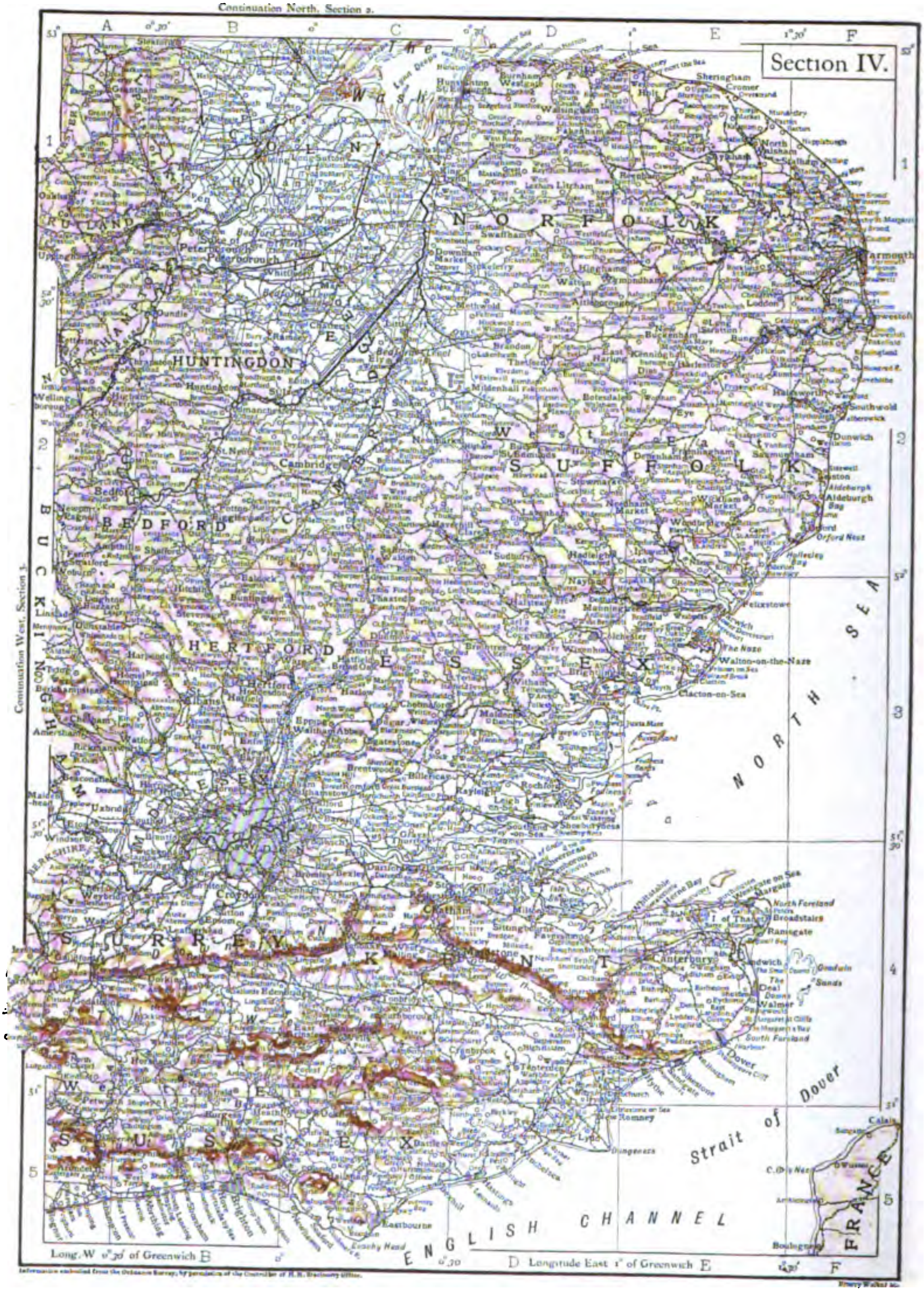
Continuation North. Section 2.

Continuation West, Section 3.



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Emery Walker sc.

misconduct, he is only checked—so far as ecclesiastical order is concerned—by his oath of canonical obedience to the "godly" monitions of his bishop; and, since these monitions are difficult and costly to enforce, while their "godliness" may be a matter of opinion, an incumbent is practically himself the interpreter of the law as applied to the doctrine and ritual of his particular church. The result has been the development within the Established Church of a most startling diversity of doctrine and ritual practice, varying from what closely resembles that of the Church of Rome to the broadest Liberalism and the extremest evangelical Protestantism. This broad comprehensiveness, which to outsiders looks like ecclesiastical anarchy, is the characteristic note of the Church of England; it may be, and has been, defended as consonant with Christian charity and suited to the genius of a people not remarkable for logical consistency; but it makes it all the more difficult to say what the religion of Englishmen actually is, even within the English Church.

The following is a list of the archiepiscopal and episcopal sees of England and Wales—the latter arranged in alphabetical order,—with date of their establishment and amount of emoluments:—

	Year of Foundation.	Annual Emoluments.
Province of Canterbury—		
Canterbury (archbishopric)	597	£15,000
Bangor	c. 550	4,200
Bath and Wells	1139	5,000
Birmingham	1904	3,500
Bristol	1897	3,000
Chichester	1075	4,200
Ely	1109	5,500
Exeter	1050	4,200
Gloucester	1541	4,300
Hereford	676	4,200
Lichfield	669	4,200
Lincoln	1067	4,500
Llandaff	c. 550	4,200
London	605	10,000
Norwich	1094	4,500
Oxford	1542	5,000
Peterborough	1541	4,500
Rochester	604	3,800
St Albans	1877	3,200
St Asaph	c. 550	4,200
St David's	c. 550	4,500
Salisbury	1075	5,000
Southwark	1904	3,000
Southwell	1884	3,500
Truro	1876	3,000
Winchester	c. 650	6,500
Worcester	c. 680	4,200
Province of York—		
York (archbishopric)	625	10,000
Carlisle	1133	4,500
Chester	1541	4,200
Durham	995	7,000
Liverpool	1880	4,200
Manchester	1847	4,200
Newcastle	1882	3,500
Ripon	1836	4,200
Sodor and Man	1154	1,500
Wakefield	1888	3,000

[1] Modern refoundation.

The following are suffragan or assistant bishoprics (the names of the dioceses to which each belongs being given in brackets): Dover, Croydon (Canterbury), Beverley, Hull, Sheffield (York), Stepney, Islington, Kensington (London), Jarrow (Durham), Guildford, Southampton, Dorking (Winchester), Barrow-in-Furness (Carlisle), Crediton (Exeter), Grantham (Lincoln), Burnley (Manchester), Thetford, Ipswich (Norwich), Reading (Oxford), Leicester (Peterborough), Richmond, Knaresborough (Ripon), Colchester, Barking (St Albans), Swansea (St. David's), Woolwich, Kingston-on-Thames (Southwark), Derby (Southwell), St Germans (Truro). See also ENGLAND, CHURCH OF; ANGLICAN COMMUNION; ECCLESIASTICAL JURISDICTION; VESTMENTS; MASS.

	Sittings.	Communicants.	Ministers (Pastoral).	Local Preachers.	Sunday Scholars.
Baptists[1]	1,421,742	424,741	2134	5,748	590,321
Congregationalists (1907)	1,801,447	498,953	3197	5,603	729,347
Presbyterian Church of England[2]	173,047	85,755	323	..	98,258
Society of Friends	..	17,442	..	..	62,347
Moravians	10,000	2,999	34	..	4,542
Wesleyan Methodists[3]	2,500,000	620,350	2658	20,119	1,039,437
Primitive Methodists[1]	1,017,690	205,407	1101	15,963	477,114
United Methodist Church[4]	738,840	158,095	833	5,577	315,993
Wesleyan Reform Union	47,435	8,717	19	508	23,008
Independent Methodists	33,000	9,732	..	375	28,387
Welsh Calvinistic Methodist	472,089	185,935	900	361	187,484
Countess of Huntingdon's Connexion	12,347	2,469	26	..	3,040
Reformed Episcopal Church	6,000	1,090	28	..	2,600
Free Church of England	8,140	1,352	24	..	4,196

Other Protestant communions.

The number of "denominations" by whom buildings were certified for worship up to 1895 was 293 (see list in *Whitaker's Almanack*, 1896, p. 252), but in many instances such "denominations" consisted of two or three congregations only, in some cases of a single congregation. The more important nonconformist churches are fully dealt with under their several headings. The above table, however, based on that in the *Statesman's Year-Book* for 1908, and giving the comparative statistics of the chief nonconformist churches, may be useful for purposes of comparison. It may be prefaced by stating that, according to returns made in 1905, the Church of England provided sitting accommodation in parish and other churches for 7,177,144 people; had an estimated number of 2,053,455 communicants, 206,873 Sunday-school teachers, and 2,538,240 Sunday scholars. There were 14,029 incumbents (rectors, vicars, and perpetual curates), 7500 curates, *i.e.* assistant clergy, and some 4000 clergy on the non-active list.

Besides the bodies enumerated in the table there are other churches concerning which similar statistics are lacking, but which, in several cases, have large numbers of adherents. The Unitarians are an important body with (1908) 350 ministers and 345 places of worship. Most numerous, probably, are the adherents of the Salvation Army, which with a semi-military organization has in Great Britain alone over 60,000 officers, and "barracks," *i.e.* preaching stations, in almost every town. The Brethren, generally known, from their place of origin, as the Plymouth Brethren, have "rooms" and adherents throughout England; the Catholic Apostolic Church ("Irvingites") have some 80 churches; the New Jerusalem Church (Swedenborgians) had (1908) 75 "societies"; the Christian Scientists, the Christadelphians, the British Israelites and similar societies, such as the New and Latter House of Israel, the Seventh Day Baptists, deserve mention. The Latter Day Saints (Mormons) had (1908) 82 churches in Great Britain.

Roman Catholics.

Roman Catholicism in England has shown a tendency to advance, especially among the upper and upper-middle classes. The published lists of "converts" are, however, no safe index to actual progress; for no equivalent statistics are available for "leakage" in the opposite direction. The membership of the Roman Catholic Church in England is estimated at about 2,200,000. But though the growth of the church relatively to the population has not been particularly startling, there can be no doubt that, since the restoration of the Roman Catholic hierarchy in 1851, its general political and religious influence has enormously increased. A notable feature in this has been the great development of monastic institutions, due in large measure to the settlement in England of the congregations expelled from France. The Roman Catholic Church in England is organized in 15 dioceses, which are united in a single province under the primacy of the archbishop of Westminster. In December 1907 there were 1736 Roman Catholic churches and stations, and the number of the clergy was returned at 3524 (see ROMAN CATHOLIC CHURCH).

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[1] In 1906.

[2] There are in addition some thousands of Presbyterians unconnected with the church, including members of the Church of Scotland.

[3] Great Britain and Ireland, 1906.

[4] On September 17, 1907, the United Methodist Free Churches, the Methodist New Connexion, and the Bible Christians were united under the name of the United Methodist Church.

Jews.

The Jews in Great Britain, chiefly found in London and other great towns, number (1907) about 196,000 and have some 200 synagogues; at the head of their organization is a chief Rabbi resident in London.

Finally it may be mentioned that a small number of Englishmen, chiefly resident in Liverpool and London, have embraced Islam; they have a mosque at Liverpool. Various foreign churches which have numbers of adherents settled in England have also branch churches and organizations in the country, notably the Orthodox Eastern Church,—with a considerable number of adherents in London, Liverpool and Manchester,—the Lutheran, and the Armenian churches. (W. A. P.)

VII. COMMUNICATIONS

Roads.—In England and Wales the high-roads, or roads on which wheeled vehicles can travel, are of two classes: (1) the main roads, or great arteries along which the main vehicular traffic of the country passes; and (2) ordinary highways, which are by-roads serving only local areas. The length of the main roads is about 22,000 m., and that of ordinary highways about 96,000. The highways of England, the old coaching roads, are among the best in the world, being generally of a beautiful smoothness and well maintained; they vary, naturally, in different districts, but in many even the local roads are superior to some main roads in other countries. The supersession of the stage coach by the railway took a vast amount of traffic away from the main roads, but their proper maintenance did not materially suffer; and a larger accession of traffic took place subsequently on the development of the cycle and the motor-vehicle.

The system of road-building by private enterprise, the undertakers being rewarded by tolls levied from vehicles, persons or animals using the roads, was established in England in 1663, when an act of Charles II. authorized the taking of such tolls at "turnpikes" in Hertfordshire and Cambridgeshire. A century later, in 1767, the authorization was extended over the whole kingdom by an act of George III. In its fulness the system lasted just sixty years, for the first breach in it was made by an act of George IV., in 1827, by which the chief turnpikes in London were abolished. Further acts followed in the same direction, leading to the gradual extinction, by due compensation of the persons interested, of the old system, the maintenance of the roads being vested in "turnpike trusts and highway boards," empowered to levy local rates. The last turnpike trust ceased to exist on the 5th of November 1895, and the final accounts in connexion with its debt were closed in 1898–1899. Toll-gates are now met with only at certain bridges, where the right to levy tolls is statutory or by prescription. By the Local Government Act of 1888 the duty of maintaining main roads was imposed on the county councils, but these bodies were enabled to make arrangements with the respective highway authorities for their repair. Under the Local Government Act of 1894 the duties of all the highway authorities were transferred to the rural district councils on or before the 31st of March 1899.

It was not until the close of the 18th century, when the period of road-building activity already indicated set in, that English roads were redeemed from an extraordinarily bad condition. The roads were until then, as a rule, merely tracks, deeply worn by ages of traffic into the semblance of ditches, and, under adverse weather conditions, impassable. Travellers also had the risk of assault by robbers and highwaymen. As early as 1285 a law provided for the cutting down of trees and bushes on either side of highways, so as to deprive lawless men of cover. Instances of legislation as regards the upkeep of roads are recorded from time to time after this date, but (to take a single illustration) even in the middle of the 18th century the journey from the village, as it was then, of Paddington to London by stage occupied from 2½ to 3 hours. But from 1784 to 1792 upwards of 300 acts were passed dealing with the construction of new roads and bridges.

Railways.—The history and development of railways in England, their birthplace, and in Ireland and Scotland, with illustrative statistics, are considered under the heading UNITED KINGDOM. The following list indicates the year of foundation, termini, chief offices and geographical sphere of the chief railways of England and Wales.

1. *Railways with Termini in London.*

(*a*) NORTHERN.

Great Northern (1846).—Terminus and offices, King's Cross. Main line—Peterborough, Grantham, Newark, Doncaster; forming, with the North-Eastern and North British lines, the "East Coast" route to Scotland. Serving also the West Riding of Yorkshire, Lincolnshire, Nottingham and other towns of the midlands, and Manchester (by running powers over the Great Central metals). This company has so extensive a system of running powers over other railways, and of lines held jointly with other companies, that few of its more important express trains from London complete their journeys entirely on the company's own lines.

Midland (1844, an amalgamation of the former North Midland, Midland Counties, Birmingham & Derby, and other lines).—Terminus, St Pancras; offices, Derby. Main line—Bedford, Leicester, Sheffield, Leeds and Carlisle, affording the "Midland" route to Scotland. Serving also Nottingham, Derby, and the principal towns of the midlands and West Riding, and Manchester. West and North line from Bristol, Gloucester and Birmingham to Leicester and Derby. Also an Irish section, the Belfast and Northern Counties system being acquired in 1903. Docks at Heysham, Lancashire; and steamship services to Belfast, &c.

London & North-Western (1846, an amalgamation of the London & Birmingham, Grand Junction, and Manchester & Birmingham lines).—Terminus and offices, Euston. Main line—Rugby, Crewe, Warrington, Preston, Carlisle; forming, with the Caledonian system, the "West Coast" route to Scotland. Serves also Manchester, Liverpool and all parts of the north-west, North Wales, Birmingham and the neighbouring midland towns, and by joint-lines, the South Welsh coal-fields. Maintains docks at Garston on the Mersey, a steamship traffic with Dublin and Greenore from Holyhead, and, jointly with the Lancashire & Yorkshire Company, a service to Belfast, &c., from Fleetwood.

Great Central (1846; until 1897, when an extension to London was undertaken, called the Manchester, Sheffield & Lincolnshire).—Terminus, Marylebone; offices, Manchester. Main line—Rugby, Nottingham, Leicester, Sheffield, Manchester. The former main line runs from Manchester and Sheffield east to Retford, thence serving Grimsby and Hull, with branches to Lincoln, &c. The main line reached from London by joining the line of the Metropolitan railway near Aylesbury and following it to Harrow. Subsequently an alternative route out of London was constructed between Neasden and Northolt, where it joins another line, of the Great Western railway, from Acton, and continues as a line held jointly by the two companies through Beaconsfield and High Wycombe. Here it absorbs the old Great Western line as far as Prince's Risborough, and continues thence to Grendon Underwood, effecting a junction with the original main line of the Great Central system. This line was opened for passenger traffic in April 1906. The Great Central company owns docks at Grimsby.

(*b*) EASTERN.

Great Eastern (1862).—Terminus and offices, Liverpool Street. Serving Essex, Suffolk, Cambridgeshire, Norfolk. Joint-line with Great Northern from March to Lincoln and Doncaster. Passenger steamship services from Harwich to the Hook of Holland, Antwerp, Rotterdam, &c.

London, Tilbury & Southend (1852).—Terminus and offices, Fenchurch Street. Serving places on the Essex shore of the Thames estuary, terminating at Shoeburyness.

(*c*) WESTERN.

Great Western (1835, London to Bristol).—Terminus and offices, Paddington. Main line—Reading, Didcot, Swindon, Bath, Bristol, Taunton, Exeter, Plymouth, Penzance. Numerous additional main lines—Reading to Newbury, Weymouth and the west, a new line opened in 1906 between Castle Cary and Langport effecting a great reduction in mileage between London and Exeter and places beyond; Didcot, Oxford, Birmingham, Shrewsbury, Chester with connexions northward, and to North Wales; Oxford to Worcester, and Swindon to Gloucester and the west of England; South Welsh system (through route from London via Wootton Bassett or via Bristol, and the Severn tunnel), Newport, Cardiff, Swansea, Milford. Steamship services to the Channel Islands from Weymouth to Waterford, Ireland from Milford, and to Rosslare, Ireland, from Fishguard, the route last named being opened in 1906. The line constructed jointly with the Great Central company (as detailed in the description above) was extended in 1910 from Ashendon to Aynho, to form a short route to the great centres north of Oxford.

London & South-Western (1839, incorporating the London & Southampton railway of 1835).—Terminus and offices, Waterloo. Main line—Woking, Basingstoke, Salisbury, Yeovil, Exeter, Plymouth; Woking, Guildford and Portsmouth; Basingstoke, Winchester, Southampton, Bournemouth, &c. Extensive connexions in Surrey, Hampshire and the south-west, as far as North Cornwall. This company owns the great docks at Southampton, and maintains passenger services from that port to the Channel Islands, Havre, St Malo and Cherbourg.

(*d*) SOUTHERN.

London, Brighton & South Coast (1846).—Termini, Victoria and London Bridge. Serving all the coast stations from Hastings to Portsmouth, with various lines in eastern Surrey and in Sussex. Maintains a service of passenger steamers between Newhaven and Dieppe.

South Eastern & Chatham (under a managing committee, 1899, of the South-Eastern company, 1836, and the London, Chatham & Dover company, 1853).—Termini—Victoria, Charing Cross, Holborn Viaduct, Cannon Street. Offices, London Bridge Station. Various lines chiefly in Kent. Steamship services between Folkestone and Boulogne, Dover and Calais, &c.

2. *Provincial Railways.*

The two most important railway companies not possessing lines to London are the North-Eastern and the Lancashire & Yorkshire.

North Eastern (1854, amalgamating a number of systems).—Offices, York. Main line—Leeds, Normanton and York to Darlington, Durham, Newcastle and Berwick-on-Tweed. Connecting with the Great Northern between Doncaster and York, and with the North British at Berwick, it forms part of the "East Coast" route to Scotland. Serving all ports and coast stations from Hull to Berwick, also Carlisle, &c. Owning extensive docks at Hull, Middlesbrough, South Shields, the Hartlepools, Blyth, &c.

Lancashire & Yorkshire (1847, an amalgamation of a number of local systems).—Offices, Manchester. Main line—Manchester, Rochdale, Tormorden, Wakefield and Normanton, with branches to Halifax, Bradford, Leeds, Huddersfield and other centres of the West Riding. Extensive system in south Lancashire, connecting Manchester with Preston and Fleetwood (where the docks and steamship services to Ireland are worked jointly with the London & North-Western company), Southport, Liverpool, &c.

Among further provincial systems there should be mentioned:—

Cambrian.—Offices, Oswestry. Whitchurch, Oswestry, Welshpool to Barmouth and Pwllheli, Aberystwyth, &c.

Cheshire Lines, worked by a committee representative of the Great Central, Great Northern and Midland Companies, and affording important connexions between the lines of these systems and south Lancashire and Cheshire (Godley, Stockport, Warrington, Liverpool; Manchester and Liverpool; Manchester and Liverpool to Southport; Godley and Manchester to Northwich and Chester, &c.).

Furness.—Offices, Barrow-in-Furness. Carnforth, Barrow, Whitehaven, with branches to Coniston, Windermere (Lakeside), &c. Docks at Barrow.

North Staffordshire.—Offices, Stoke-upon-Trent. Crewe and the Potteries, Macclesfield, &c., to Uttoxeter and Derby.

Cross-Country Connexions.—While London is naturally the principal focal point of the English railway system, the development of through connexions between the chief lines by way of the metropolis is very small. Some through trains are provided between the North-Western and the London, Brighton & South Coast lines via Willesden Junction, Addison Road and Clapham Junction; and a through connexion by way of Ludgate Hill has been arranged between main line trains of the South-Western and the Great Northern railways, but otherwise passengers travelling through London have generally to make their own way from one terminus to another. Certain cross-country routes, however, are provided to connect the systems of some of the companies, among which the following may be noticed.

(1) Through connexions with the continental services from Harwich, and with Yarmouth and other towns of the East coast, are provided from Yorkshire, Lancashire, &c., by way of the Great Northern and Great Eastern Joint line from Doncaster and Lincoln to March.

(2) Through connexions between the systems of the South-Eastern & Chatham and the Great Western companies are provided via Reading.

(3) Through connexions between the systems of the Great Central and the Great Western companies are provided by the line connecting Woodford and Banbury.

(4) Through connexions between the Midland and the South-Western systems are provided (*a*) by the Midland and South-Western Junction line connecting Cheltenham on the north-and-west line of the Midland with Andover Junction on the South-Western line; and (*b*) by the Somerset & Dorset line, connecting the same lines between Bath, Templecombe and Bournemouth.

(5) The line from Shrewsbury to Craven Arms and Hereford, giving connexion between the north and the south-west, and Wales, is worked by the North-Western and Great Western companies.

Canals and rivers.

Inland Navigation.—The English system of inland navigation is confined principally to the following districts: South Lancashire, the West Riding of Yorkshire, the Midlands, especially about Birmingham, the Fen district and the Thames basin (especially the lower part). All these districts are interconnected. The condition of inland navigation, as a whole, is not satisfactory. The Fossdyke in Lincolnshire, connecting the river Trent at Torksey with the Witham near Lincoln, and now belonging to the Great Northern and Great Eastern joint railways, is usually indicated as the earliest extant canal in England, inasmuch as it was constructed by the Romans for the purpose of drainage or water-supply, and must have been used for navigation at an early period. But the history of canal-building in England is usually dated from about 1760, and from the construction, at the instance of Francis, Duke of Bridgewater, of the Bridgewater canal in South Lancashire, now belonging to the Manchester Ship Canal Company. The activity in canal-building which prevailed during the later years of the 18th century was, in a measure, an earlier counterpart of the first period of railway development, which, proceeding subsequently along systematized lines not applied to canal-construction, and providing obvious advantages in respect of speed, caused railways to withdraw much traffic from canals. Some canals and river navigations have consequently become derelict, or are only maintained with difficulty and in imperfect condition. The inland navigation system suffers from a want of uniformity in the size of locks, depth of water, width of channels and other arrangements, so that direct intercommunication between one canal and another is often impossible in consequence; moreover, although the canals, like railways, are owned by many separate bodies, hardly any provision has been made, as it has in the case of railways, for such facilities as the working of through traffic over various systems at an inclusive charge. Lastly, the railway companies themselves have acquired control of about 30% of the total mileage of canals in England and Wales, and in many cases this has had a prejudicial effect on the prosperity of canals. Notwithstanding these disabilities, there has been in modern times a new development in the trade of some canals, born of a realization that for certain classes of goods water-transport is cheaper than the swifter rail-transport. Various proposals have been made for the establishment of a single control over all inland waterways.

The lower or estuarine courses of some of the English rivers as the Thames, Tyne, Humber, Mersey and Bristol Avon, are among the most important waterways in the world, as giving access for sea-borne traffic to great ports. From the Mersey the Manchester Ship Canal runs to Manchester. The manufacturing districts of South Lancashire and the West Riding of Yorkshire are traversed and connected by several canals following transverse valleys of the Pennine Chain. The main line of the Aire and Calder navigation runs from Goole by Castleford to Leeds, whence the Leeds and Liverpool canal, running by Burnley and Blackburn, completes the connexion between the Humber and the Mersey. Other canals are numerous, among which may be mentioned the Sheffield and South Yorkshire, connecting Sheffield with the Trent. The Trent itself affords an extensive navigation, from which, at Derwent mouth, the Trent and Mersey Canal runs near Burton and Stafford, and through the Potteries, to the Bridgewater Canal and so to the Mersey. This canal is owned by the North Staffordshire railway company. The river Weaver, a tributary of the Mersey, affords a waterway of importance to the salt-producing towns of Cheshire. The system of the Shropshire Union railways and canal company, which is connected by lease with the London & North-Western railway company, carries considerable traffic, especially in the neighbourhood of Ellesmere Port. In the Black Country and neighbourhood the numerous ramifications of the Birmingham Canal navigations bear a large mineral traffic. This system is connected with the rivers Severn and Trent and the canal system of the country at large, and is controlled by the London & North-Western company. The principal line of navigation from the Thames northward to the midlands is that of the Grand Junction, which runs from Brentford, is connected through London with the port of London by the Regent's Canal, and follows closely the main line of the North-Western railway. It connects with the Oxford Canal at Braunston in Northamptonshire, and through this with canals to Birmingham and the midlands, and continues to Leicester. Both the Severn up to Stourport and the Thames up to Oxford have a fair traffic, but the Thames and Severn Canal is not much used. There is some traffic on the navigable drainage cuts and rivers of the Fens, but beyond these, in a broad consideration of the waterways of England from the point of view of their commercial importance, it is unnecessary to go.

See H. R. De Salis, *Bradshaw's Canals and Navigable Rivers of England and Wales* (London, 1904); *Report* of Royal Commission on Canals (London, 1909).

Oversea Communications.—The chief ports for continental passenger traffic are as follows:—

Harwich to Amsterdam, Antwerp, Hamburg, Hook of Holland, Rotterdam (Great Eastern railway); to Copenhagen and Esbjerg (Royal Danish mail route).

Queenborough to Flushing (Zeeland Steamship company).

Dover to Calais (South-Eastern & Chatham railway); to Ostend (Belgian Royal mail steamers).

Folkestone to Boulogne (South Eastern & Chatham railway).

Newhaven to Dieppe (London, Brighton & South Coast railway).

Southampton to Cherbourg, Havre, St Malo (South-Western railway).

The chief ports for trans-Atlantic traffic are Liverpool and Southampton, and special trains are worked in connexion with the steamers to and from London. The great development of harbour accommodation at Dover early in the 20th century brought trans-Atlantic traffic to this port also. Southampton and Liverpool are the two greatest English ports for all oceanic passenger traffic; but London has also a large traffic, both to European and to foreign ports. The passenger traffic to the Norwegian ports, always very heavy in summer, is carried on chiefly from Hull and Newcastle.

VIII. Industries

Agriculture.—In the agricultural returns for Great Britain, issued annually by the government, the area of England (apart from Wales) has been divided into two sections, "arable" and "grass," corresponding with a former division into "corn counties" and "grazing counties," except that Leicestershire is included not in the "grass" but in the "arable" section. Most of the eastern part of England is "arable," while the western and northern part is "grass," the boundary between the sections being the western limit of Hampshire, Berkshire, Oxfordshire, Warwickshire, Leicestershire, Nottinghamshire, and of the East Riding of Yorkshire.

The division is thus as follows:—

Grass Counties.	*Arable Counties.*
Northumberland.	Yorkshire, East Riding.
Cumberland.	Lincolnshire.
Durham.	Nottingham.
Yorkshire, North and West Ridings.	Rutland.
Westmorland.	Huntingdonshire.
Lancashire.	Warwickshire.
Cheshire.	Leicestershire.
Derbyshire.	Northamptonshire.
Staffordshire.	Cambridgeshire.
Shropshire.	Norfolk
Worcestershire.	Suffolk.
Herefordshire.	Bedfordshire.
Monmouthshire.	Buckinghamshire.
Gloucestershire.	Oxfordshire.
Wiltshire.	Berkshire.
Dorsetshire.	Hampshire.
Somersetshire.	Hertfordshire.
Devonshire.	Essex.
Cornwall.	Middlesex.
	Surrey.
	Kent.
	Sussex.

The average area under cultivation of all the counties is about ·76 of the whole area. The counties having the greatest area under cultivation (ranging up to about nine-tenths of the whole) may be taken to be—Leicestershire, the East Riding of Yorkshire, Lincolnshire, Huntingdonshire, Rutland, Northamptonshire, Bedfordshire and Cambridgeshire. Those with the smallest proportional cultivated area are Westmorland, Middlesex, Northumberland, Surrey, Cumberland, the North and West Ridings of Yorkshire, Lancashire, Durham and Cornwall. Geographical considerations govern these conditions to a very great extent; thus the counties first indicated lie almost entirely within the area of the low-lying and fertile Eastern Plain, while the smallest areas of cultivation are found in the counties covering the Pennine hill-system, with its high-lying uncultivated moors. In the case of Cornwall and Cumberland the physical conditions are similar to these; but in that of Middlesex and Surrey the existence of large urban areas belonging or adjacent to London must be taken into account. These also affect the proportion of cultivated areas in the other home counties. The presence of a widespread urban population must also be remembered in the case of Lancashire and the West Riding of Yorkshire.

Distribution of crops.

The geographical distribution of the principal crops, &c., may now be followed. The grain crops grown in England consist almost exclusively of wheat, barley and oats. Lincolnshire, Norfolk, Suffolk, Essex, Cambridgeshire and the East Riding of Yorkshire are especially productive in all these; the North and West Ridings of Yorkshire produce a notable quantity of barley and oats; and the oat-crops in the following counties deserve mention—Devonshire, Hampshire, Lancashire, Cumberland, Cornwall, Cheshire and Sussex. There is no county, however, in which the single crop of wheat or barley stands pre-eminently above others, and in the case of the upland counties of Cumberland, Westmorland and Derbyshire, the metropolitan county of Middlesex, and Monmouthshire, these crops are quite insignificant. In proportion to their area, the counties specially productive of wheat are Cambridgeshire, Huntingdonshire, Hertfordshire, Bedfordshire and Essex; and of barley, Norfolk, Suffolk and the East Riding of Yorkshire. In fruit-growing, Kent takes the first place, but a good quantity is grown in Cambridgeshire, Norfolk and Essex, in Worcestershire and other western counties, where, as in Herefordshire, Somerset and Devon, the apple is especially cultivated and cider is largely produced. Kent is again pre-eminent in the growth of hops; indeed this practice and that of fruit-growing give the scenery of the county a strongly individual character. Hop-growing extends from Kent into the neighbouring parts of Sussex and Surrey, where, however, it is much less important; it is also practised to a considerable degree in a group of counties of the midlands and west—Herefordshire, Worcestershire, Gloucestershire and Shropshire. Market-gardening is carried on most extensively on suitable lands in the neighbourhood of the great areas of urban population; thus the open land remaining in Middlesex is largely devoted to this industry. From the Channel and Scilly Islands, vegetables, especially seasonable vegetables, and also flowers which, owing to the peculiar climatic conditions of these islands, come early to perfection, are imported to the London market. Considering the crops not hitherto specified, it may be indicated that turnips and swedes form the chief green crops in most districts; potatoes, mangels, beans and peas are also commonly grown. Beyond the three chief grain crops, only a little rye is grown. The cultivation of flax is almost extinct, but it is practised in a few districts, such as the East and West Ridings of Yorkshire.

Live stock.

The counties in which the greatest proportion of the land is devoted to permanent pasture may be judged roughly from the list of "grass counties" already given. Derbyshire, Leicestershire, the midland counties generally, and Somersetshire, have the highest proportion, and the counties of the East Anglian seaboard the lowest. But with lands thus classified heath, moor and hill pastures are not included; and the greatest areas of these are naturally found in the counties of the Pennines and the Lake District, especially in Northumberland, Cumberland, Westmorland and the North and West Ridings of Yorkshire. There is also plenty of hill-pasture in the south-western counties (from Hampshire and Berkshire westward), especially in Devonshire, Cornwall and Somersetshire, and also in Monmouthshire and along the Welsh marches, on the Cotteswold Hills, &c. In all these localities sheep are extensively reared, especially in Northumberland, but on the other hand in Lincolnshire the numbers of sheep are roughly equal to those in the northern county. Other counties in which the numbers are especially large are Devonshire, Kent, Cumberland and the North and West Ridings of Yorkshire. Cattle are reared in great numbers in Lincolnshire, Lancashire and the West Riding of Yorkshire, Devonshire, Somersetshire and Cornwall; but the numbers of both cattle and sheep are in no English county (save Middlesex) to be regarded as insignificant. Pigs are bred most extensively in Suffolk, Norfolk and Lincolnshire and in Somersetshire.

Woodlands.

It is often asserted that the scenery of rural England is of its kind unrivalled. Except in open lands like the Fens, the peculiarly rich appearance of the country is due to the closely-divided fields with their high, luxuriant hedges, and especially to the profuse growth of trees. There is not, however, any large continuous forested tract. Certain areas still bear the name of forest where there is now none; the term here possesses an historical significance, in many cases indicating former royal game-preserves. Great areas of England were once under forest. The clearing of land for agricultural purposes, the use of wood for the prosecution of the industries of an increasing population, and other causes, have led to the gradual disforesting of large tracts. There are still, however, some small well-defined woodland areas. The New Forest in Hampshire, the Forest of Dean in Gloucestershire, and Epping Forest, which is preserved as a public recreation-ground by the City of London, are the most notable instances. The counties comprising the greatest proportional amount of woodland fall into two distinct groups—Hampshire, Surrey, Sussex and Kent, with Berkshire and Buckinghamshire; Monmouth, Herefordshire and Gloucestershire. Cambridgeshire, lying almost wholly within the area of the Fens, has the smallest proportional area of woodland of any English county.

The number of persons engaged in agriculture in England and Wales was found by the census of 1901 to be 1,192,167; the total showing a steady decrease (*e.g.* from 1,352,389 in 1881), which is especially marked in the case of females. But the decrease lies mainly in the number of agricultural labourers; the number of farmers is not notably affected, and the increasing substitution of machinery for manual labour must be taken into consideration. The average size of holdings in England may be taken approximately as 66 acres, the average in 1903 being 66·1, whereas in 1895 it was 65·3.

(See also the article AGRICULTURE.)

Sea fisheries.

Fisheries.—All the seas round Britain are rich in fish, and there are important fishing stations at intervals on all the English coasts, but those on the east coast are by far the most numerous. On an estimate of weight and value of the fish landed, Grimsby at the mouth of the Humber in Lincolnshire, stands pre-eminent as a fishing port. For example, the fish landed there in 1903 were of nearly four times the value of those landed at Hull, which was the second in order of all the English stations. Next in importance stand Lowestoft, Yarmouth and North Shields, Boston and Scarborough, and, among a large number of minor fishing stations, Hartlepool and Ramsgate. Great quantities of fish are also landed at the riverside market of Billingsgate in London, but the conditions here are exceptional, the landings being effected by carrier steamers, plying from certain of the fishing fleets, and not taking part in the actual process of fishing. On the south coast Newlyn ranks in the same category with Boston; at Plymouth considerable catches are landed; and Brixham ranks alongside the last ports named on the east coast. The chief fishing centres of the English Channel are thus seen to belong to the coast of Devonshire and Cornwall. On the west coast the Welsh port of Milford takes the first place, while Swansea and Cardiff have a considerable fishing industry, surpassed, however, by that of Fleetwood in Lancashire. Liverpool also ranks among the more important centres. As a comparison of the production of the east, south and west coast fisheries, an average may be taken of the annual catches recorded over a term of years. In the ten years 1894–1903 this average was 6,985,588 cwt. for the east coast stations, 669,759 cwt. for those of the south coast, and 884,932 for those of the west (including the Welsh stations).

Distinctions may be drawn, as will be seen, between the nature and methods of the fisheries on the various coasts, and the relative prosperity of the industry from year to year cannot be considered as a whole. Thus in the period considered the recorded maximum weight of fish landed at the east coast ports was 9,539,114 cwt. in 1903 (the value being returned as £5,721,105); whereas on the south coast it was 736,599 cwt. in 1899, and on the west 1,117,164 cwt. in 1898. Considered as a whole, the individual fish, by far the most important in the English fisheries, is the herring, for which Yarmouth and Lowestoft are the chief ports. The next in order are haddock, cod and plaice, and the east coast fisheries return the greatest bulk of these also. But whereas the south coast has the advantage over the west in the herring and plaice fisheries, the reverse is the case in the haddock and cod fisheries, haddock, in particular, being landed in very small quantities at the south coast ports. Mackerel, however, are landed principally at the southern ports, and the pilchard is taken almost solely off the south-western coast. A fish of special importance to the west coast fisheries is the hake. Among shell-fish, crabs and oysters are taken principally off the east coast; the oyster beds in the shallow water off the north Kent and Essex coasts, as at Whitstable and Colchester, being famous. Lobsters are landed in greatest number on the south coast.

The number of vessels of every sort employed in fishing was returned in 1903 as 9721, and the number of persons employed as 41,539, of whom 34,071 were regular fishermen. The development of the steam trawling-vessel is illustrated by the increase in numbers of these vessels from 480 in 1893 to 1135 in 1903. They belong chiefly to North Shields, Hull, Grimsby, Yarmouth and Lowestoft. There are a considerable number on the west coast, but very few on the south. These vessels have a wide range of operations, pursuing their work as far as the Faeroe Islands and Iceland on the one hand, and the Bay of Biscay and the Portuguese coast on the other.

Fresh-water fisheries.

The English freshwater fisheries are not of great commercial importance, nor, from the point of view of sport, are the salmon and trout fisheries as a whole of equal importance with those of Scotland, Ireland or Wales. The English salmon and trout fisheries may be geographically classified thus: (1) *North-western division*, Rivers Eden, Derwent, Lune, Ribble: (2) *North-eastern*, Coquet, Tyne, Wear, Tees, &c.; (3) *Western*, Dee, Usk, Wye, Severn; (4) *South-western*, Taw, Torridge, Camel, Tamar, Dart, Exe, Teign, &c.; (5) *Southern*, Avon and Stour (Christchurch) and the Itchin and other famous trout streams of Hampshire. The rivers of the midlands and east are of little importance to salmon-fishers, though the Trent carries a few, and in modern times attempts have been made to rehabilitate the Thames as a salmon river. The trout-fishing in the upper Thames and many of its tributaries (such as the Kennet, Colne and Lea) is famous. But many of the midland, eastern and south-eastern rivers, the Norfolk Broads, &c., are noted for their coarse fish.

Mining.—Although the conditions of mining have, naturally, undergone a revolutionary development in comparatively modern times, yet some indications of England's mineral wealth are found at various periods of early history. The exploitation of tin in the south-west is commonly referred back to the time of the Phoenician sea-traders, and in the first half of the 13th century England supplied Europe with this metal. At a later period tin and lead were regarded as the English minerals of highest commercial value; whereas to-day both, but especially lead, have fallen far from this position. The Roman working of lead and iron has been clearly traced in many districts, as has that of salt in Cheshire. The subsequent development of the iron industry is full of interest, as, while extending vastly, it has entirely lapsed in certain districts. However long before it may have been known to a few, the use of coal for smelting iron did not become general till the later part of the 18th century, and down to that time, iron-working was confined to districts where timber was available for the supply of the smelting medium, charcoal. Thus the industry centred chiefly upon the Weald (Sussex and Kent), the Forest of Dean in Gloucestershire, and the Birmingham district, but from the first district named it afterwards wholly departed, following the development of the coal-fields. These have, in some cases, a record from a fairly early date; thus, an indication of the Northumberland coal-supply occurs in a charter of 1234, and the Yorkshire coal-field is first mentioned early in the following century. But how little this source of wealth was developed appears from an estimate of the total production of coal, which gives in 1700 only 2,612,000 tons, and, in 1800, 10,080,000 tons, against the returned total (for the United Kingdom) of 225,181,300 tons in 1900.

The chief minerals raised in England, as stated in the annual home office report on mines and quarries, appear in order of value, thus: coal, iron ore, clay and shale, sandstone, limestone, igneous rocks, salt, tin ore. Coal surpasses all the other minerals to such an extent that, taking the year 1903 as a type, when the total value of the mineral output was very nearly £70,000,000, that of coal is found to approach £61,000,000.

Coal-fields.

The position of the various principal coal-fields has been indicated in dealing with the physical geography of England, but the grouping of the fields adopted in the official report may be given here, together with an indication of the counties covered by each, and the percentage of coal to the total bulk raised in each county. These figures are furnished as a general demonstration of the geographical distribution of the industry, but are based on the returns for 1903.

Coal-fields.	Counties.	Percentage.
Northern	Durham	22·37
	Northumberland . . .	7·48
Yorkshire, &c. . . .	Yorkshire (West Riding)[1] .	17·76
	Derbyshire	9·40
	Nottinghamshire . . .	5·41
Lancashire and Cheshire	Lancashire	15·26
	Cheshire	0·25
Midland[2]	Leicestershire	1·31
	Shropshire	0·50
	Staffordshire	8·10
	Warwickshire	2·12
	Worcestershire	0·44
Small detached . . .	Cumberland	1·37
	Gloucestershire[3] . . .	0·87
	Somersetshire	0·62
	Westmorland	0·07
	Yorkshire (North Riding)[1]	..
	Monmouthshire[4] . . .	6·67

The coal-fields on the eastern flank of the Pennines, therefore, namely, the Northern and the Yorkshire, are seen to be by far the most important in England. The carrying trade in coal is naturally very extensive, and may be considered here. The principal ports for the shipping of coal for export, set down in order of the amount shipped, also fall very nearly into topographical groups, thus:—Newcastle, South Shields and Blyth in the Northern District; Newport in Monmouthshire; Sunderland in the Northern District, Hull, Grimsby and Goole on the Humber, which forms the eastern outlet of the Yorkshire coal-fields; Hartlepool, in the Northern District, and Liverpool. The tonnage annually shipped ranges from about 4½ millions of tons in the case of Newcastle to some half a million in the case of Liverpool; but the export trade of Cardiff in South Wales far surpasses that of any English port, being more than three times that of Newcastle in 1903. The coastwise carrying trade is also important, the bulk being shared about equally by Sunderland, Newcastle, South Shields and Cardiff, while Liverpool has also a large share. Of the whole amount of coal received coastwise at English and Welsh ports (about 13½ million tons), London received considerably over one-half (nearly 8 million tons in 1903). The railways having the heaviest coal traffic are the North-Eastern, which monopolizes the traffic of Northumberland and Durham; the Midland, commanding the Derbyshire, Yorkshire and East Midland traffic, and some of the Welsh; the London & North Western, whose principal sources are the Lancashire, Staffordshire and South Welsh districts; the Great Western and the Taff Vale (South Welsh), with the Great Central, Lancashire & Yorkshire and Great Northern systems.

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[1] The figure 17·76 is the percentage for the whole of Yorkshire.

[2] The West Midlands (Shropshire, &c.) include the coal-fields of Shrewsbury, Leebotwood, Coalbrookdale, the Clee Hills and the Forest of Wyre.

[3] The Forest of Dean coal-field is in Gloucestershire.

[4] The coal-field of Monmouthshire belongs properly to, and in the Report is classified with, the great coal-field of South Wales.

In the face of railway competition, several of the canals maintain a fair traffic in coal, for which they are eminently suitable—the system of the Birmingham navigation, the Aire and Calder navigation of Yorkshire, and the Leeds and Liverpool navigation have the largest shares in this trade.

Iron.

The richest iron-mining district in England and in the United Kingdom is the Cleveland district of the North Riding of Yorkshire. It produces over two-fifths of the total amount of ore raised in the Kingdom, and not much less than one-half of that raised in England. The richness of the ore (about 30% of metal) is by no means so great as the red haematite ore found in Cumberland and north Lancashire (Furness district, &c.). Here the percentage is over 50, but the ore, though the richest found in the kingdom, is less plentiful, about 1½ million tons being raised in 1903 as against more than 5½ millions in Cleveland. There is also a considerable working of brown iron ore at various points in Lincolnshire, Northamptonshire and Leicestershire; with further workings of less importance in Staffordshire and several other districts. The total amount of ore raised in England is about 12½ million tons, but it is not so high, in some iron-fields, as formerly. Some of the lesser deposits have been worked out, and even in the rich Furness fields it has been found difficult to pursue the ore. The import of ore (the bulk coming from Spain) has consequently increased, and the ports where the principal import trade is carried on are those which form the principal outlets of the iron-working districts of Cleveland and Furness, namely Middlesbrough and Barrow-in-Furness.

The geographical distribution of the remaining more important English minerals may be passed in quicker review. Of the metals, the production of copper is a lapsing industry, confined to Cornwall. For the production of lead the principal counties are Derbyshire, Durham and Stanhope, but the industry is not extensive, and is confined to a few places in each county. Quarrying for limestone, clay and sandstone is general in most parts. For limestone the principal localities are in Durham, Derbyshire and Yorkshire, while for chalk-quarrying Kent is pre-eminent among a group of south-eastern counties, including Hampshire, Sussex and Surrey, with Essex. Fireclay is largely raised from coal-mines, while, among special clays, there is a considerable production of china and potter's clays in Cornwall, Devonshire and Dorsetshire. As regards igneous rocks, the Charnwood Forest quarries of Leicestershire, and those of Cornwall, are particularly noted for their granite. Slate is worked in Cornwall and Devon, and also in Lancashire and Cumberland, where, in the Lake District, there are several large quarries. Salt, obtained principally from brine but also as rock-salt, is an important object of industry in Cheshire, the output from that county and Staffordshire exceeding a million tons annually. In Worcestershire, Durham and Yorkshire salt is also produced from brine.

The total number of persons in any way occupied in connexion with mines and quarries in England and Wales in 1901 was 805,185; the number being found to increase rapidly, as from 528,474 in 1881. Coal-mines alone occupied 645,654, and to development in this direction the total increase is chiefly due. The number of ironstone and other mines decreased in the period noticed from 55,907 to 31,606.

Manufacturing Industries.—There are of course a great number of important industries which have a general distribution throughout the country, being more or less fully developed here or there in accordance with the requirements of each locality. But in specifying the principal industries of any county, it is natural to consider those which have an influence more than local on its prosperity. In England, then, two broad classes of industry may be taken up for primary consideration—the textile and the metal. Long after textile and other industries had been flourishing in the leading states of the continent, in the Netherlands, Flanders and France, England remained, as a whole, an agricultural and pastoral country, content to export her riches in wool, and to import them again, greatly enhanced in value, as clothing. It is not to be understood that there were no manufacturing industries whatever. Rough cloth, for example, was manufactured for home consumption. But from Norman times the introduction of foreign artisans, capable of establishing industries which should produce goods fit for distant sale, occupied the attention of successive rulers. Thus the plantation of Flemish weavers in East Anglia, especially at the towns of Worstead (to which is attributed the derivation of the term worsted) and Norwich, dates from the 12th century. The industry, changing locality, like many others, in sympathy with the changes in modern conditions, has long been practically extinct in this district. Then, when religious persecution drove many of the industrial population of the west of Europe away from the homes of their birth, they liberally repaid English hospitality by establishing their own arts in the country, and teaching them to the inhabitants. Thus religious liberty formed part of the foundation of England's industrial greatness. Then came the material agent, machinery propelled by steam. The invention of the steam engine, following quickly upon that of the carding machine, the spinning jenny, and other ingenious machinery employed in textile manufactures, gave an extraordinary impulse to their development, and, with them, that of kindred branches of industry. At the basis of all of them was England's wealth in coal. The vast development of industries in England during the 19th century may be further correlated with certain events in the general history of the time. Insular England was not affected by the disturbing influences of the Napoleonic period in any such degree as was continental Europe Such conditions carried on the work of British inventors in helping to develop industries so strongly that manufacturers were able to take full advantage of the opportunities offered by the American Civil War (in spite of the temporary disability it entailed upon the cotton industry) and by the Franco-German War. These wars tended to paralyse industries in the countries affected, which were thus forced to English markets to buy manufactured commodities. That England, not possessing the raw material, became the seat of the cotton manufacture, was owing to the ingenuity of her inventors. It was not till the later part of the 18th century, when a series of inventions, unparalleled in the annals of industry, followed each other in quick succession, that the cotton manufacture took real root in the country, gradually eclipsing that of other European nations, although a linen manufacture in Lancashire had acquired some prominence as early as the 16th century. But though the superior excellence of their machinery enabled Englishmen to start in the race of competition, it was the discovery of the new motive power, drawn from coal, which made them win the race. In 1815 the total quantity of raw cotton imported into the United Kingdom was not more than 99 millions of pounds, which amount had increased to 152 millions of pounds in 1820, and rose further to 229 millions in 1825, so that there was considerably more than a doubling of the imports in ten years.

Textiles.

The geographical analysis of the cotton industry in England is simple. It belongs almost entirely to south Lancashire—to Manchester and the great industrial towns in its neighbourhood. The industry has extended into the adjacent parts of Cheshire, the West Riding of Yorkshire and Derbyshire. The immediate neighbourhood of a coal-supply influenced the geographical settlement of this industry, like others; and the importance to the manufacture of a moist climate, such as is found on the western slope of the Pennines (in contradistinction to the eastern), must also be considered. The excess of the demand of the factories over the supply of raw material has become a remarkable feature of the industry in modern times.

The distribution of the woollen industries peculiarly illustrates the changes which have taken place since the early establishment of manufacturing industries in England. It has been seen how completely the industry has forsaken East Anglia. Similarly, this industry was of early importance along the line of the Cotteswold Hills, from Chipping Camden to Stroud and beyond, as also in some towns of Devonshire and Cornwall, but though it survives in the neighbourhood of Stroud, the importance of this district is far surpassed by that of the West Riding of Yorkshire, where the woollen industry stands pre-eminent among the many which, as already indicated, have concentrated there. As the cotton industry has in some degree extended from Lancashire into the West Riding, so has the woollen from the West Riding into a few Lancastrian towns, such as Rochdale. Among other textile industries attaching to definite localities may be mentioned the silk manufacture of eastern Staffordshire and Cheshire, as at Congleton and Macclesfield; and the hosiery and lace manufactures of Nottinghamshire, Derbyshire and Leicestershire.

Metal-working.

The metal-working industries also follow a geographical distribution, mainly governed by the incidence of the coal-fields, as well as by that of the chief districts for the production of iron-ore already indicated, such as the Cleveland and Durham and the Furness districts. But the district most intimately connected with every branch of this industry, from engineering and the manufacture of tools, &c., to working in the precious metals, is the "Black Country" and Birmingham district of Staffordshire, Warwickshire and Worcestershire. Apart from this district, large quantities of iron and steel are produced in the manufacturing areas of Lancashire and the West Riding of Yorkshire, and here, as in the Black Country, are found certain centres especially noted for the production of an individual class of goods, such as Sheffield for its cutlery. There is, further, a large engineering industry in the London district; and important manufactures of agricultural implements are found at many towns of East Anglia and in other agricultural localities. Birmingham and Coventry may be specially mentioned as centres of the motor and cycle building industry. The establishment of their engineering and other workshops at certain centres by the great railway companies has important bearing on the concentration of urban population. For example, by this means the London & North Western and the Great Western companies have created large towns in Crewe and Swindon respectively.

Certain other important industries may be localized. Thus, the manufacture of china and pottery, although widespread, is primarily identified with Staffordshire, where an area comprising Stoke and a number of contiguous towns actually bears the name of the Potteries (*q.v.*) Derby has a similar fame, while the manufacture of glass, important in Leeds and elsewhere in the West Riding of Yorkshire, and in the London district, centres peculiarly upon a single town in South Lancashire—St Helens. Finally, the bootmakers of Northamptonshire (at Wellingborough, Rushden, &c.), and the strawplaiters of Bedfordshire (at Luton and Dunstable), deserve mention among localized industrial communities.

Occupations of the People.—The occupations of the people may be so considered as to afford a conception of the relative extent of the industries already noticed, and their importance in relation to other occupations. The figures to be given are those of the census of 1901, and embrace males and females of 10 years of age and upwards. The textile manufactures occupied a total of 994,668 persons, of which the cotton industry occupied 529,131. A high proportion of female labour is characteristic of each branch of this industry, the number of females employed being about half as many again as that of males (the proportion was 1·47 to 1 in 1901). The metal industries of every sort occupied 1,116,202; out of which those employed in engineering (including the building of all sorts of vehicles) numbered 741,346. Of the other broad classes of industry already indicated, the manufacture of boots and shoes occupied 229,257, and the pottery and glass manufactures 90,193. For the rest, the numbers of persons occupied in agriculture has been quoted as 1,192,167; and of those occupied in mining as 805,185. Among occupations not already detailed, those of the male population include transport of every sort (1,094,301), building and other works of construction (1,042,864), manufacture of articles of human consumption, lodging, &c. (774,291), commerce, banking, &c. (530,685), domestic service, &c. (304,195), professional occupations (311,618). The service of government in every branch occupied 171,687. Female workers were occupied to the number of 1,664,381 in domestic service generally. Tailoring and the textile clothing industries and trade generally occupied 602,881; teaching 172,873; nursing and other work in institutions 104,036; and the civil service, clerkships and similar occupations 82,635.

IX. TERRITORIAL DIVISIONS, &c.

For various administrative and other purposes England and Wales have been divided, at different times from the Saxon period onwards, into a series of divisions, whose boundaries have been adjusted as each purpose demanded, without much attempt to establish uniformity. Therefore, although the methods of local government are detailed below (Section X.), and other administrative arrangements are described under the various headings dealing with each subject, it is desirable to give here, for ease of reference and distinction, a schedule of the various areas into which England and Wales are divided. The areas here given, excepting the Poor Law Union, are those utilized in the Census Returns (see the General Report, 1901).

England and Wales; Areas.

County (ancient or geographical).

Parliamentary Areas	Division. Borough.	
Administrative Areas	Administrative County.	
	County Borough. Municipal Borough. Urban District (other than borough)	(City, town)
	Rural District. Civil Parish. Poor Law Union.	
Judicial Areas	County Court Circuit. County Court District. Petty Sessional Division.	
Ecclesiastical Areas	Province. Diocese. Parish.	
Registration Areas	Division. County. District. Subdistrict	

The ancient counties were superseded for most practical purposes by the administrative counties created by the Local Government Act of 1888. The ancient division, however, besides being maintained in general speech and usage, forms the basis on which the system of distribution of parliamentary representation now in force was constructed. The Redistribution of Seats Act 1885 made a new division of the country into county and borough constituencies. All the English counties, with the exception of Rutland, are divided into two or more constituencies, each returning one member, the number of English county parliamentary areas being 234. In Wales eight smaller or less populous counties form each one parliamentary constituency, while the four larger are divided, the number of Welsh county parliamentary areas being 19. The number of county areas for parliamentary purposes in England and Wales is thus 253, and the total number of their representatives is the same. Outside the county constituencies are the parliamentary boroughs. Of these there are 135 in England, one of them, Monmouth district, being made up of three contributory boroughs, while many are divided into several constituencies, the number of borough parliamentary areas in England being 205, of which 61 are in the metropolis. Of the 205 borough constituencies, 184 return each one member, and 21 return each two members so that the total number of English borough members is 226. Besides the county and borough members there are in England five university members, namely, two for Oxford, two for Cambridge and one for London. In Wales there are 10 borough parliamentary areas, all of which, except Merthyr Tydfil and Swansea town division, consist of groups of several contributory boroughs. Each Welsh borough constituency returns one member, except Merthyr Tydfil, which returns two, so that there are eleven Welsh borough members.

The administrative counties, created in 1888, number 62, each having a county council. They sometimes coincide in area with the ancient counties of the same name, but generally differ, in a greater or less degree, for the following reasons—(1) in some cases an ancient county comprises (approximately) two or more administrative counties, in the formation of which names of some ancient divisions were preserved, thus:—

Ancient County.	*Administrative County.*
Cambridgeshire	Cambridge. Isle of Ely.
Hampshire	Southampton. Isle of Wight.
Lincolnshire	Parts of Holland. Parts of Kesteven. Parts of Lindsey.
Northamptonshire. . . .	Northampton. Soke of Peterborough.
Suffolk	East Suffolk. West Suffolk.
Sussex	East Sussex. West Sussex.
Yorkshire	East Riding. North Riding. West Riding.

The Scilly Islands, which form part of the ancient county of Cornwall, without being ranked as an administrative county, are provided with a county council and have separate administration. (2) The administrative county of London has an area taken entirely from the counties of Middlesex, Kent and Surrey. (3) All boroughs which on June 1, 1888, had a population of not less than 50,000, boroughs which were already counties having a population of not less than 20,000, and a few others, were formed into separate administrative areas, with the name of county boroughs. Of these there were originally 61, but their number subsequently increased. (4) Provision was made by the act of 1888 for including entirely within one administrative county each of such urban districts as were situated in more than one ancient county.

The various urban and rural districts are described below (Section X.). The *Civil Parish* is defined (Poor Law Amendment Act 1866) as "a place for which a separate poor-rate is or can be made," but the parish council has local administrative functions beyond the administration of the poor law. The civil parish has become more or less divorced in relationship from the *Ecclesiastical Parish* (a division which probably served in early times for administrative purposes also), owing to successive independent alterations in the boundaries of both (see PARISH). *Poor-law unions* are groups of parishes for the local administration of the Poor Laws. Within the unions the local poor-law authorities are the *Board of Guardians*. In rural districts the functions of these boards are, under the Local Government Act of 1894, performed by the district councils, and in other places their constitution is similar to that of the urban and district councils (see POOR LAW).

Registration districts are generally, but not invariably, coextensive with unions of the same name. These districts are divided into sub-districts, within which the births and deaths are registered by registrars appointed for that purpose. *Registration counties* are groups of registration districts, and their boundaries differ more or less from those both of the ancient and the administrative counties. In England and Wales there are eleven registration divisions, consisting of groups of registration counties (see REGISTRATION). (O. J. R. H.)

X. LOCAL GOVERNMENT

The Reform Act of 1832 was the real starting-point for the overhauling of English local government. For centuries before, from the reign of Edward III., under a number of statutes and commissions, the administrative work in the counties had been in the hands of the country gentlemen and the clergy, acting as justices of the peace, and sitting in petty sessions and quarter sessions. Each civil or "poor law" parish was governed by the vestry and the overseers of the poor, dating from the Poor Law of 1601; the vestry, which dealt with general affairs, being presided over by the rector, and having the churchwardens as its chief officials. In 1782 Gilbert's Act introduced the grouping of parishes for poor law purposes, and boards of guardians appointed by the justices of the peace. The municipal boroughs (246 in England and Wales in 1832) were governed by mayor, aldermen, councillors and a close body of burgesses or freemen, a narrow oligarchy. Reform began with the Poor Law Amendment Act of 1834, grouping the parishes into Unions, making the boards of guardians mainly elective, and creating a central poor law board in London. The Municipal Corporations Act followed in 1835, giving all ratepayers the local franchise. And as a result of the failure of the Public Health Board established in 1848, the royal commission of 1869–1871 led to the establishment in 1871 of the Local Government Board as a central supervising body. Meanwhile, the school boards resulting from the Education Act of 1870 brought local government also into the educational system; and the Public Health Act of 1875 put further duties on the local authorities. By 1888 a new state of chaos had grown up as the result of the multiplication of bodies, and the new Redistribution Act of 1885 paved the way for a further reorganization of local matters by the Local Government Act of 1888, followed by that of 1894. In London, which required separate treatment, a similar process had been going on. The Metropolis Management Act of 1855 established (outside the city) two classes of parishes—the first class with vestries of their own, the second class grouped under district boards elected by the component vestries; and the Metropolitan Board of Works (abolished in 1888), elected by the vestries and the district boards, was made the central authority.

In 1867 the Metropolitan Asylums Board took over its work from the metropolitan boards of guardians. See further CHARITY AND CHARITIES, PUBLIC HEALTH, EDUCATION, JUSTICE OF THE PEACE, VESTRY, &c.

The system of local government now existing in England (see also the article LOCAL GOVERNMENT) may be said to have been founded in 1888, when the Local Government Act of that year was passed. Since then the entire system of the government of districts and parishes has been reorganized with due regard to the preceding legislation. The largest area of local government is the county; next to that the sanitary district, urban or rural, including under this head municipal boroughs, all of which are urban districts. The parish is, speaking generally, the smallest area, though, as will hereafter be seen, part of a parish may be a separate area for certain purposes; and there may be united districts or parishes for certain purposes. It will be convenient to follow this order in the present article. But before doing so, it should be pointed out that all local bodies in England are to some extent subject to the control of central authorities, such as the privy council, the home office, the Board of Agriculture, the Board of Trade, the Board of Education or the Local Government Board.

The county and the county council.

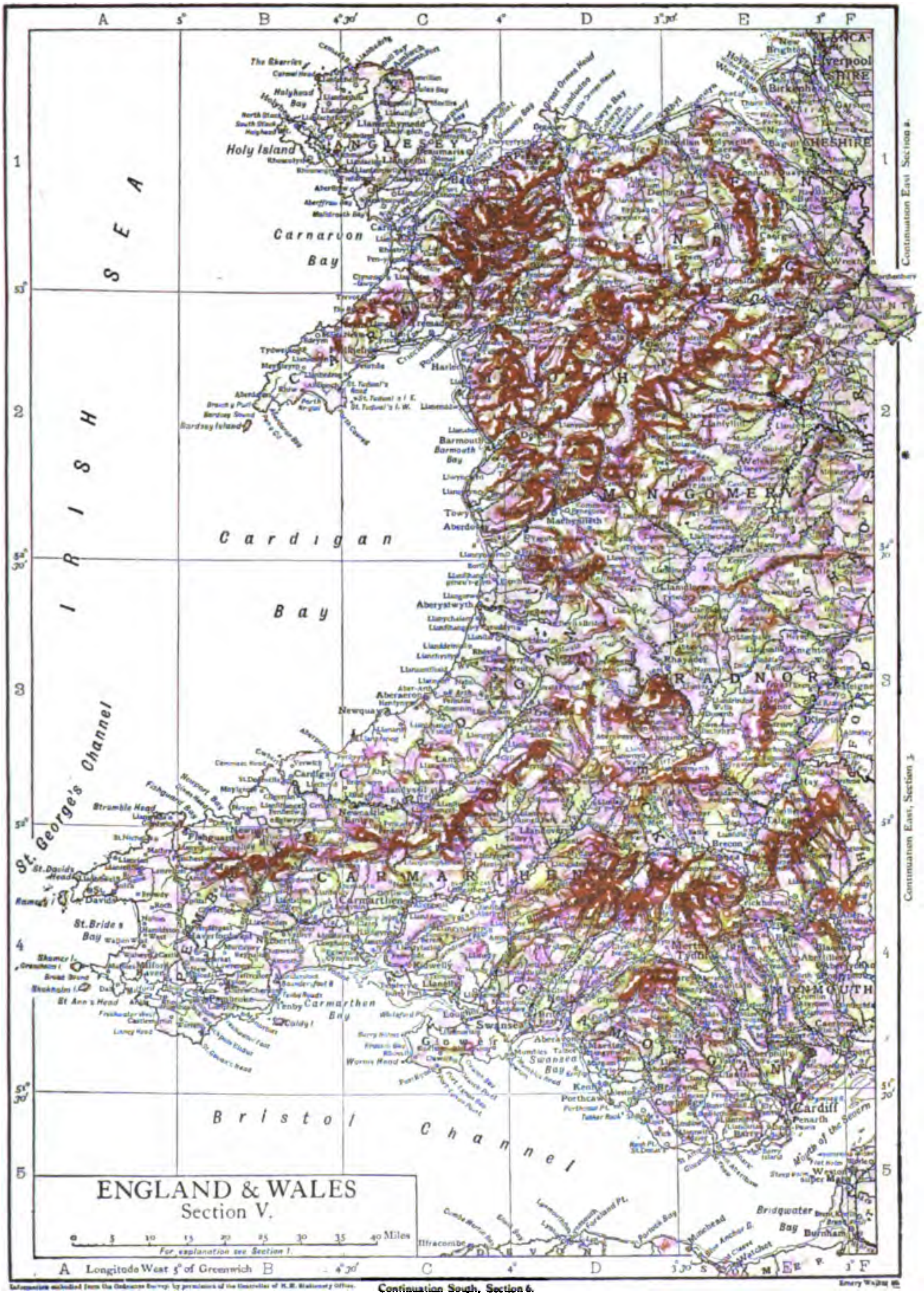
The Administrative County.—The administrative county includes all places within its area, with two important exceptions. The first of these consists of the county borough. The second is the quarter sessions borough, which forms part of the county for certain specified purposes only. But the county includes all other places, such as liberties and franchises, which before 1888 were exempt from contribution to county rate. For each administrative county a county council is elected. For purposes of election the entire county is divided into divisions corresponding to the wards of a municipal borough, and one councillor is elected for each electoral division.

County council elections.

The electors are the county electors, *i.e.* in a borough the persons enrolled as burgesses, and in the rest of the county the persons who are registered as county electors, *i.e.* those persons who possess in a county the same qualification as burgesses must have in a borough, and are registered.

The qualification of a burgess or county elector is substantially the occupation of rated property within the borough or county, residence during a qualifying period of twelve months within the borough or county, and payment of rates for the qualifying property. A person so qualified is entitled to be enrolled as a burgess, or registered as a county elector (as the case may be), unless he is alien, has during the qualifying period received union or parochial relief or other alms, or is disentitled under some act of parliament such as the Corrupt Practices Act, the Felony Act, &c. The lists of burgesses and county electors are prepared annually by the overseers of each parish in the borough or county, and are revised by the revising barrister at courts holden by him for the purpose in September or October of each year. When revised they are sent to the town clerk of the borough, or to the clerk of the peace of the county, as the case may be, by whom they are printed. The lists are conclusive of the right to vote at an election, although on election petition involving a scrutiny the vote of a person disqualified by law may be struck off, notwithstanding the inclusion of his name in a list of voters.

The qualification of a county councillor is similar to that required of a councillor in a municipal borough, with some modifications. A person may be qualified in any one of the following ways: viz. by being (1) enrolled as a county elector, and possessed of a property qualification consisting of the possession of real or personal property to the amount of £1000 in a county having four or more divisions, or of £500 in any other county, *or* the being rated to the poor rate on an annual value of £30 in a county having four or more divisions, or of £15 in any other county; (2) enrolled in the non-resident list, and possessed of the same property qualification (the non-resident list contains the names of persons who are qualified for enrolment in all respects save residence in the county or within 7 m. thereof, and are actually resident beyond the 7 m. and within 15 m.); (3) entitled to elect to the office of county councillor (for this qualification no property qualification is required, but the office of a councillor elected on this qualification only becomes vacant if for six months he ceases to reside within the county); (4) a peer owning property in the county; (5) registered as a parliamentary voter in respect of the ownership of property in the county. Clerks in holy orders and ministers of religion are not disqualified as they are for being borough councillors, but in other respects the persons disqualified to be elected for a county are the same as those disqualified to be elected for a borough. Such disqualifications include the holding of any office or place of profit under the council other than the office of chairman, and the being concerned or interested in any contract or



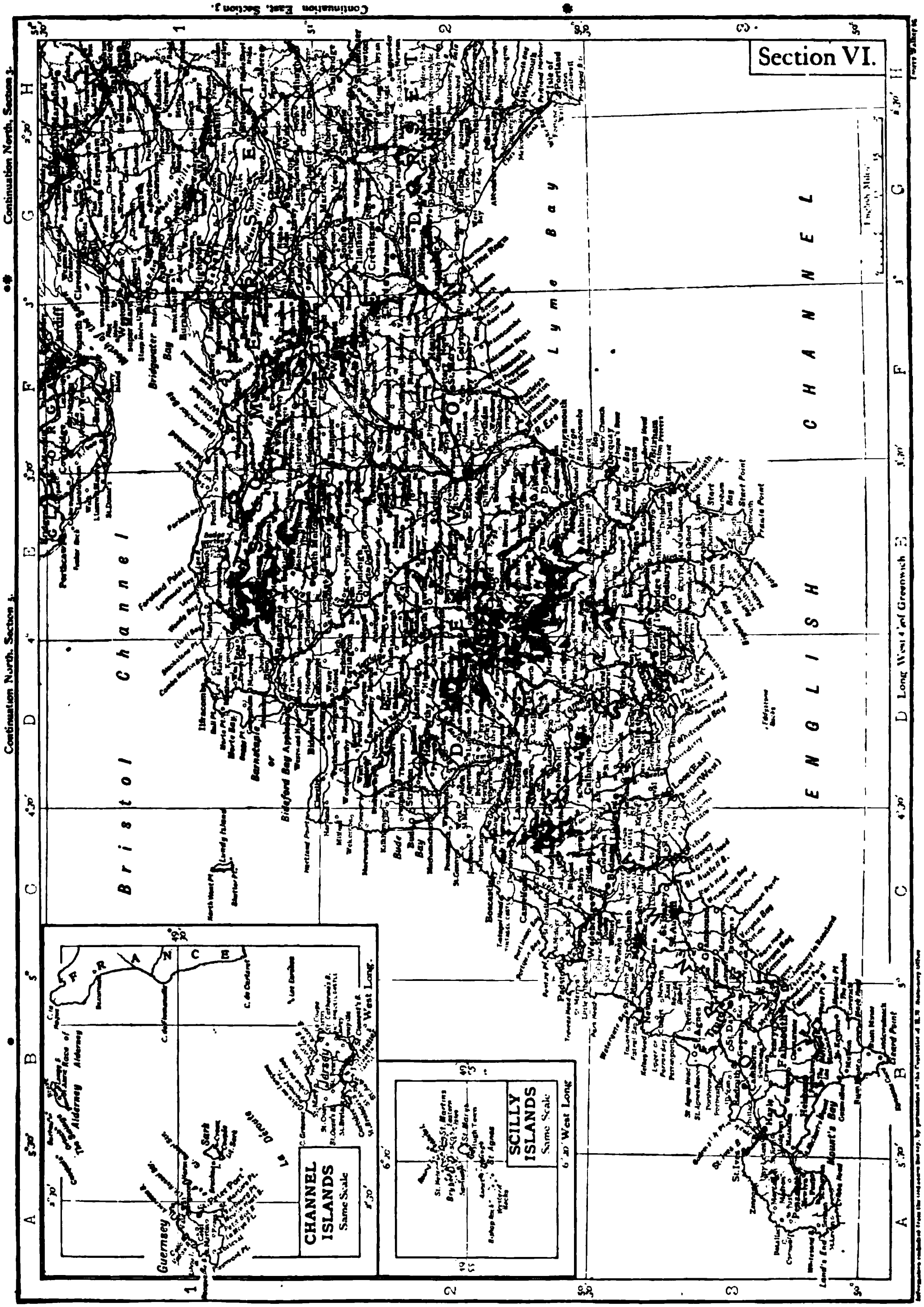
ENGLAND & WALES
Section V.

Information extracted from the Ordnance Survey by permission of the Controller of H.M. Stationery Office.

Continuation South, Section 6.

Emery Walker sc.

Section VI.



Continuation East, Section 3.
Continuation North, Section 3.
Continuation North, Section 5.
Bristol Channel
Lyme Bay
ENGLISH CHANNEL
Long West of Greenwich
CHANNEL ISLANDS
Same Scale
SCILLY ISLANDS
Same Scale
FRANCE
Guernsey
Alderney
Sark
Jersey
Lundy Island
Cardiff
Bridgwater Bay
Barnstaple or Bideford Bay
Ilfracombe
Tor Bay
Start Point
Lizard Point
Land's End
Mount's Bay
Falmouth
Fowey
Looe (East)
Looe (West)
Bude Bay
Whitesand Bay
St. Austell B.
St. Ives B.
Isle of Portland
Dorchester
Exmouth
Teignmouth
Torquay
Dartmouth
Bolt Head
Dodman Point
English Miles
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employment with, by or on behalf of the council. Women, other than married women, are eligible.

County councillors are elected for a term of three years, and at the end of that time they retire together. The ordinary day of election is the 8th March, or some day between the 1st and 8th March fixed by the council. Candidates are nominated in writing by a nomination paper signed by a proposer and seconder, and subscribed by eight other assenting county electors of the division; and in the event of there being more valid nominations than vacancies a poll has to be taken in the manner prescribed by the Ballot Act 1872. Corrupt and illegal practices at the election are forbidden by a statute passed in the year 1894, which imposes heavy penalties and disqualifications for the offences which it creates. These offences include not only treating, undue influence, bribery and personation, but certain others, of which the following are the chief. Payment on account of the conveyance of electors to or from the poll; payment for any committee room in excess of a prescribed number; the incurring of expenses in and about the election beyond a certain maximum; employing, for the conveyance of electors to or from the poll, hackney carriages or carriages kept for hire; payments for bands, flags, cockades, &c.; employing for payment persons at the election beyond the prescribed number; printing and publishing bills, placards or posters which do not disclose the name and address of the printer or publisher; using as committee rooms or for meetings any licensed premises, or any premises where food or drink is ordinarily sold for consumption on the premises, or any club premises where intoxicating liquor is supplied to members. In the event of an illegal practice, payment, employment or hiring, committed or done inadvertently, relief may be given by the High Court, or by an election court, if the validity of the election is questioned on petition; but unless such relief is given (and it will be observed that it cannot be given for a *corrupt* as distinguished from an illegal practice), an infringement of the act may void the election altogether. The validity of the election may be questioned by election petition. Indeed, this is the only method when it is sought to set aside the election on any of the usual grounds, such as corrupt or illegal practices, or the disqualification of the candidate at the date of election. Election petitions against county councillors and members of other local bodies (borough councillors, urban and rural district councillors, members of school boards and boards of guardians) are classed together as municipal election petitions, and are heard in the same way, by a commissioner who must be a barrister of not less than fifteen years' standing. The petition is tried in open court at some place within the county, the expenses of the court being provided in the first instance by the Treasury, and repaid out of the county rates, except in so far as the court may order them to be paid by either of the parties. If a candidate is unseated a casual vacancy is created which has to be filled by a new election. A county councillor is required to accept office by making and subscribing a declaration in the prescribed form that he will duly and faithfully perform the duties of the office, and that he possesses the necessary qualification. The declaration may be made at any time within three months after notice of election. If the councillor does not make it within that time, he is liable to a fine the amount of which, if not determined by bye-law of the council, is £25 in the case of an alderman or councillor, and £50 in the case of the chairman. Exemption may, however, be claimed on the ground of age, physical or mental incapacity, previous service, or payment of the fine within five years, or on the ground that the claimant was nominated without his consent. If during his term of office a member of the council becomes bankrupt, or compounds with his creditors, or is (except in case of illness) continuously absent from the county, being chairman for more than two months, or being alderman or councillor for more than six months, his office becomes vacant by declaration of the council. In the case of disqualification by absence, the same fines are payable as upon non-acceptance of office, and the same liability arises on resignation. Acting without making the declaration, or without being qualified at the time of making the declaration, or after ceasing to be qualified, or after becoming disqualified, involves liability to a fine not exceeding £50, recoverable by action.

Chairman, &c.

The councillors who have been elected come into office on the 8th March in the year of election. The first quarterly meeting of the newly-elected council is held on the 16th or on such other day within ten days after the 8th as the county council may fix. The first business at that meeting is the election of the chairman, whose office corresponds to that of the mayor in a borough. He is elected for the ensuing year, and holds office until his successor has accepted office. The chairman must be a fit person, elected by the council from their own body or from persons qualified to be councillors. He may receive such remuneration as the council think reasonable. He is by virtue of his office a justice of the peace for the county. Having elected the chairman, the meeting proceeds to the election of aldermen, whose number is one-third of the number of councillors, except in London, where the number is one-sixth. An alderman must be a councillor or a person qualified to be a councillor. If a councillor is elected he vacates his office of councillor, and thus creates a casual vacancy in the council. In every third year one-half of the whole number of aldermen go out of office, and their places are filled by election, which is conducted by means of voting papers. It will be observed, therefore, that while a county councillor holds office for three years, a county alderman holds office for six. The council may also appoint a vice-chairman who holds office during the term of office of the chairman; in London the council have power to appoint a paid deputy chairman.

Officers.

It may be convenient at this point to refer to the officers of the county council. Of these, the chief are the clerk, the treasurer, and the surveyor. Before 1888 the clerk of the peace was appointed in a county by the *custos rotulorum*. He held office for life during good conduct, and had power to act by a sufficient deputy. Under the act of 1888 existing clerks of the peace became clerks of the councils of their counties, holding office by the same tenure as formerly, except in the county of London, where the offices were separated. Thereafter a new appointment to the offices of clerk of the peace and clerk of the county council was to be made by the standing joint-committee, at whose pleasure he is to hold office. The same committee appoint the deputy-clerk, and fix the salaries of both officers. The clerk of the peace was formerly paid by fees which were fixed by quarter sessions, but he is now generally, if not in every case, paid by salary, the fees received by him being paid into the county fund. The county council may also employ such other officers and servants as they may think necessary.

Business.

Subject to a few special provisions in the Local Government Act of 1888, the business of the county council is regulated by the provisions laid down in the Municipal Corporations Act 1882, with regard to borough councils. There are four quarterly meetings in every year the dates of which may be fixed by the council, with the exception of that which must be held on the 16th March or some day within ten days after the 8th of March as already noticed when treating of elections. Meetings are convened by notices sent to members stating the time and place of the meeting and the business to be transacted. The chairman, or in his absence the vice-chairman, or in the absence of both an alderman or councillor appointed by the meeting, presides. All questions are determined by the votes of the majority of those present and voting, and in case of equality of votes the chairman has a casting vote. Minutes of the proceedings are taken, and if signed by the chairman at the same or the next meeting of the council are evidence of the proceedings. In all other respects the business of the council is regulated by standing orders which the council are authorized to make. Very full power is given to appoint committees, which may be either general or special, and to them may be delegated, with or without restrictions or conditions, any of their powers or duties except that of raising money by rate or loan. Power is also given to appoint joint-committees with other county councils in matters in which the two councils are jointly interested, but a joint-committee so appointed must not be confounded with the standing joint-committee of the county council and the quarter sessions, which is a distinct statutory body and is elsewhere referred to. The finance committee is also a body with distinct duties.

Relation of county to boroughs.

In order to appreciate some of the points relating to the finance of a county council, it is necessary to indicate the relations between an administrative county and the boroughs which are locally situated within it. The act of 1888 created a new division of boroughs into three classes; of these the first is the county borough. A certain number of boroughs which either had a population of not less than 50,000, or were counties of themselves, were made counties independent of the county council and free from the payment of county rate. In such boroughs the borough council have, in addition to their powers under the Municipal Corporations Act 1882, all the powers of a county council under the Local Government Act. They are independent of the county council, and their only relation is that in some instances they pay a contribution to the county, *e.g.* for the cost of assizes where there is no separate assize for the borough. The boroughs thus constituted county boroughs enumerated in the schedule to the Local Government Act 1888 numbered sixty-one, but additional ones are created from time to time.

The larger quarter sessions boroughs, *i.e.* those which had, according to the census of 1881, a population exceeding 10,000, form part of the county, and are subject to the control of the county council, but only for certain special purposes. The reason for this is that while in counties the powers and duties under various acts were entrusted to the county authority, in boroughs they were exercised by the borough councils. In the class of boroughs now under consideration these powers and duties are retained by the borough council; the county council exercise no jurisdiction within the borough in respect of them; and the borough is not rated in respect of them to the county rate. The acts referred to include those relating to the diseases of animals, destructive insects, explosives, fish conservancy, gas meters, margarine, police, reformatory and industrial schools, riot (damages), sale of food and drugs, weights and measures. But for certain purposes these boroughs are part of the county and rateable to county rate, *e.g.* main roads, cost of assizes and sessions, and in certain cases pauper lunatics. The county councillors elected for one of these boroughs may not vote on any matter involving expenditure on account of which the borough is not assessed to county rate.

The third class of boroughs comprises those which have a separate court of quarter sessions, but had according to the census of 1881 a population of less than 10,000. All such boroughs form part of the county for the purposes of pauper lunatics, analysts, reformatory and industrial schools, fish conservancy, explosives, and, of course, the purposes for which the larger quarter sessions boroughs also form part of the county, such as main roads, and are assessed to county rate accordingly. And in a borough, whether a quarter sessions borough or not, which had in 1881 a population of less than 10,000, all the powers which the borough council formerly possessed as to police, analysts, diseases of animals, gas meters, and weights and measures cease and are transferred to the county council, the boroughs becoming in fact part of the area of the county for these purposes.

It will be seen, therefore, that for some purposes, called in the act general county purposes, the entire county, including all boroughs other than county boroughs, is assessed to the county rate; while for others, called special county purposes, certain boroughs are now assessed. This explanation is necessary in order to appreciate what has now to be said about county finance. But before leaving the consideration of the area of the county it may be added that all liberties and franchises are now merged in the county and subject to the jurisdiction of the county council.

Finance.

The county council is a body corporate with power to hold lands. Its revenues are derived from various sources which will presently be mentioned, but all receipts have to be carried to the county fund, either to the general county account if applicable to general county purposes, or to the special county account if applicable to special county purposes. The county council may, with the consent of the Local Government Board, borrow money on the security of the county fund or any of its revenues, for consolidating the debts of the county; purchasing land or buildings; any permanent work or other thing, the cost of which ought to be spread over a term of years; making advances in aid of the emigration or colonization of inhabitants of the county; and any purpose for which quarter sessions or the county council are authorized by any act to borrow. If, however, the total debt of the council will, with the amount proposed to be borrowed, exceed one-tenth of the annual rateable value of the property in the county, the money cannot be borrowed unless under a provisional order made by the Local Government Board and confirmed by parliament. The period for which a loan is made is fixed by the county council with the consent of the Local Government Board, but may not exceed thirty years, and the mode of repayment may be by equal yearly or half-yearly instalments of principal or of principal and interest combined, or by means of a sinking fund invested and applied in accordance with the Local Government Acts. The loans authorized may be raised by debentures or annuity certificates under these acts, or by the issue of county stock, and in some cases by mortgage.

The county council must appoint a finance committee for regulating and controlling the finance of the county, and the council cannot make any order for the payment of money out of the county fund save on the recommendation of that committee. Moreover, the order for payment of any sum must be made in pursuance of an order of the council signed by three members of the finance committee present at the meeting of the council, and countersigned by the clerk. The order is directed to the county treasurer, by whom authorized payments are then made.

The accounts of the receipts and expenditure of the county council are made up for the twelve months ending the 31st March in each year, and are audited by a district auditor. The form in which the accounts must be made up is prescribed by the Local Government Board. The auditor is a district auditor appointed by the Local Government Board under the District Auditors Act 1879, and in respect of the audit the council is charged with a stamp duty, the amount of which depends on the total of the expenditure comprised in the financial statement. Before each audit the auditor gives notice of the time and place appointed, and the council publish the appointment by advertisement. A copy of the accounts has to be deposited for public inspection for seven days before the audit. The auditor has the fullest powers of investigation; he may require the production of any books or papers, and he may require the attendance before him of any person accountable. Any owner of property or ratepayer may attend the audit and object to the accounts, and either on such objection or on his own motion the auditor may disallow any payment and surcharge the amount on the persons who made or authorized it. Against any allowance or surcharge appeal lies to the High Court if the question involved is one of law, or to the Local Government Board, who have jurisdiction to remit a surcharge if, in the circumstances, it appears to them to be fair and equitable to do so. It will be seen that this is really an effective audit.

Revenue of county council.

The sources of revenue of the council are the exchequer contribution, income from property and fees, and rates. Before 1888 large grants of money had been made annually to local authorities in aid of local taxation. Such grants represented a contribution out of taxation for the most part arising out of property other than real property, while local taxation fell on real property alone. By the act of 1888 it was provided that for the future such annual grants should cease, and that other payments should be made instead thereof. The commissioners of Inland Revenue pay into the Bank of England, to an account called "the local taxation account," the sums ascertained to be the proceeds of the duties collected by them in each county on what are called local taxation licences, which include licences for the sale of intoxicating liquor, licences on dogs, guns, establishment licences, &c. The amount so ascertained to have been collected in each county is paid under direction of the Local Government Board to the council of that county. The commissioners of Inland Revenue also pay into the same account a sum equal to 1½% on the net value of personal property in respect of which estate duty is paid. Under the Local Taxation (Customs and Excise) Act 1890, certain duties imposed on spirits and beer (often referred to as "whisky money") are also to be paid to "the local taxation account." The sums so paid in respect of the duties last above mentioned, and in respect of the estate duty and spirits and beer additional duties, are distributed among the several counties in proportion to the share which the Local Government Board certify to have been received by each county during the financial year ending the 31st March 1888, out of the grants theretofore made out of the exchequer in aid of local rates. The payments so made out of "the local taxation account" to a county council are paid to the county fund, and carried to a separate account called "the Exchequer contribution account." The money standing to the credit of this account is applied: (i.) in paying any costs incurred in respect thereof or otherwise chargeable thereon; (ii.) in payment of the sums required by the Local Government Act 1888 to be paid in substitution for local grants; (iii.) in payment of the new grant to be made by the county council in respect of the costs of union officers; and (iv.) in repaying to "the general county account" of the county fund the costs on account of general county purposes for which the whole area of the county (including boroughs other than county boroughs) is liable to be assessed to county contribution. Elaborate provision is made for the distribution of the surplus (if any), with a view to securing a due share being paid to the quarter sessions boroughs.

The payments which the county council have to make in substitution for the local grants formerly made out of Imperial funds include payments for or towards the remuneration of the teachers in poor-law schools and public vaccinators; school fees paid for children sent from a workhouse to a public elementary school; half of the salaries of the medical officer of health and the inspector of nuisances of district councils; the remuneration of registrars for births and deaths; the maintenance of pauper lunatics; half of the cost of the pay and clothing of the police of the county, and of each borough maintaining a separate police force. In addition to the grants above mentioned, the county council is required to grant to the guardians of every poor-law union wholly or partly in their county an annual sum for the costs of the officers of the union and of district schools to which the union contributes. Another source is the income of any property belonging to the council, but the amount of this is usually small. The third source of revenue consists of the fees received by the different officers of the county councils or of the joint-committee. For example, fees received by the clerk of the peace, inspectors of weights and measures, and the like. These fees are paid into the county fund, and carried either to "the general county account" or, if they have been received in respect of some matter for which part only of the county is assessed, then to the special account to which the rates levied for that purpose are carried. The remaining source of income of a county council is the county rate, the manner of levying which is hereafter stated.

Powers transferred from quarter sessions.

Of the powers and duties of county councils, it may be convenient to treat of these first, in so far as they are transferred to or conferred on them by the Local Government Act 1888, under which they were created, and afterwards in so far as they have been conferred by subsequent legislation. Before the passing of the Local Government Act 1888, the only form of county government in England was that of the justices in quarter sessions (*q.v.*). Quarter sessions were originally a judicial body, but being the only body having jurisdiction over the county as a whole, certain powers were conferred and certain duties imposed upon them with reference to various matters of county government from time to time. The principal object of the act of 1888 was to transfer these powers and duties from the quarter sessions to the new representative body—the county council; and it may be said that substantially the whole of the administrative business of quarter sessions was thus transferred.

The subjects of such transfer include (i.) the making, assessing and levying of county, police, hundred and all rates, and the application and expenditure thereof, and the making of orders for the payment of sums payable out of any such rate, or out of the county stock or county fund, and the preparation and revision of the basis or standard for the county rate. With regard to the county rate, a few words of description may be sufficient here. The council appoint a committee called a county rate committee, who from time to time prepare a basis or standard for county rate, that is to say, they fix the amount at which each parish in the county shall contribute its quota to the county rate. As a general rule the poor-law valuations are followed, but this is not universally the case, some county councils adopting the assessment to income tax, schedule A, and others forming an independent valuation of their own. The overseers of any parish aggrieved by the basis may appeal against it to quarter sessions, and it is to be noticed that this appeal is not interfered with, the transfer of the duties of justices relating only to administrative and not to judicial business. When a contribution is required from county rate, the county council assess the amount payable by each parish according to the basis previously made, and send their precept to the guardians of the unions comprising the several parishes in the county, the guardians in their turn requiring the overseers of each parish to provide the necessary quota of that parish out of the poor rate, and the sum thus raised goes into the county fund. The police rate is made for the purpose of defraying the expenses of the county police. It is made on the same basis as the county rate, and is levied with it. The hundred rate is seldom made, though in some counties it may be made for purposes of main roads and bridges chargeable to the hundred as distinguished from the county at large; (ii.) the borrowing of money; (iii.) the passing of the accounts of, and the discharge of the county treasurer; (iv.) shire halls, county halls, assize courts, the judges' lodgings, lock-up houses, court houses, justices' rooms, police stations and county buildings, works and property; (v.) the licensing under any general act of houses and other places for music or for dancing, and the granting of licences under the Racecourses Licensing Act 1879; (vi.) the provision, enlargement, maintenance and management and visitation of, and other dealing with, asylums for pauper lunatics; (vii.) the establishment and maintenance of, and the contribution to, reformatory and industrial schools; (viii.) bridges and roads repairable with bridges, and any powers vested by the Highways and Locomotives Amendment Act 1878 in the county authority. It may be observed that bridges have always been at common law repairable by the county, although, with regard to bridges erected since the year 1805, these are not to be deemed to be county bridges repairable by the county unless they have been erected under the direction or to the satisfaction of the county surveyor. The common-law liability to repair a bridge extends also to the road or approaches for a distance of 300 ft. on each side of the bridge. Of the powers vested in the county authority under the Highway Act 1878, the most important are those relating to main roads, which are specially noticed hereafter; (ix.) the tables of fees to be taken by and the costs to be allowed to any inspector, analyst or person holding any office in the county other than the clerk of the peace and the clerks of the justices; (x.) the appointment, removal and determination of salaries of the county treasurer, the county surveyor, the public analysts, any officer under the Explosives Act 1875, and any officers whose remuneration is paid out of the county rate, other than the clerk of the peace and the clerks of the justices; (xi.) the salary of any coroner whose salary is payable out of the county rate, the fees, allowances and disbursements allowed to be paid by any such coroner, and the division of the county into coroners' districts and the assignments of such districts; (xii.) the division of the county into polling districts for the purposes of parliamentary elections, the appointment of the places of election, the places of holding courts for the revision of the lists of voters, and the costs of, and other matters to be done for the registration of parliamentary voters; (xiii.) the execution as local authority of the acts relating to contagious diseases of animals, to destructive insects, to fish conservancy, to wild birds, to weights and measures, and to gas meters, and of the Local Stamp Act 1869; (xiv.) any matters arising under the Riot (Damages) Act 1886. Under this act compensation is payable out of the police rate to any person whose property has been injured, stolen or destroyed by rioters; (xv.) the registration of rules of scientific societies, the registration of charitable gifts, the certifying and recording of places of religious worship, the confirmation and record of the rules of loan societies. These duties are imposed under various statutes.

In addition to the business of quarter sessions thus transferred, there was also transferred to the county council certain business of the justices of the county out of session, that is to say, in petty or special sessions. This business consists of the licensing of houses or places for the public performance of stage plays, and the execution, as local authority, of the Explosives Act 1875. Power was given by the act to the Local Government Board to provide, by means of a provisional order, for transferring to county councils any of the powers and duties of the various central authorities which have been already referred to; but although such an order was at one time prepared, it has never been confirmed, and nothing has been done in that direction.

Police.

Apart from the business thus transferred to county councils, the act itself has conferred further powers or imposed further duties with reference to a variety of other matters, some of which must be noticed. But before passing to them it is necessary here to call attention to one important subject of county government which has not been wholly transferred to the county council, namely, the police. It was matter of considerable discussion before the passing of the act whether the police should remain under the control of the justices, or be transferred wholly to the control of the county council. Eventually a middle course was taken. The powers, duties and liabilities of the quarter sessions and justices out of session with respect to the county police were vested in the quarter sessions and the county council jointly, and are now exercised through the standing joint-committee of the two bodies. That committee consists of an equal number of members of the county council and of justices appointed by the quarter sessions, the number being arranged between the two bodies or fixed by the secretary of state. The committee are also charged with the duties of appointing or removing the clerk of the peace, and they have jurisdiction in matters relating to justices' clerks, the provision of accommodation for quarter sessions or justices out of session, and the like, and their expenses are paid by the county council out of the county fund. The standing joint-committee have power to divide their county into police districts, and, when required by order in council, are obliged to do so. In such a case, while the general expenditure in respect of the entire police force is defrayed by the county at large, the local expenditure, *i.e.* the cost of pay, clothing and such other expenses as the joint-committee may direct, is defrayed at the cost of the particular district for which it is incurred (see also POLICE).

County coroners.

Among the powers and duties given to county councils by the Local Government Act 1888, the first to be mentioned, following the order in the act itself, is that of the appointment of county coroners. The duties of a coroner are limited to the holding of inquiries into cases of death from causes suspected to be other than natural, and to a few miscellaneous duties of comparatively rare occurrence, such as the holding of inquiries relating to treasure trove, and acting instead of the sheriff on inquiries under the Lands Clauses Act, &c., when that officer is interested and thereby disabled from holding such inquiries. (For the history of the office of coroner, which is a very ancient one, see that title.) The county council may appoint any fit person, not being a county alderman or county councillor, to fill the office, and in the case of a county divided into coroners' districts, may assign him a district. It has been decided, however, that the power hereby conferred does not extend to the appointment of a coroner for a liberty or other franchise who would not under the old law have been appointed by the freeholders. It may be mentioned that though a coroner may have a district assigned to him, he is nevertheless a coroner for the entire county throughout which he has jurisdiction.

Main roads.

It was provided by the Highway Act 1878 that every road which was disturnpiked after the 31st of December 1870 should be deemed to be a main road, the expenses of the repair and maintenance of which were to be contributed as to one-half thereof by the justices in quarter sessions, then the county authority. By another section of the same act it was provided that where any highway in a county was a medium of communication between great towns, or a thoroughfare to a railway station, or otherwise such that it ought to be declared a main road, the county authority might declare it to be a main road, and thereupon one-half the expense of its maintenance would fall upon the county at large. Once a road became a main road it could only cease to be such by order of the Local Government Board. As already stated, the powers of the quarter sessions under the act of 1878 were transferred to the county council under the Local Government Act of 1888, and that body alone has now power to declare a road to be a main road. But the act of 1888 made some important changes in the law relating to the maintenance of main roads. It declared that thereafter not only the half but the whole cost of maintenance should be borne by the county. Provision is made for the control of main roads in urban districts being retained by the urban district council. In urban districts where such control has not been claimed, and in rural districts, the county council may either maintain the main roads themselves or allow or require the district councils to do so. The county council must in any case make a payment towards the costs incurred by the district council, and if any difference arises as to the amount of it, it has to be settled by the Local Government Board. In Lancashire the cost of main roads falls upon the hundred, as distinguished from the county at large, special provision being made to that effect. Special provision has also been made for the highways in the Isle of Wight and in South Wales, where the roads were formerly regulated by special acts, and not by the ordinary Highway Acts.

Rivers pollution prevention.

The county council have the same power as a sanitary authority to enforce the provisions of the Rivers Pollution Prevention Acts in relation to so much of any stream as passes through or by any part of their county. Under these acts a sanitary authority is authorized to take proceedings to restrain interference with the due flow of a stream or the pollution of its waters by throwing into it the solid refuse of any manufactory or quarry, or any rubbish or cinders, or any other waste or any putrid solid matter. They may also take proceedings in respect of the pollution of a stream by any solid or liquid sewage matter. They have the same powers with respect to manufacturing and mining pollutions, subject to certain restrictions, one of which is that proceedings are not to be taken without the consent of the Local Government Board. The county council may not only themselves institute proceedings under the acts, but they may contribute to the costs of any prosecution under the acts instituted by any other county or district council. The Local Government Board is further empowered by provisional order to constitute a joint-committee representing all the administrative counties through or by which a river passes, and confer on such committee all or any of the powers of a sanitary authority under the acts.

Parliamentary and legal costs.

A county council has the same power of opposing bills in parliament and of prosecuting or defending any legal proceedings necessary for the promotion or protection of the interests of the inhabitants of a county as are conferred on the council of a municipal borough by the Borough Funds Act 1872, with this difference, that in order to enable them to oppose a bill in parliament at the cost of the county rate, it is not necessary to obtain the consent of the owners and ratepayers within the county. The power thus conferred is limited to opposing bills. The council are not authorized to promote any bill, and although they frequently do so, they incur the risk that if the bill should not pass the members of the council will be surcharged personally with the costs incurred if they attempt to charge them to the county rate. Of course if the bill passes, it usually contains a clause enabling the costs of promotion to be paid out of the county rate. It must not be supposed, however, that the county council have no power to institute or defend legal proceedings or oppose bills save such as is expressly conferred upon them by the Local Government Act. In this respect they are in the same position as all other local authorities, with respect to whom it has been laid down that they may without any express power in that behalf use the funds at their disposal for protecting themselves against any attack made upon their existence as a corporate body or upon any of their powers or privileges.

By-laws.

The county council have also the same powers as a borough council of making by-laws for the good government of the county and for the suppression of nuisances not already punishable under the general law. This power has been largely acted upon throughout England, and the courts of law have on several occasions decided that such by-laws should be benevolently interpreted, and that in matters which directly arise and concern the people of the county, who have the right to choose those whom they think best fitted to represent them, such representatives may be trusted to understand their own requirements. Such by-laws will therefore be upheld, unless it is clear that they are uncertain, repugnant to the general law of the land, or manifestly unreasonable. It may be mentioned that, while by laws relating to the good government of the county have to be confirmed by the secretary of state, those which relate to the suppression of nuisances have to be confirmed by the Local Government Board. Such confirmation, however, though necessary to enable the council to enforce them, does not itself confer upon them any validity in point of law.

Medical officers.

The county council have power to appoint and pay one or more medical officers of health, who are not to hold any other appointment or engage in private practice without the express written consent of the council. The council may make arrangements whereby any district council or councils may have the services of the county medical officer on payment of a contribution towards his salary, and while such arrangement is in force the duty of the district council to appoint a medical officer is to be deemed to have been satisfied. Every medical officer, whether of a county or district, must now be legally qualified for the practice of medicine, surgery and midwifery. Besides this, in the case of a county, or of any district or combination of districts of which the population exceeds 50,000, the medical officer must also have a diploma in public health, unless he has during the three consecutive years before 1892 been medical officer of a district or combination having a population of more than 20,000, or has before the passing of the act been for three years a medical officer or inspector of the Local Government Board.

Alterations of local areas.

The only other powers and duties of a county council arising under the Local Government Act itself which it is necessary to notice are those relating to alterations of local areas. It may be convenient here to state that certain alterations of areas can only be effected through the medium of the Local Government Board after local inquiry These cases include the alteration of the boundary of any county or borough, the union of a county borough with a county, the union of any counties or boroughs or the division of any county, the making of a borough into a county borough. In these cases the order of the Local Government Board is provisional only, and must be confirmed by parliament. The powers of a county council to make orders for the alteration of local areas are as follows: When a county council is satisfied that a prima facie case is made out as respects any county district not a borough, or as respects any parish, for a proposal for all or any of the things hereafter mentioned, they may hold a local inquiry after giving such notice in the locality and to such public departments as may be prescribed from time to time by the orders of the Local Government Board. The things referred to include the alteration of the boundary of the district or parish; the division or union thereof with any other district or districts, parish or parishes; the conversion of a rural district or part thereof into an urban district or vice versa. In these cases, after the local inquiry above referred to has been held, the county council, being satisfied that the proposal is desirable, may make an order for the same accordingly. The order has to be submitted to the Local Government Board, and that board must hold a local inquiry in order to determine whether the order should be confirmed or not, if the council of any district affected by it, or one-sixth of the total number of electors in the district or parish to which it relates, petition against it. The Local Government Board have power to modify the terms of the order whether it is petitioned against or not, but if there is no petition, they are bound to confirm, subject only to such modifications. Very large powers are conferred upon county councils for the purpose of giving full effect to orders made by them under these provisions. A considerable extension of the same powers was made by the Local Government Act 1894, which practically required every council to take into consideration the areas of sanitary districts and parishes within the entire administrative county, and to see that a parish did not extend into more than one sanitary district; to provide for the division of a district which did extend into more than one district into separate parishes, so that for the future the parish should not be in more than one county district; and to provide for every parish and rural sanitary district being within one county. An enormous number of orders under the act of 1894 was made by county councils, and, speaking generally, it will now be found that no parish extends into more than one county or county district. Other powers and duties of the county council under the act of 1894 will be noticed hereafter.

Of the statutes affecting county councils passed subsequent to 1888 mention need only be made of the chief.

Education.

Previous to the Education Act 1902, county councils had certain optional powers under the Technical Instruction Acts to supply or aid the supply of technical or manual instruction. Their duties in respect to education were, however, much enlarged by the act of 1902. That act abolished the old school boards and school attendance committees, and substituted a single authority for all kinds of schools and for all kinds of education. The county council or the council of a county borough is now in every case the local education authority, except that non-county boroughs with a population of over 10,000, and urban districts with a population of over 20,000, may be the local education authorities for elementary education only, but they may relinquish their powers in favour of the county council. For higher education county councils and county boroughs are the sole education authorities, except that non-county boroughs and urban councils are given a concurrent power of levying a rate for higher education not exceeding 1d. in the £. Under the act, an education committee must be established by all authorities The majority of the members of the committee are appointed by the council, usually out of their own body, and the remainder are appointed by the council on the nomination or recommendation of other bodies. Some of the members of the committee must be women. All matters relating to the exercise of the powers of the education authority (except those of rating and borrowing) must be referred to the committee, and before exercising any of their powers the council must (except in cases of emergency) receive and consider the report of the education committee with respect to the matter in question. As to higher education the local education authority must consider the educational needs of their area and take such steps as seem to them desirable, after consultation with the Board of Education, to supply or aid the supply of education other than elementary, and to promote the general co-ordination of all forms of education. For this purpose they are authorized to levy a rate not exceeding 2d.

in the £ except with the consent of the Local Government Board. They must also devote to the same purpose the sums received by them in respect of the residue of the English share of the local taxation (customs and excise) duties already referred to See further EDUCATION and TECHNICAL EDUCATION.

Midwives.

Under the Midwives Act 1902, every council of a county or county borough is the local supervising authority over midwives within its area. The duty of the local supervising authority is to exercise general supervision over all midwives practising within their area in accordance with rules laid down in the act; to investigate charges of malpractices, negligence or misconduct on the part of a midwife, and if a prima facie case be established, to report it to the Central Midwives Board; to suspend a midwife from practice if necessary to prevent the spread of infection; to report to the central board the name of any midwife convicted of an offence; once a year (in January) to supply the central board with the names and addresses of all midwives practising within their area and to keep a roll of the names, accessible at all reasonable times for public inspection; to report at once the death of any midwife or change in name and address. The local supervising authority may delegate their powers to a committee appointed by them, women being eligible to serve on it. A county council may delegate its powers under the act to a district council.

Lunatics.

Part of the business transferred from quarter sessions to the council was that which related to pauper lunatics, but the whole subject of lunacy was consolidated by an act of the year 1890, which again has been amended by a later act. The councils of all administrative counties and county boroughs and the councils of a few specified quarter sessions boroughs, which before 1890 were independent areas for purposes of the Lunacy Acts, are local authorities for the purposes of the Lunacy Acts, and each of them is under an obligation to provide asylum accommodation for pauper lunatics. This accommodation may be provided by one council or by a combination of two or more, and such council or combination may provide one or more asylums. The county council exercise their powers through a visiting committee, consisting of not less than seven members, or, in the case of a combination, of a number of members appointed by each council in agreed proportions. In the case of a combination the expenses are defrayed by the several councils in such proportion as they may agree upon, and the proportion may be fixed with reference to either the accommodation required by each council or the population of the district. A county borough may also, instead of providing an asylum of its own, contract with the visiting committee of any asylum to receive the pauper lunatics from the borough. Private patients may be accommodated in the asylums provided by a county council, and received upon terms fixed by the visiting committee. The expenses of lunatic asylums are defrayed in the following manner: The guardians from whose union a lunatic is sent have to pay a fixed weekly sum, which may not exceed 14s. a week. A larger charge is made for lunatics received from unions outside the county, as these do not, of course, contribute anything towards the provision or up-keep of the asylum itself. In addition to the payments by guardians, there is a contribution of 4s. a week from "the exchequer contribution account" already mentioned, and the remaining expenses are defrayed out of the county rate.

Allotments.

Under the Allotments Acts 1887 to 1907, it is the duty of a county council to ascertain the extent to which there is a demand for allotments in the urban districts and parishes in the county, or would be a demand if suitable land were available, and the extent to which it is reasonably practicable, having regard to the provisions of the acts, to satisfy any such demand, and to co-operate with authorities, associations or persons best qualified to assist, and to take such steps as may be necessary. The powers of the Local Government Board under the Allotments Acts were transferred by the act of 1907 to the Board of Agriculture and Fisheries, and by the same act the powers and duties of rural district councils were transferred to parish councils. The county council under these acts has compulsory powers of purchase or hire if they are unable to acquire land by agreement and on reasonable terms. If an objection is made to an order for compulsory purchase or hire, the order will not be confirmed by the Board of Agriculture until after a local inquiry has been held. If the Board of Agriculture is satisfied, after holding a local inquiry, that a county council have failed to fulfil their obligations as to allotments, the board may transfer all and any of the powers of the county council to the Small Holdings Commissioners.

Small holdings.

By the Small Holdings and Allotments Act 1907, Small Holdings Commissioners are appointed by the Board of Agriculture to ascertain the extent of the demand for small holdings, and confer with county councils as to how best to provide them. Local authorities are required to furnish information and give assistance to the commissioners, who report to the board. If the board, after considering the report, consider it desirable, they require the county council concerned to prepare a scheme for the provision of small holdings; if the county council decline to prepare a scheme, the board may direct the commissioners to do so. A county council may also prepare a scheme on its own initiative. When a scheme has been confirmed, the county council must carry out the obligations imposed on it within a prescribed time; if they make default the board may direct the commissioners to assume all the powers of the county council, and the county council must repay to the board the expenses the commissioners may incur. A county council may delegate, by arrangement, to the council of any borough or urban district in the county their powers in respect of the act. A small holding is defined by the act as one which exceeds 1 acre, but must not exceed 50 acres or £50 annual value. Every county council must establish a small holdings and allotments committee, to which must be referred all matters relating to the exercise and performance by the council of their powers and duties as to small holdings and allotments.

Hospitals.

Under the Isolation Hospitals Acts 1893 and 1901, a county council may provide for the establishment of isolation hospitals for the reception of patients suffering from infectious diseases on the application of any local authority within the county, or on the report of the medical officer of the county that hospital accommodation is necessary and has not been provided, or it may take over hospitals already provided by a local authority. The council by their order constitute a hospital district and form a committee for its administration. The committee have power to purchase land, erect a hospital, provide all necessary appliances, and generally administer a hospital for the purposes above mentioned.

Parish councils.

The powers and duties of a county council under the Local Government Act 1894 are numerous and varied, and the chief of them are mentioned hereafter in connexion with parish councils. The county council may establish a parish council in a parish which has a population of less than 300, and may group small parishes under a common parish council; in every case they fix the number of members of the parish council. They may authorize the borrowing of money by a parish council, and they may lend money to a parish council. They may hear complaints by a parish council that a district council has failed to provide sufficient sewerage or water-supply, or has failed to enforce the provisions of the Public Health Acts in their district, and on such complaint they may transfer to themselves and exercise the powers of the defaulting council, or they may appoint a person to perform those duties. They may make orders for the custody and preservation of public books, writings, papers and documents belonging to a parish. They may divide a parish into wards for purposes of elections or of parish meetings. They may authorize district councils to aid persons in maintaining rights of common. They may, on the petition of a district council, transfer to themselves the powers of a district council who have refused or failed to take the necessary proceedings to assert public rights of way or protect roadside wastes. They may dispense with the disqualification of a parish or district councillor arising only by reason of his being a shareholder in a water company or similar company contracting with the council, and, as has above been stated, they have large powers of altering the boundaries of parishes.

Diseases of animals.

Among the powers and duties of quarter sessions transferred to county councils were those arising under the acts relating to contagious diseases of animals. These acts were consolidated and amended by a statute of 1894, and the county council remain the local authority for the execution of that act in counties.

Light railways.

Under the Light Railways Act 1896 a county council may be authorized by order of the light railway commissioners to construct and work or contract for the construction or working of a light railway, lend money to a light railway company, or join any other council in these matters.

Miscellaneous.

Among other statutes conferring powers or imposing duties upon county councils, mention may be made of such acts as those relating to sea fisheries regulation, open spaces, police superannuation, railway and canal traffic, shop hours, weights and measures, fertilizing and feeding stuffs, wild birds' protection, land transfer, locomotives on highways and the acquisition of small dwellings. Sufficient has been said to indicate that the legislature from time to time recognizes the important position of the county council as an administrative body, and is continually extending its functions.

The municipal borough and the borough council.

The Urban District.—A municipal borough is a place which has been incorporated by royal charter. In the year 1835 the Municipal Corporations Act was passed, which made provision for the constitution and government of certain boroughs which were enumerated in a schedule. That act was from time to time amended, until in 1882 by an act of that year the whole of the earlier acts were repealed and consolidated. A few ancient corporations which were not enumerated in the schedule to the act of 1835 continued to exist after that year, but by an act of 1883 all of these, save such as should obtain charters before 1886, were abolished, the result being that all boroughs are now subject to the act of 1882. A place is still created a borough by royal charter on the petition of the inhabitants, and when that is done the provisions of the act of 1882 are applied to it by the charter itself. The charter also fixes the number of councillors, the boundaries of the wards (if any), and assigns the number of councillors to each ward, and provides generally for the time and manner in which the act of 1882 is first to come into operation. The charter is supplemented by a scheme which makes provision for the transfer to the new borough council of the powers and duties of existing authorities, and generally for the bringing into operation of the act of 1882. If the scheme is opposed by the prescribed proportion (one-twentieth) of the owners and ratepayers of the proposed new borough, it has to be confirmed by parliament. The governing body in a borough is the council elected by the burgesses.

Officers.

The qualification of a burgess has been incidentally mentioned in connexion with that of a county elector, and need not be further noticed. A borough councillor must be qualified in the same manner as a county councillor, and he is disqualified in the same way, with this addition, that a peer or ownership voter is not qualified as such, and that a person is disqualified for being a borough councillor if he is in holy orders or is the regular minister of a Dissenting congregation. Women, other than married women, are eligible. Borough councillors are elected for a term of three years, one-third of the whole number going out of office in each year, and if the borough is divided into wards, these are so arranged that the number of councillors for each ward shall be three or a multiple of three. The ordinary day of election is the 1st of November. At an election for the whole borough the returning officer is the mayor; at a ward election he is an alderman assigned for that purpose by the council. The nomination and election of candidates and the procedure at the election are the same as have already been described in the case of the election of county councillors. The law as to corrupt and illegal practices at the election is also similar, and the election may be questioned by petition in exactly the same way. A borough councillor must, within five days after notice of his election, make a declaration of acceptance of office under a penalty, in the case of an alderman or councillor of £50, and in the case of a mayor of £100, or such other sums as the council may by by-law determine. A councillor may be disqualified in the same way as a county councillor, by bankruptcy or composition with creditors, or continuous absence from the borough (except in case of illness). In short it may be said that as the provisions relating to the election of borough councillors were merely extended to county councillors by the Local Government Act of 1888 with a few modifications, these provisions, as already stated when dealing with county councils, apply generally to the election of borough councillors. After the annual election on the 1st of November the first quarterly meeting of the council is held on the 9th, and at that meeting the mayor and aldermen are elected. The election of the mayor and aldermen is again the same as has already been described in connexion with the election of the chairman and aldermen of a county council. The officers of a borough council are the town clerk and the treasurer, but the council have power to appoint such other officers as they think necessary. All these officers receive such remuneration as the council from time to time think fit, and hold office during pleasure. The provisions with respect to the transaction of the business of the council are also the same in the case of a borough as in that of a county council.

Finance audit.

The entire income of the borough council is paid into the borough fund, and that fund is charged with certain payments, which are specifically set out in the 5th schedule to the act of 1882. These include the remuneration of the mayor, recorder and officers of the borough, overseers' expenses, the expenses of the administration of justice in the borough, the payment of the borough coroner, police expenses and the like. An order of the council for the payment of money out of the borough fund must be signed by three members of the council and countersigned by the town clerk, and any such order may be removed into the king's bench division of the High Court of Justice by writ of *certiorari*, and may be wholly or partly disallowed or confirmed on the hearing. This is really the only way in which the validity of a payment by a borough council can be questioned, for, as will be seen hereafter, the audit in the borough is not an effective one. The borough fund is derived, in the first instance, from the property of the corporation. If the income from such property is insufficient for the purposes to which it is applicable, as usually is the case, it has to be supplemented by a borough rate, which may be a separate rate made by the council or may be levied through the overseers as part of the poor rate by means of a precept addressed to them. In the event of the borough fund being more than sufficient to meet the demands upon it without recourse to a borough rate, any surplus may be applied in payment of any expenses of the council as a sanitary authority or in improving the borough or any part thereof by drainage, enlargement of streets or otherwise. The borough treasurer is required to make up his accounts half-yearly, and to submit them, with the necessary vouchers and papers, to the borough auditors. These auditors are three in number—two of them elected annually by the burgesses. An elective auditor must be qualified to be a councillor, but may not be a member of the council. The third auditor is appointed by the mayor and is called the mayor's auditor. The auditors so appointed are charged with the duty of auditing the accounts of the treasurer, but they have no power of disallowance or surcharge, and their audit is therefore quite ineffective.

Jurisdiction of justices; quarter sessions.

Where a borough has not a separate court of quarter sessions, but has a separate commission of the peace, the justices of the county in which the borough is situate have a concurrent jurisdiction with the borough justices in all matters arising within the borough. Where, however, the borough has a court of quarter sessions, the county justices have no jurisdiction within the borough. In all cases, whether the borough has quarter sessions or a separate commission or not, the mayor, by virtue of his office, is a justice for the borough, and continues to be such justice during the year next after he ceases to be mayor. He takes precedence over all justices in and for the borough, and is entitled to take the chair at all meetings at which he is present by virtue of his office of mayor. A separate commission of the peace may be granted to a borough on the petition of the council. A borough justice is required to take the oaths of allegiance and the judicial oaths before acting; he must while acting reside in or within 7 m. of the borough, or occupy a house, warehouse or other property in the borough; but he need not be a burgess nor have the qualification by estate required of a county justice. Where the borough has a separate commission, the borough justices have power to appoint a clerk, who is now paid by salary, the fees and costs pertaining to his office being paid into the borough fund, out of which his salary is paid. The council may by petition obtain the appointment of a stipendiary magistrate for the borough. The crown may also on petition of the council grant a separate court of quarter sessions for the borough, and in that event a recorder has to be appointed by the crown. He must be a barrister of not less than five years' standing, and he holds office during good behaviour; he receives a yearly salary. The recorder sits as sole judge of the court of quarter sessions of the borough. He has all the powers of a court of quarter sessions in a county, including the power to hear appeals from the borough justices; but to this there are a few exceptions, notably the power to grant licences for the sale of intoxicating liquor. The grant of a separate court of quarter sessions also involves the appointment by the council of a clerk of the peace for the borough. It should be added that the grant of a court of quarter sessions to any borough other than a county borough after the passing of the Local Government Act 1888, does not affect the powers, duties or liabilities of the county council as regards that borough, nor exempt the parishes in the borough from being assessed to county rate for any purposes to which such parishes were previously liable to be assessed.

Sheriff, coroner.

When a borough is a county of itself the council appoint a sheriff on the 9th of November in every year. And where the borough has a separate court of quarter sessions the council appoint a fit and proper person, not an alderman or councillor, to be the borough coroner, who holds office during good behaviour. If the borough has a civil court the recorder, if there is one, is judge of it; if there is no recorder, the judge of the court is an officer of the borough appointed under the charter.

Power to acquire land.

The provisions of the Municipal Corporations Act 1882 relate chiefly to the constitution of the municipal corporation. It does not itself confer many powers or impose many duties upon the council as a body. It does, however, enable a municipal corporation to acquire corporate land and buildings, the buildings including a town hall, council house, justices' room, police stations and cells, sessions house, judges' lodgings, polling stations and the like. The council may borrow money for the erection of such buildings; they may acquire and hold land in mortmain by virtue of their charter, or with the consent of the Local Government Board. Corporate land cannot be alienated without the consent of the same board. The council may convert corporate land, with the approval of the Local Government Board, into sites for workmen's dwellings.

Borough bridges.

Another duty imposed upon a borough council by the act of 1882 is the maintenance of bridges within the borough which are not repairable by the county in which the borough is locally situate. It may here be mentioned that a city or borough which is a county of itself is liable at common law to repair all public bridges within its limits. In a borough which is not a county of itself the inhabitants are only liable to repair bridges within the borough by immemorial usage or custom.

By-laws.

Of the other powers possessed by the council of a borough under the act of 1882, one of the most important is the power to make by-laws for the good rule and government of the borough, and for the prevention and suppression of nuisances not already punishable in summary manner by virtue of an act in force throughout the borough. It will be observed that these by-laws are of two classes. The former do not come into force until the expiration of forty days after a copy of them has been sent to the secretary of state, during which forty days the sovereign in council may disallow any by-law or part thereof. The latter require to be confirmed by the Local Government Board.

Under the act of 1882 every municipal borough might have its own separate police force. As has already been stated when dealing with county councils, boroughs having a population of less than 10,000 according to the census of 1881 can no longer have a

Police.

separate police force. But for some time before that year it had become the rule not to grant to any new borough with a population of less than 20,000 a separate police force. The subject of police is separately treated in the *Encyclopaedia Britannica*, and it is not necessary to supplement what is there stated. Under an act of 1893 the borough police may, in addition to their ordinary duties, be employed to discharge the duties of a fire brigade.

The district and the district council.

The powers and duties of a borough council in the Municipal Corporations Act do not arise or exist to any great extent under that act. In a few cases, those namely of county boroughs, the councils have the powers of county councils. In the quarter sessions boroughs other than county boroughs they have some only of these powers. But in every case the council of the borough have the powers and duties of an urban district council, and, except where they derive their authority from local acts, it may be said that their principal powers and duties consist of those which they exercise or perform as an urban council. These will now be considered.

Before the year 1848 there was not outside the municipal boroughs any system of district government in England. It is true that in some populous places which were not corporate boroughs local acts of parliament had been passed appointing improvement commissioners for the government of these places. In many boroughs similar acts had been obtained conferring various powers relating to sanitary matters, streets and highways and the like. But there was no general system, nor was there, save by special legislation, any means by which sanitary districts could be constituted. In the year 1848 the first Public Health Act was passed. It provided for the formation of local boards in boroughs and populous places, such places outside boroughs being termed local government districts. In boroughs the town council were generally appointed the local board for purposes of the act. It was not, however, until 1872 that a general system of sanitary districts was adopted. By the Public Health Act of that year the whole country was mapped out into urban and rural sanitary districts, and that system has been maintained until the present time, with some important changes introduced by the Public Health Acts 1875 to 1907, and the Local Government Act 1894.

Constitution of district councils.

The whole of England and Wales is divided into districts, which are either urban or rural. Urban districts include boroughs and places which were formerly under the jurisdiction of local boards or improvement commissioners. The power to constitute new urban districts is now conferred upon county councils, as already stated. There is a concurrent power in the Local Government Board under the Public Health Act 1875, but that power is now rarely exercised, and new urban districts are in practice created only by orders of county councils made under the Local Government Act 1888, section 57. Rural districts were first created in 1872. Before that time there was practically no sanitary authority outside the urban district, for although the vestry of a parish had in some cases power to make sewers and had also some other sanitary powers, there was no authority for such a district as now corresponds to a rural district. There were, indeed, highway boards and burial boards which had powers for special purposes, but district authority in the sense in which it is now understood there was none. Before the year 1894 the rural district consisted of the area of the poor-law union, exclusive of any urban district which might be within it, and the guardians of the poor were the rural sanitary authority. Since 1894 this has been changed. By the Local Government Act of that year the guardians ceased to be the rural sanitary authority. The union was preserved as the rural sanitary district, with this qualification, that if it extended into more than one county it was divided so that no rural district should extend into more than one county. Rural district councillors are elected for each parish in the rural district, and they become by virtue of their office guardians of the poor for the union comprising the district, so that there is now no election of guardians in a rural district. Guardians are still elected as such for urban districts, but the rural district council have ceased to be the same body as the guardians and are now wholly distinct. A district councillor, whether urban or rural, holds office for a term of three years. One-third of the whole council retire in each year, the annual elections being held in March, but there may be a simultaneous retirement of the whole council in every third year if the county council at the instance of the district council so order. The qualification and disqualification of district councillors, whether urban or rural, now depend upon the Local Government Act 1894. Property qualification is abolished. Any person may be elected who is either a parochial elector of some parish within the district or has during the whole of the twelve months preceding his election resided in the district, and no person is disqualified by sex or marriage. The electors both in urban and rural districts are the body called the parochial electors. These are practically the persons whose names appear in the parliamentary register or in the local government register as being entitled to vote at elections for members of parliament or county or parish councillors as the case may be. The election takes place subject to rules made by the Local Government Board, these rules being largely founded upon adaptations of the Municipal Corporations Act 1882. The election is by ballot on the same lines as those prescribed for a municipal election, and the Corrupt Practices Act, the provisions of which have been referred to when dealing with county councils, applies to the elections of district councils. The provisions with reference to election petitions, the grounds upon which they may be presented and the procedure upon them, are the same in every respect as have already been mentioned when dealing with county councils. It may be convenient here to state that the Local Government Board has power to unite any number of districts or parts of districts into what is called a united district for certain special purposes such as water-supply, sewerage or the like. This is done by means of a provisional order made by the board and confirmed by parliament. In such a united district the governing body is a joint board constituted in manner provided by the order, and it has under the order such of the powers of a district council as are necessary for the purposes for which the united district is created. Thus a joint sewerage board would generally be invested by the order with all the powers of a district council relating to the provision and control of sewers and the disposal of sewage. It may also be convenient here to mention another special kind of district authority, that is, a port sanitary authority. It is also constituted by order of the Local Government Board, and it may include one or more sanitary districts or parts of districts abutting upon a port. In this case also the authority consists of such members and is elected in such manner as the order determines, and it has such of the powers of an ordinary district council as the order may confer upon it. These relate for the most part to nuisances and infectious disease, having special reference to ships. It has been thought convenient to deal here with district councils, whether urban or rural, together, but the powers of the former are much more extensive than those of the latter, and as the consideration of the subject proceeds it will be necessary to indicate what powers and duties are conferred or imposed upon urban district councils only. It must be pointed out, however, that when the necessity arises for conferring upon a rural district council any of the powers exercisable only by an urban district council, that can be done by means of an order of the Local Government Board. The necessity for this provision arises because it sometimes happens that in a district otherwise rural there are some centres of population, hardly large enough to be constituted urban districts, which nevertheless require the same control as an urban district.

United districts.

Port sanitary authority.

Powers of urban and rural councils compared.

Business and offices.

A district council may from time to time make regulations with respect to summoning, notice, place, management and adjournment of their meetings and generally with respect to the transaction and management of their business. Three members must be present to constitute a quorum. At the annual meeting, which is held as soon as convenient after the 15th April in each year, a chairman for the succeeding year has to be appointed. He presides at all meetings, and in his absence another member appointed by the meeting takes his place. Questions are determined by the majority present and voting, the chairman having the casting vote. Minutes are taken and, if signed at the meeting or the next ensuing meeting, are made evidence. The officers of the council consist of a clerk, a medical officer, a surveyor, one or more inspectors of nuisances and a treasurer. Of these all but the medical officer of health and inspectors of nuisances hold office at pleasure and receive such remuneration as the council may determine. If the urban district is a borough, the town clerk and borough treasurer fulfil the same office for purposes of the Public Health Acts. The salaries of the medical officer of health and inspectors of nuisances are, as to one moiety thereof, paid out of "the exchequer contribution account" by the county council, if they are appointed in accordance with the requirements of the Local Government Board as to qualification, appointment, duties, salary and tenure of office. The orders of the Local Government Board as to these matters are set out in the *Statutory Rules and Orders*. District councils may also employ such other officers and servants as may be necessary and proper for the fulfilment of their duties. Officers and servants are prohibited from being concerned or interested in any bargain or contract made with their council, and from receiving under cover of their office or employment any fee or reward whatsoever other than their proper salaries, wages and allowances, under penalty of being rendered incapable of holding office under any district council, and of a pecuniary penalty of £50. There are some exceptions to this provision somewhat similar to those already mentioned with respect to the disqualification of members of the council. It may be mentioned here that by an act, called the Public Bodies' Corrupt Practices Act 1889, severe penalties are imposed alike upon members and officers of public bodies for corruption in office.

Committees.

A district council may appoint committees consisting wholly or partly of members of their own body for the exercise of any powers which in their opinion can properly be exercised by such committees. Such committees do not, however, hold office beyond the next annual meeting of the council, and their acts must be submitted to the council for their approval. If they are appointed for any purposes of the Public Health or Highway Acts, the council may authorize them to institute any proceedings or do any act which the council might have instituted or done, other than the raising of any loan or the making of any rate or contract. A rural district council may delegate their entire powers in any parish to a parochial committee. Such committee may consist wholly of members of their own body or of members of the parish council, or partly of members of both. Such a committee may be subject to any regulations and restrictions imposed upon it by the rural district council.

Public Health Acts.

In dealing with the powers and duties of district councils it will be convenient to treat of these first as they arise under the Public Health Acts, and afterwards as they arise under other statutes. In so far as such powers and duties are common to urban and rural district councils alike they will be referred to as appertaining to district councils. When reference is made to any power or duty of an urban council it is to be understood that the rural council have no such power or duty unless conferred or imposed upon them by order of the Local Government Board. And it must be borne in mind that in a borough the borough council is the urban district council.

Sewerage and drainage.

The district council are required to cause to be made such sewers as may be necessary for effectually draining their district. This duty may be enforced by the Local Government Board on complaint made to them that the council have failed in performing it, and in the case of a rural district by the county council on complaint of the parish council. All sewers, whether made by the council, by their predecessors, or by private persons, vest in the district council, that is to say, become their property, with some exceptions, of which the principal is sewers made by a person for his own profit. The owner or occupier of any premises is entitled as of right to cause his drain to be connected with any sewer, on condition only of his giving notice and complying with the regulations of the council as to the mode in which the communication is to be made, and subject to the control of any person appointed by the council to superintend the work. Moreover, the owner or occupier of premises without the district has the same right, subject only to such terms and conditions as may be agreed or, in case of dispute, settled by justices or by arbitration. If a house does not possess a sufficient drain, the occupier may be required to provide one, and to cause it to discharge into a sewer if there is one within 100 ft. of the house, otherwise into a cesspool, as the council may direct. In the case of new houses, these may not be built or occupied in an urban district without their being first provided with sufficient drains as the council may require; and in an urban district it is forbidden to cause any building to be newly erected over a sewer without the consent of the council. For the purpose of sewage disposal a district council may construct any works and contract for the use or purchase or lease of any land, buildings, engines, materials or apparatus, and contract to supply for a period not exceeding twenty-five years any person with sewage. It may be pointed out here that these expressions are defined by the act, the effect of the definitions being shortly that a drain is a conduit for the drainage of one building or of several within the same curtilage, while a sewer comprises every kind of drain except that which is covered by the definition of a drain as above stated. The result has been that district councils frequently find themselves in the position of being responsible for the repair and condition of drains which, by reason of having been laid for more than one house, are sewers vested in and repairable by them. An attempt was made to remedy this state of things by the Public Health Amendment Act 1890, section 19, but the remedy so provided was very partial, and may be said to be confined to the case where two or more houses belonging to different owners are drained into a common drain laid under private land, and ultimately discharging into a sewer in a road or street.

Sanitary accommodation for houses.

Removal of refuse.

The district council are charged with the duty of enforcing the provision of proper sanitary accommodation (water-closets, privies, ashpits, &c.) for all dwelling-houses, new or old, and for factories, and the maintenance of such conveniences in proper condition. The urban council have power to provide and maintain and make provision for the regulation of urinals, water-closets, earth-closets, privies, ashpits and other similar conveniences for public accommodation. In the event of a complaint being made to a district council that any drain, closet, privy, ashpit or cesspool is a nuisance or injurious to health, the council may empower their surveyor to enter and examine the premises, and, if the complaint is well founded, they may require the owner to do the necessary works. The district council are not bound to undertake the removal of house refuse from premises, or the cleansing of closets, privies, ashpits and cesspools. They may, however, undertake these duties, and, if the Local Government Board require, they must do so. An urban council and a rural council, if invested with the requisite power by the Local Government Board, may, and when required by order of that board must provide for the proper cleansing of streets, and may also provide for the proper watering of streets. When they have undertaken, or are required to perform these duties, a penalty is imposed upon them for neglect. If they do not undertake these duties, they may make by-laws imposing on the occupiers of premises the duty of cleansing footways and pavements, the removal of house refuse, and the cleansing of earth-closets, privies, ashpits and cesspools; and an urban council may also make by-laws for the prevention of nuisances arising from snow, filth, dust, ashes and rubbish, and for the prevention of the keeping of animals on any premises so as to be injurious to health. The keeping of swine in a dwelling-house, or so as to be a nuisance, is made an offence punishable by a penalty in an urban district, as also is the suffering of any waste or stagnant water to remain in any cellar, or within any dwelling-house after notice, and the allowing of the contents of any closet, privy or cesspool to overflow or soak therefrom. Provision is also made for enforcing the removal of accumulations of manure, dung, soil or filth from any premises in an urban district, and for the periodical removal of manure or other refuse from mews, stables or other premises.

Water-supply.

With regard to water-supply, district councils have extensive powers. They may provide their district or any part of it with a supply of water proper and sufficient for public and private purposes, and for this purpose they may construct and maintain waterworks, dig wells, take on lease or hire any waterworks, purchase waterworks or water, or right to take or convey water either within or without their district, and any rights, powers and privileges of any water company, and contract with any person for the supply of water. They may not, however, commence to construct waterworks within the limits of supply of any water company empowered by act of parliament or provisional order to supply water without giving notice to the company, and not even then so long as the company are able and willing to supply the necessary water. Any dispute as to whether the company are able and willing has to be settled by arbitration. Where the council do supply water, they have the same powers of carrying mains under streets or through private lands as they have with respect to the laying of sewers, as already mentioned. They can charge water rents which depend upon agreements with consumers, or they may charge water rates assessed on the net annual value of the premises supplied. It is to be observed that they are not bound to charge for a supply of water at all, unless they are required to do so in an urban district by at least ten persons, rated to the poor rate, or in a parish in a rural district by at least five persons so rated in the parish. Even then the amount of the rate is left to the council, any deficiency in the cost of the water, in so far as it is not defrayed out of water rates or rents, being borne in an urban district by the general district rate, and in a rural district by the separate sanitary rates made for the parish or contributory place supplied. For the purpose of enabling them to supply water, most of the provisions of the Waterworks Clauses Acts are incorporated with the Public Health Act, and are made available for the district council. They are empowered to supply water by measure if they think fit, and may charge a rent for water-meters. The power of the district council to supply water is strictly limited to their own district, but they may, with the sanction of the Local Government Board, supply water to the council of an adjoining district on such terms as may be agreed upon, or as, in case of dispute, may be settled by arbitration. If any house is without a sufficient supply, and it appears that a supply can be furnished at a reasonable cost, as defined in the Public Health Act and the Public Health Water Act 1878, the owner may be required to provide the supply, and, if he fails, the council may themselves provide the supply and charge the owner with the cost. All public sources of water-supply such as streams, pumps, wells, reservoirs, conduits, aqueducts and works used for the gratuitous supply of water to the inhabitants of the district are vested in the council, who may cause all such works to be maintained and plentifully supplied with pure and wholesome water for the gratuitous use of the inhabitants, but not for sale by them. The council may supply water to public baths or wash-houses, or for trade or manufacturing purposes. In the case of the former the supply may be gratuitous. In the latter case it is to be on terms agreed between the parties. The urban council are required to cause fire-plugs, and all necessary works, machinery and assistance for securing a supply of water in case of fire, to be provided and maintained, and for this purpose they may enter into an agreement with any water company or person. Provision is made for preventing the pollution of water by gas refuse and enabling a district council, with the sanction of the attorney-general, to take any proceedings they may think fit for preventing the pollution of any stream in their district by sewage. The district council are also empowered to obtain an order of justices directing the closing of any well, tank or cistern, public or private, or any public pump the water from which is likely to be used for drinking or domestic purposes, or for manufacturing drinks for the use of man, if such water is found to be so polluted as to be injurious to health.

Power is given to prohibit the use as dwellings of any cellars, vaults or underground rooms built or occupied after 1875, and with regard to such cellars as were occupied as dwellings before 1875, *Cellar dwellings.*

the continued occupation of these is also forbidden unless they comply with certain stringent requirements as to the height of the rooms, height of the ceilings above the surface of the street, open areas in front, effectual drainage, sanitary conveniences appurtenant to the cellars, and the provision of fireplaces.

Common lodging-houses.

District councils are required to keep a register of the common lodging-houses in their district. No person is allowed to keep a common lodging-house unless he is registered, and a house may not be registered until it has been inspected and approved for the purpose by an officer of the council. Further, the council may refuse to register a keeper unless they are satisfied of his character and of his fitness for the position. The council are empowered to make by-laws for fixing the number of lodgers and separating the sexes therein, promoting cleanliness and ventilation, giving of notices and taking precautions in case of any infectious disease, and generally for the well-ordering of such houses. The keepers of common lodging-houses are required to limewash their walls and ceilings in the months of April and October in every year, and if paupers or vagrants are received to lodge, they may be required to report as to the persons who have resorted thereto. They must give notice of any infectious disease to the medical officer of health and to the poor-law relieving officer, and they must give free access for inspection. There is no definition of the expression "common lodging-house" in the Public Health Acts, and at one time the courts decided that shelters for the destitute kept by charitable persons were not common lodging-houses. That idea is now exploded, and the acts apply to charitable institutions which receive persons of the class ordinarily received into common lodging-houses.

Houses let in lodgings.

By-laws may also be made relating to houses let in lodgings which are not common lodging-houses. These by-laws are in practice limited to those inhabited by the poorer classes, although the act imposes no such restriction.

Nuisances.

The Public Health Acts 1875 to 1907 contain elaborate provisions for dealing with nuisances. Those which are dealt with summarily are thus enumerated:—(1) any premises in such a state as to be a nuisance or injurious to health; (2) any pool, ditch, gutter, watercourse, privy, urinal, cesspool, drain or ashpit so foul or in such a state as to be injurious to health; (3) any animal so kept as to be a nuisance or injurious to health; (4) any accumulation or deposit which is a nuisance or injurious to health; (5) any house or part of a house so overcrowded as to be dangerous or injurious to the health of the inmates, whether or not members of the same family; (6) any factory, workshop or workplace not already under the operation of any general act for the regulation of factories or bakehouses not kept in a cleanly state or not ventilated in such a manner as to render harmless as far as practicable any gases, vapours, dust or other impurities generated in the course of the work carried on therein that are a nuisance or injurious to health, or so overcrowded while work is carried on as to be dangerous or injurious to the health of those employed therein; (7) any fireplace or furnace which does not as far as practicable consume the smoke arising from the combustible used therein, and which is used for working engines by steam or in any mill, factory, dye-house, brewery, bakehouse or gas work, or in any manufacturing or trade process whatsoever; and (8) any chimney not being the chimney of a private dwelling-house sending forth black smoke in such quantity as to be a nuisance. The nuisances above enumerated are said to be nuisances liable to be dealt with summarily. It is the duty of every district council to inspect their district with a view to the discovery of any such nuisances. In the event of such discovery by them or of information given to them of the existence of any such nuisance, the district council are required to serve a notice requiring the abatement of the nuisance on the person by whose act, default or sufferance it arises or continues, or if such person cannot be found, on the owner or occupier of the premises at which the nuisance arises. The notice must require the abatement of the nuisance within a specified time, and must prescribe the works which in the opinion of the council are necessary to be done. If the nuisance arises from the absence or defective construction of any structural convenience, or if there is no occupier of the premises, the notice must be served upon the owner. If the person who causes the nuisance cannot be found, and it is clear that the nuisance does not arise or continue by the act, default or sufferance of the owner or occupier of the premises, the local authority may themselves abate the nuisance without further order. If the person on whom the notice is served objects to give effect to it, he may be summoned before justices, and the justices may make an order upon him to abate the nuisance or prohibiting the recurrence of the nuisance if this is likely, and directing the execution of the necessary works. If the nuisance is such as to render a dwelling-house unfit for human habitation, the justices may close it until it is rendered fit for that purpose. Disobedience under the order of justices involves a penalty and a daily penalty for every day during which default continues. Private persons may complain to justices in respect of nuisances by which they are personally aggrieved, and if the district council make default in doing their duty, the Local Government Board may authorize any officer of police to institute any necessary proceedings at the cost of the defaulting council. The district council may, if in their opinion proceedings before justices afford an inadequate remedy, take proceedings in the high court, but in that case, if the nuisance is of a public nature, they must proceed by action in the name of the attorney-general. The provisions as to nuisances are extended to ships by an act of 1885.

It is forbidden to establish within an urban district without the consent of the council any offensive trade, business or manufacture. With regard to any offensive trade which has been established or may be consented to in any urban district, if it is verified by the medical officer or any two legally qualified medical practitioners, or by any ten inhabitants of the district, to be a nuisance or injurious to health, the urban district council are required to take proceedings before magistrates with a view to the abatement of the nuisance complained of.

Unsound meat.

Any medical officer or inspector of nuisances may inspect any meat, &c., exposed for sale or deposited in any place for the purpose of sale or of preparation for sale and intended for the food of man. This power of inspection is, in districts where the Public Health Act 1890 has been adopted, extended to all articles intended for the food of man. If upon such inspection the meat, &c., appears to be diseased, unsound or unwholesome, it may be taken before a justice for the purpose of being condemned, and the person to whom the meat, &c., belongs or in whose possession it was found is liable to a penalty or, in the discretion of the justices, to imprisonment for three months without the option of a fine.

Infectious diseases.

The Public Health Acts contain important provisions relating to infectious disease. Any person who knows he is suffering from an infectious disease must not carry on any trade or business unless he can do so without risk of spreading the disease. Local authorities may require premises to be cleansed and disinfected; they may order the destruction of bedding, clothing or other articles which have been exposed to infection; they may provide proper places for the disinfection of infected articles free of charge; they may provide ambulances, &c. In the case of a person found suffering from infectious disease who has not proper lodging or accommodation, or is lodging in a room occupied by more than one family, or is on board any ship or vessel, such person may by means of a justice's order be removed to a hospital; a local authority may pay the expenses of a person in a hospital or, if necessary, provide nursing attendance; any person exposing himself or any other in his charge while suffering from infectious disease, or exposing infected bedding, clothing or the like, is made liable to a penalty. Owners and drivers of public conveyances must not knowingly convey any person suffering from infectious disease, and if any person suffering from such a disease is conveyed in any public vehicle the owner or driver as soon as it comes to his knowledge must give notice to the medical officer. It is also forbidden to let houses or rooms in which infected persons have been lodging, or to make false statements to persons negotiating for the hire of such rooms. An act was passed in the year 1890, called the Infectious Diseases Prevention Act. When adopted it enabled an urban or district council to obtain the inspection of dairies where these were suspected to be the cause of infectious disease, with a view to prohibiting the supply of milk from such dairies if the fact were established. The act of 1907 extended the provisions of the act of 1890. It enables a local authority to require dairymen to furnish a complete list of sources of supply if the medical officer certifies that any person is suffering from infectious disease which he has reason to suspect is attributable to milk supplied within his district. It also compels dairymen to notify infectious diseases existing among their servants. The act of 1890 also forbids the keeping for more than forty-eight hours of the body of a person who has died of infectious disease in a room used at the time as a dwelling-place, sleeping-place or workshop. It provides for the bodies of persons dying of infectious diseases in a hospital being removed only for burial, and gives power to justices in certain cases to order bodies to be buried. The diseases to which the act applies are smallpox, cholera, membranous croup, erysipelas, scarlatina or scarlet fever, typhus, typhoid, enteric, relapsing, continued or puerperal fever, and any other infectious disease to which the act has been applied by the local authority of the district in the prescribed manner. The most important provision, however, relating to infectious disease is that contained in the Infectious Disease Notification Act 1889. That was originally an adoptive act, but it is now extended to all districts in England and Wales. It requires the notification to the medical officer of health of the district of every case in which a person is suffering from one of the diseases above mentioned. The duty of notification is imposed upon the head of the family, and also upon the medical practitioner who may be in attendance on the patient. The medical attendant is entitled to receive in respect of each notification a fee of 2s. 6d. if the case occurs in his private practice, and of 1s. if the case occurs in his practice as medical officer of any public body or institution. These fees are paid by the urban or rural district council as the case may be. The provisions as to notification are applied to every ship, vessel, boat, tent, van, shed or similar structure used for human habitation in like manner as nearly as may be as if it were a building. Exception is made, however, in the case of a ship, vessel or boat belonging to a foreign government. It is not too much to say that this act has been one of the most effectual means of preventing the spread of infectious disease in modern times.

Hospitals. The district council are empowered to provide hospitals or temporary places for the reception of the sick. They may build them, contract for the use of them, agree for the reception of the sick inhabitants of their district into an existing hospital, or combine with any other district council in providing a common hospital. As has already been mentioned when dealing with county councils, if a district council make default in providing hospital accommodation, the county council may put in operation the Isolation Hospitals Act. The power given to provide hospitals must be exercised so as not to create a nuisance, and much litigation has taken place in respect of the providing of hospitals for smallpox. Up to the present time, however, the courts have refused to accept as a principle that a smallpox hospital is necessarily a source of danger to the neighbourhood, and for the most part applications for injunction on that ground have failed.

Epidemics. Where any part of the country appears to be threatened with or is affected by any formidable epidemic, endemic or infectious disease, the Local Government Board may make regulations for the speedy interment of the dead, house-to-house visitation, the provision of medical aid and accommodation, the promotion of cleansing, ventilation and disinfection, and the guarding against the spread of disease. Such regulations are made and enforced by the district councils. The provisions of the Public Health Acts relating to infectious disease are for the most part extended to ships by an act of the year 1885.

Mortuaries. District councils may, and if required by the Local Government Board, must provide mortuaries, and they may make by-laws with respect to the management and charges for the use of the same. Where the body of a person who has died of an infectious disease is retained in a room where persons live or sleep, or the retention of any dead body may endanger health, any justice on the certificate of a medical practitioner may order the removal of a body to a mortuary and direct the body to be buried within a time limited by the friends of the deceased or in their default by the relieving officer. A district council may also provide and maintain a proper place (otherwise than at a workhouse or at a mortuary) for the reception of dead bodies during the time required to conduct any *post mortem* examination ordered by a coroner.

Cemeteries. Under an act of 1879 the district council have power to provide and maintain a cemetery either within or without their district, and they may purchase or accept a donation of land for that purpose. The provisions of the Cemeteries Clauses Act 1847 apply to a cemetery thus provided. These cannot all be referred to here, but it may be noted that no part of the cemetery need be consecrated, but that if any part is, such part is to be defined by suitable marks, and a chapel in connexion with the Established Church must be erected in it. A chaplain must also be appointed to officiate at burials in the consecrated portion. The power to provide a cemetery under the act under consideration must not be confounded with that of providing a burial ground under the Burial Acts. These acts will be mentioned later in connexion with the powers of parish councils, for in general they are adopted for a parish, part of a parish or combination of parishes, and are administered by a burial board, except where that body has been superseded by a parish council or joint committee. It may be mentioned, however, that under the Local Government Act 1894, where a burial board district is wholly in an urban district, the urban council may resolve that the powers, duties and liabilities of the burial board shall be transferred to the council, and thereupon the burial board may cease to exist. And it is provided by the same act that the Burial Acts shall not hereafter be adopted in any urban parish without the approval of the urban council. The distinction between a burial ground provided under the Burial Acts and a cemetery provided under the act of 1879 is important in many ways, of which one only need be mentioned here—the expenses under the Burial Acts are paid out of the poor rate, while the expenses under the act of 1879 are paid in an urban district out of the general district rate, the incidence of which differs materially from that of the poor rate, as will be seen hereafter.

Highways. In an urban district the urban council have always had all the powers and duties of a surveyor of highways under the Highway Acts. But before 1894 a rural district council had no power or duty in respect of highways except in a few cases where, by virtue of a provision in the Highway Act 1878, the rural sanitary authority of a district coincident in area with a highway district were empowered to exercise all the powers of a a highway board. Except in these cases the highway authority in a parish was the surveyor of highways, elected annually by the inhabitants in vestry, or in a highway district consisting of a number of parishes united by order of quarter sessions, the highway board composed of waywardens representing the several parishes. By the Local Government Act 1894, there were transferred to the district council of every rural district all the powers, duties and liabilities of every highway authority, surveyor or highway board within their district, and the former highway authorities ceased to exist. The highway authority in every district, rural as well as urban, is therefore the district council. Of the chief duties of a district council with regard to highways, the first and most obvious is the duty to repair. This duty was formerly enforceable by indictment of the inhabitants of the parish, but it is not quite clear whether this procedure is applicable, now that the liability to repair is transferred to a council representing a wider area. Under the Highway Acts it is enforceable by summary proceedings before justices and by orders of the county council, but in either case, if the liability to repair is disputed, that question has to be decided on indictment preferred against the highway authority alleged to be in default. In a rural district any parish council may complain to the county council that the district council have made default in keeping any highway in repair, and the county council may thereupon transfer to themselves and execute the powers of the district council at the cost of the latter body, or they may make an order requiring the district council to perform their duty, or they may appoint some person to do so at the cost of the district council. It is important to observe, however, that an action does not lie against a district council in respect of the failure to repair a highway even at the suit of a person who has thereby been injured. The reason assigned for this doctrine is that the council as highway surveyor stand in the same position as the inhabitants of the parish, against whom such an action would not lie. The district council are, however, liable for any injury caused through negligence on the part of their officers or servants in carrying out the work of repair.

Streets. But while rural as well as urban district councils have the powers and duties of surveyors of highways, the provisions of the Public Health Acts relating to streets apply only in urban districts, except in so far as the Local Government Board may by order have conferred urban powers upon a rural district council. These provisions have now to be referred to. It may be convenient to state that the expression "street" is here used in a sense much wider than its ordinary meaning. It is defined by the act to include any highway and any public bridge (not being a county bridge), and any road, lane, footway, square, court, alley or passage, whether a thoroughfare or not. For certain purposes streets as thus defined are divided into two classes, viz. those which are and those which are not highways repairable by the inhabitants at large. But it has to be borne in mind that it is not every highway that is repairable by the inhabitants at large. Before the year 1836 as soon as a way was dedicated to public use and the public had by user signified their acceptance of it, it became without more notice repairable by the parish. Therefore every, highway—whether carriage-way, driftway, bridleway or footway—which can be shown to have been in use before 1836, is presumably repairable by the inhabitants at large, the only exceptions being such highways as are repairable by private persons or corporate bodies *ratione clausurae*, *ratione tenurae*, or by prescription. But in the year 1836, when the Highway Act 1835 came into operation, the law was altered. It was possible, just as formerly, to dedicate a way to the use of the public, and it thereupon became a highway to all intents and purposes. But mere dedication did not make the way repairable by the public. That result was not to follow unless certain stringent requirements were fulfilled. When it is shown, therefore, that a highway has been dedicated after 1836, it is not repairable by the inhabitants at large unless it can be shown that these provisions have been complied with, or that it has been declared to be repairable under provisions of the Public Health Acts presently to be mentioned. (There was also power given to justices, by the Highway Act 1862, to declare a private road or occupation road in a highway district to be a public highway repairable by the parish; but this power does not appear to have been acted upon to any extent.)

All streets being highways repairable by the inhabitants at large within an urban district, are vested in and under the control of the urban council. After much litigation it has now been established that this provision does not give the council an absolute property in the soil of the street, but merely such a qualified property in the surfaces as enables them to exercise control. The urban council are required from time to time to cause all such streets to be made up and repaired as occasion may require, and they are empowered to raise, lower or alter the soil of the street, and to place and keep in repair fences and posts for the safety of foot-passengers. The other class of streets consists of those which are not highways repairable by the inhabitants at large. Under the Public Health Act 1875 such streets may be dealt with in manner following:—If any such street or part thereof is not sewered, levelled, paved, metalled, flagged, channelled, made good or lighted to the satisfaction of the council, the council may cause it to be made up at the expense of the owners of premises fronting the street in proportion to their several frontages. When all or any of the works aforesaid have been executed in the street, and the council are of opinion that the street ought to become a highway repairable by the inhabitants at large, they may by notice to be fixed up in the street declare it to be a highway repairable by the inhabitants at large, and the declaration will be effective unless, within one month after the notice has been put up, the majority of the owners in the street object thereto. An alternative procedure has been provided by the Private Street Works Act, which may be adopted by any urban council. One important point of difference is that under the latter act the council may resolve that the expenses shall be apportioned among the owners not merely according to frontage, but according to the greater or less degree of benefit to be derived by any premises from the works.

Where a house or building in a street is taken down to be rebuilt, the urban district council may prescribe the line to which it is to be rebuilt, paying compensation to the building owner for any damage which he may sustain consequent upon the requirement. Save to this extent, no power is given by the general law to a district council to prescribe a building line. But under an act of 1888 it is provided that it shall not be lawful in any urban district without the consent of the urban authority to erect or bring forward any house or building in any street or any part of such house or building beyond the front main wall of the house or building on either side thereof in the same street.

The control exercised by an urban district council over streets and buildings is to a very large extent exercised through by-laws which they are empowered to make for various purposes relating to the laying out and formation of new streets, the erection and construction of new buildings, the provision of sufficient air-space about buildings to secure a free circulation of air, and the provision of suitable and sufficient sanitary conveniences. The manner in which such by-laws are made and confirmed will be hereafter noticed. In general, the by-laws require plans of new streets to be submitted to the council, and they are required to approve or disapprove of these plans within a month. They cannot disapprove of a plan unless it contravenes the provisions of some statute or by-law; but if a person builds otherwise than according to an approved plan he does so at the risk of having his work pulled down or destroyed. Among the miscellaneous powers of an urban council with respect to streets may be mentioned the power to widen or improve, and certain powers incorporated from the Towns Improvement Clauses Act 1847, with respect to naming streets, numbering houses, improving the line of streets, removing obstructions, providing protection in respect of ruinous or dangerous buildings, and requiring precautions to be taken during the construction and repair of sewers, streets and houses. An urban council may also provide for the lighting of any street in their district, and may contract with any person or company for that purpose. If there is no company having statutory powers of supply within their district, they may themselves undertake the supply of gas, and they may purchase the undertaking of any gas company within their district.

Public parks.

An urban council may acquire and maintain lands for the purpose of being used as public walks or pleasure-grounds, and may support or contribute to the support of such walks or grounds if provided by any other person. They may also contribute to the cost of laying out, planting or improvement of lands provided for this purpose by any person, in their own district or outside that district, if it appears that the walks or grounds could eventually be used by the inhabitants of that district. An urban council may also provide public clocks or pay for the reasonable cost of repairing and maintaining any public clocks in the district, though not vested in them.

Markets and slaughter-houses.

Where an urban council are the council of a borough, and in other cases with the consent of the owners and ratepayers of the district, they may provide market accommodation for their district. They may not, however, establish any market so as to interfere with any market already established in the district under a franchise or charter. For purposes of markets certain provisions of the Markets and Fairs Clauses Act 1847 are incorporated with the Public Health Act. The only one of these that need be noticed is that which provides that after the market is opened for public use every person, other than a licensed hawker, who shall sell or expose for sale in any place within the district, except in his own dwelling-place or shop, any articles in respect of which tolls are authorized to be taken shall be liable to a penalty. The tolls which may be taken by an urban council must be approved by the Local Government Board; and any by-laws which they make for the regulation of the market must be confirmed by the same body. An urban council may also provide slaughter-houses and make by-laws with respect to the management and charges for the use of them. Where they do not provide slaughter-houses, all previously existing slaughter-houses have to be registered and new ones licensed; and no person may lawfully use a slaughter-house which is not either registered or licensed. Licences may be suspended by justices in the event of their being used contrary to the provisions of the act or of the by-laws, and on a second conviction the licence may be revoked. On a conviction of selling or exposing for sale, or having in his possession or on his premises unsound meat, the court may also revoke the licence.

Hackney carriages, &c.

Certain police regulations contained in the Town Police Clauses Act 1847 are by virtue of the Public Health Act 1875 in force in all urban districts. These relate to obstructions and nuisances in streets, fires, places of public resort, hackney carriages and public bathing. An urban council may also license proprietors, drivers and conductors of horses, ponies, mules or asses standing for hiring in the district in the same way as in the case of hackney carriages, and they may also license pleasure boats and vessels, and the boatmen or persons in charge thereof, and they may make by-laws for all these purposes.

Contracts, purchase of lands.

Every district council may enter into such contracts as are necessary for carrying into execution the various purposes of the Public Health Acts. A district council being a corporation, the general law applies in the case of a rural council that they must contract under their common seal, the exception to this rule including the doing of acts very frequently recurring or too insignificant to be worth the trouble of affixing the common seal. In the case of an urban council certain stringent regulations are laid down. A contract made by an urban council, whereof the value and amount exceed £50, must be under seal, and certain other formalities must be observed, some of which are imperative; for example, the taking of sureties from the contractor, and the making provision for penalties to be paid by him in case the terms of the contract are not observed. Every local authority may also, for purposes of the act, purchase or take on lease, sell or exchange, any lands. Such lands as are not required for the purpose for which they were purchased must unless the Local Government Board otherwise direct, be sold. Powers of compulsory purchase of lands are also given under the Lands Clauses Acts, but before these can be put in operation certain conditions must be observed. The Local Government Board must make inquiry into the propriety of allowing the lands to be taken, and the power to acquire the lands compulsorily can only be conferred by means of a provisional order confirmed by parliament.

By-laws.

With regard to the by-laws which district councils may make for many purposes, the subjects of which have been already from time to time mentioned, it is only necessary to state that these require to be confirmed by the Local Government Board. Such confirmation does not, however, give validity to a by-law which cannot be justified by the provisions of the act, and many by-laws which have been so confirmed have been held to be invalid under the general law as being uncertain, unreasonable or repugnant to the law of the realm. For the guidance of local authorities, the Local Government Board have from time to time issued model series of by-laws dealing with the various subjects for which by-laws may be made, and these are for the most part followed throughout England and Wales.

Finance.

As a general rule, all the expenses of carrying into execution the Public Health Acts in an urban district fall upon a fund which is called the general district fund, and that fund is provided by means of a rate called the general district rate. To this there are some exceptions. First, in the case of boroughs where from the time of the first adoption of the Sanitary Acts these expenses have been paid out of the borough rate, the expenses continue to be so paid; and in an urban district which was formerly subject to an Improvement Act, the expenses may be payable out of the improvement rate authorized by that act. The general rule, however, prevails over by far the greater part of England and Wales. The general district rate is made and levied on the occupiers of all kinds of property for the time being assessable to any rate for the relief of the poor, subject to a few exceptions and conditions. Of these the first is that the owner may be rated instead of the occupier, at the option of the urban authority, where the value of the premises is under £10, where the premises are let to weekly or monthly tenants, or where the premises are let in separate apartments, or the rents become payable or are collected at any shorter period than quarterly. When the owner is rated he must be assessed upon a certain proportion only of the net annual value of the premises. The owners or occupiers of certain specified properties are assessed in respect of the same in the proportion of one-fourth part only of the net annual value thereof. These properties include tithes, tithe commutation rent charge, land used as arable, meadow or pasture ground only, or as woodlands, market gardens or nursery grounds, orchards, allotments, any land covered with water such as the reservoir of a waterworks company, or used only as a canal or towing-path of the same, or as a railway constructed under the powers of any Act of Parliament for public conveyance. The reason for these partial exemptions apparently is that sanitary arrangements are made chiefly for the benefit of houses and buildings, while the properties just enumerated do not receive the same amount of benefit. The only other point to be noticed in this connexion is that an urban council may divide their district into parts for all or any of the purposes of the act, rating each part separately for those purposes. The expenses of highways in an urban district fall as a rule upon the general district rate, but under certain conditions, which need not be here set out, a separate highway rate may have to be levied. The urban council have extensive powers of amending the rate, and the rate is collected in such manner as the urban authority may appoint.

The expenses of a rural district council are of two kinds. Of these the first is called general expenses, and it includes the expense of the establishment and officers of the council, of disinfection, providing of conveyance for infected persons, and the expenses of highways. These expenses are payable out of a common fund which is raised out of the poor rate of the several parishes in the district, according to the rateable value of each. Special expenses include the expenses of the construction and maintenance and cleansing of sewers, providing water-supply, and all other expenses incurred or payable in respect of a parish or contributory place within the district determined by order of the Local Government

Board to be special expenses. The expression "contributory place" means a place other than a parish chargeable with special expenses. For the most part it has reference only to what is called a special drainage district, that is to say, a district formed out of one or more parishes or parts of parishes for the purpose of the provision of a common water-supply, or scheme of sewerage, or the like, and in the event of such a district including part only of a parish, the remaining portion would, so far as the special expenses for which the district was created are concerned, be a separate contributory place. These special expenses are chargeable to each parish or contributory place, and they are defrayed by means of special sanitary rates, such rates being raised on all property assessed to the relief of the poor, but with the same exemptions of certain properties as have been mentioned under the head of general district rate in urban districts.

Borrowing powers.

District councils are empowered to borrow with the sanction of the Local Government Board, subject to certain restrictions and regulations. The money must be borrowed for permanent works, the expenses of which ought in the opinion of the Local Government Board to be spread over a term of years which must not exceed sixty. The sums borrowed must not exceed, with the outstanding loans, the amount of the assessable value for two years of the district for which the money is borrowed; and if the sum borrowed would, with the outstanding loans, exceed the assessable value for one year, the sanction of the Local Government Board may not be given except after local inquiry. The money may be repaid by equal instalments of principal, or of principal and interest, or by means of a sinking fund.

Audit.

Where the urban council are the council of a borough, their accounts as urban council are made up and audited in the same ineffective manner as has already been mentioned in the case of the accounts of the council under the Municipal Corporations Act, but each of the borough auditors receives remuneration for auditing the accounts of the council as urban district council. Where the urban council are not the council of a borough, the accounts are made up annually, and audited by the district auditor in the same effective manner as has already been mentioned in the case of the accounts of a county council. The accounts of a rural district council are made up half-yearly and are audited in the same way.

Proceedings against district councils.

The Public Authorities Protection Act 1893 was passed to repeal the numerous provisions contained in many acts of parliament, whereby, before legal proceedings could be taken against a public body, notice of action had to be given and the proceedings commenced within a certain limited time. The act applies to all public authorities, including, of course, district councils, and it provides in effect that where any action or legal proceeding is taken against a council for any act done in pursuance or execution, or intended execution, of an act of parliament, or of any public duty or authority, the action must be commenced within six months next after the act, neglect or default complained of, or in the case of a continuance of injury or damage, within six months next after the ceasing thereof. And it provides further that, in the event of the judgment of the court being given in favour of the council, the council shall be entitled to recover their costs taxed as between solicitor and client. Notice of action is abolished in every case.

Housing of the working classes.

Among other acts which are either incorporated with the Public Health Acts or have been passed subsequently to them, one of the most important is the Housing of the Working Classes Act 1890. It contains three distinct parts. Under the first an urban district council may, by means of a scheme, acquire, rearrange and reconstruct an area which has been proved to be insanitary. The scheme has to be confirmed by the Local Government Board, and carried out by means of a provisional order. The second part of the act deals with unhealthy dwelling-houses, and requires the urban district council to take steps for the closing of any dwelling-houses within their district which are unfit for human habitation. The third part of the act deals with what is called in the act working-class lodging-houses. But the expression is a little misleading, for it includes separate houses or cottages for the working classes, whether containing one or several tenements, and the expression "cottage" may include a garden of not more than half an acre, provided that the estimated annual value of such garden shall not exceed £3. This part of the act may be adopted by a rural district council, but an urban district council can carry it into execution without formal adoption. Land may be acquired for erecting lodging-houses as above defined, and these, when erected, may be managed and let by the council.

Baths and wash-houses.

The urban district council may adopt the provisions of the Baths and Washhouses Acts, and thereunder provide public baths, wash-houses, open bathing-places, covered swimming baths, which they may close in the winter months and use as gymnasia.

Tramways.

Under the Tramways Act 1870 the urban district council may obtain from the Board of Trade a provisional order authorizing the construction of tramways in their district by themselves. Any private persons, and any corporation or company may, with the consent of the council, obtain the like authority, but the Board of Trade have power in certain cases to dispense with the consent of the local authority. Where the order is obtained by a person or body other than the district council, the council may purchase the undertaking at the end of twenty-one years after the tramways have been constructed or at the expiration of every subsequent period of seven years, and the terms of purchase are that the person or company must sell the undertaking upon payment of the then value, exclusive of any allowance for past or future profits of the undertaking, or any compensation for compulsory sale or other consideration whatsoever of the tramway, and all lands, buildings, works, materials and plant suitable to and used for the purposes of the undertaking. It should be observed, however, that although the local authority may themselves construct, and may acquire from the original promoters a system of tramways, they may not themselves work them without special authority of the legislature, and must in general let the working of the undertaking to some person or company.

Bills in Parliament and legal proceedings.

Under the Borough Funds Act 1872 the urban district council may, if in their judgment it is expedient, promote or oppose any local and personal bill or bills in parliament, or may prosecute or defend any legal proceedings necessary for the promotion or protection of the interests of the district, and may charge the costs incurred in so doing to the rates under their control. The power to incur parliamentary costs, however, is subject to several important restrictions. The resolution to promote or oppose the bill must in the first instance have been carried by an absolute majority of the whole number of the council at a meeting convened by special notice, and afterwards confirmed by the like majority. The resolution must have been published in newspapers circulated in the district, and must have received the consent of the Local Government Board or of a secretary of state, if the matter is one within his jurisdiction; and further, the expenses must not be incurred unless the promotion or opposition has been assented to by the owners and ratepayers of the district assembled at a meeting convened for the purpose of considering the matter, and if necessary, signified by a poll. Moreover, the expenses must, before they can be charged to the rates, be examined and allowed by some person authorized by a secretary of state or the Local Government Board, as the case may be.

Under the Pawnbrokers Act 1872 the licences to pawnbrokers, which were formerly granted by justices, are now granted by district councils.

Adulteration.

Under the Sale of Food and Drugs Acts certain important duties devolve upon medical officers and inspectors of nuisances who are officers of district councils. But for the most part the acts do not impose upon district councils themselves any special powers or duties, although, as a matter of fact, prosecutions for offences are usually undertaken by the district councils, and the expenses of the execution of the acts are paid out of their funds. In quarter sessions boroughs, however, where the council have the duty of appointing a public analyst, they are under an obligation to put the acts in force from time to time, as occasion may arise. The acts themselves must be consulted for the procedure, beginning with the taking of samples and ending with the conviction of an offender.

Rivers pollution.

The powers and duties of a district council under the Rivers Pollution Prevention Act 1876 have been incidentally noticed when dealing with county councils, whose powers under the acts are precisely the same.

Electric lighting.

Under the Electric Lighting Acts the Board of Trade may license any district council to supply electricity, or may grant to them a provisional order for the same purpose. A similar licence or order may be granted to a private person or company to supply electricity within the district of a district council, but in that case the consent of the district council must be given, unless the Board of Trade, for special reasons, dispense with such consent. These licences are now rarely applied for or granted, and the provisions which were formerly contained in the provisional orders have now been consolidated by the Electric Lighting Clauses Act 1899, the effect of which will be to make provisional orders uniform for the future. It is now almost the exception, at least in urban districts, to find a district council which has not obtained a provisional order under these acts, and for the most part the undertakings of local authorities in the way of supplying electricity have been very prosperous.

Allotments.

Under the Allotment Acts district councils were empowered to provide allotments for the labouring population of their district, if they were satisfied that there was a demand for allotments, that these could not be obtained at a reasonable rent by voluntary arrangement, and that the land could be let at such a price as would not involve a loss to the council. The district council might acquire land, let it and regulate it, and they might provide common pasture. These powers were, by an act of 1907, transferred to parish councils.

Public libraries.

The urban district council execute the Public Libraries Acts for their district, and the rate for the expenses of the acts, which may not exceed 1d. in the £, is in a borough in the nature of a borough rate, and in any other urban district in the nature of a general district rate. Under the acts not only public libraries, but also public museums, schools for science, art galleries and schools for art, with the necessary buildings, furniture, fittings and conveniences, may be provided for the inhabitants of the district. Land may be acquired, and money borrowed, for the purposes of the acts.

A great number of other statutes confer powers or impose duties upon district councils, such as the acts relating to town gardens, agricultural gangs, fairs, petroleum, infant life protection, commons, open spaces, canal boats, factories and workshops, margarine, sale of horse-flesh and shop hours.

The parish and the parish council.

Before the passing of the Local Government Act 1894 there was really nothing in the form of local government for a parish. It is true that the inhabitants in vestry had certain powers. They could adopt various acts, which will be more particularly referred to hereafter, and they could appoint the persons who were to carry these acts into execution. They elected the churchwardens and overseers, the highway surveyor, if the parish was a separate unit for highway purposes, and the waywardens if it was included in a highway district. But there was nothing in the nature of a representative body exercising any powers of government in the parish regarded as a separate area. Under the act of 1894 this was changed. In every rural parish, that is to say, in every parish which is not included within an urban district, there is a parish meeting, which consists of the parochial electors of the parish. As already stated, these are the persons whose names are on the parliamentary and local government registers. If the parish has a population exceeding 300, a parish council must be elected. If it has a population of 100 or upwards, the county council are bound to make an order for the election of a parish council if the parish meeting so resolves. Where there is no parish council, as will be seen hereafter, the various powers conferred upon a council are exercised by the parish meeting itself. Two or more parishes may be grouped together under a common parish council by order of the county council if the parish meetings of each parish consent. An annual parish meeting in every rural parish must be held on the 25th day of March or within seven days before or after that date; and if there is no parish council, there must be at least one other parish meeting in the year. At the annual parish meeting the parish council, if there is one, is elected, and the members of the council, who originally held office for one year only, now, under a subsequent act, hold office for three years. Any person who is a parochial elector, or who has for twelve months preceding the election resided in the parish, or within 3 m. thereof, may be elected parish councillor, and the number of councillors is to be fixed from time to time by the county council, not being less than five nor more than fifteen. Women, whether married or single, are eligible.

The council are elected in manner provided by the rules of the Local Government Board. The rules now in force will be found in the *Statutory Rules and Orders*. They are very similar to those which are in force with reference to the elections of district councils, which have already been noticed. If a poll is demanded, it must be taken under the Ballot Act, as applied by the rules, and for all practical purposes it may be taken that the election proceeds in the same manner as that of a district council. The parish council elects a chairman annually. He may be one of their own number, or some other person qualified to be a parish councillor. The council is a body corporate, may hold land in mortmain, and can appoint committees for its own parish or jointly with any other parish council.

Powers to appoint overseers.

Among the powers conferred upon a parish council are those of appointing overseers and of appointing and revoking the appointment of assistant overseers. Churchwardens are no longer overseers, and the parish council may appoint as overseers a number of persons equal to the number formerly appointed as overseers and churchwardens. It may be useful to mention here that for purposes of the administration of the poor law, overseers no longer act, their duties in that respect having been superseded by the guardians. They remain, however, the rating authority so far as regards the poor rate and nearly all other rates, the exceptions being the general district rate in an urban district and the borough rate in a borough, made by the town council. They still have power to give relief to poor persons in case of sudden and urgent necessity, but their principal duty is that of rating authority, and they are bound to make out the lists for their parishes of jurors and electors. No payment is made to them. The office is compulsory, but certain persons are privileged from being elected to it. The assistant overseer, who was formerly nominated by the inhabitants and vestry and then formally appointed by justices, is now, as has been stated, appointed by the parish council. He holds office at pleasure, and receives such remuneration as the council fix, and he performs all the duties of an overseer, or such of them as may be prescribed by the terms of his appointment. There may be in a parish a collector of rates appointed by the guardians. In that event, an assistant overseer cannot be appointed to perform the duties of collector of rates, but, on the other hand, the parish council may invest the collector with any of the powers of an overseer. The parish council may appoint a clerk, who may be either one of their own number without payment, or the assistant overseer, rate collector or some other fit person, with remuneration.

Powers and duties of parish councils.

Among the duties transferred to parish councils may be mentioned the provision of parish books and of a vestry room or parochial office, parish chest, fire engine or fire escape, the holding or management of parish property, other than property relating to affairs of the church or held for an ecclesiastical charity, the holding or management of village greens or of allotments, the appointment of trustees of parochial charities other than ecclesiastical charities in certain cases, and certain limited powers with reference to the supply of water to the parish, the removal of nuisances, and the acquisition of rights of way which are beneficial to the inhabitants.

Lighting and Watching Act.

Among the most important of the matters which concern a rural parish is the administration of what are commonly called the adoptive acts. These include the Lighting and Watching Act, the Baths and Washhouses Acts, the Burial Acts, the Public Improvement Act and the Public Libraries Acts. The Lighting and Watching Act was formerly adopted for a parish, or part of a parish, by the inhabitants in vestry, who elected lighting inspectors, of whom one-third went out of office in every year. The inspectors took the necessary steps for having the parish lighted (the provisions as to watching having been obsolete for many years), and the expenses of lighting were raised by the overseers upon an order issued to them by the inspectors. The owners and occupiers of houses, buildings and property, other than land, pay a rate in the £ three times greater than that at which the owners and occupiers of land are rated and pay for the purposes of the act. Now this act, like the other adoptive acts, can only be adopted by the parish meeting, and where adopted for part only of a parish, must be adopted by a parish meeting held for that part. After the adoption of the act it is carried into execution by the parish council, if there is one, and if not, by the parish meeting, and the expenses are raised in the same manner as heretofore.

Baths and Wash-houses Acts.

Burial Acts.

The Baths and Washhouses Acts have already been referred to in dealing with district councils, and it is sufficient to say that they are now adopted and administered in a rural parish in the manner pointed out with reference to the Lighting and Watching Act. The same may be said of the Burial Acts, but these are sufficiently important to require special notice. These acts contain provisions whereby burials may be prohibited in urban districts, and churchyards or burial grounds already existing may be closed when full. Formerly, when the acts had been adopted by the vestry, it was necessary to appoint a burial board to carry the acts into execution and provide and manage burial grounds. Now, in a rural parish which is coextensive with an area for which the acts have been adopted, the burial board is abolished and the acts are administered by the parish council; and the acts cannot be adopted in a rural parish save by the parish meeting. If the area under a burial board in 1894 was partly in a rural parish and partly in an urban district, the burial board was superseded, and the powers of the board are exercised by a joint committee appointed partly by the urban district council and partly by the parish council, or parish meeting as the case may be. In a rural parish where there is no parish council, though the acts are adopted by the parish meeting, it is still necessary to elect the burial board, and that board will be elected by the parish meeting. The distinction between a burial ground under the Burial Acts and a cemetery provided under the Public Health Acts has already been noticed. A burial ground, properly so called, has to be divided into consecrated and unconsecrated portions, and the former really takes the place of the parish churchyard; and the incumbent of the parish church, the clerk, and the sexton continue to receive the same fees upon burials in the consecrated portion as they would have done in the parish churchyard. It has been mentioned that a portion of the burial ground must be left unconsecrated. But this is subject to one important exception, that the parish meeting may unanimously resolve that the whole of the burial ground shall be consecrated. In that case, however, the parish council may, within ten years thereafter, determine that a separate unconsecrated burial ground shall also be provided for the parish. The expenses of the execution of the Burial Acts are provided by the overseers out of the poor rate upon the certificate of the body entrusted with the execution of them. In the event of the acts being adopted for a portion only of a rural parish, the burial board, or the parish meeting, may by resolution transfer all the powers of the board to the parish council.

Public Improvement Act.

The Public Improvement Act, when adopted, enables a parish council to purchase or lease, or accept gifts of land for the purpose of forming public walks, exercise or play grounds, and to provide for the expense by means of a parish improvement rate. Before any such rate is imposed, however, a sum in amount not less than at least half of the estimated cost of the proposed improvement must have been raised by private subscription or donation, and the rate must not exceed sixpence in the £.

Public Libraries Acts.

The Public Libraries Acts enable the authority adopting them to provide public libraries, museums, schools for science, art galleries and schools for art. The expenses in a rural parish are defrayed by means of a rate raised with, and as part of, the poor rate, with a qualification to the effect that agricultural land, market gardens and nursery grounds are to be assessed to the rate at one-third only of their rateable value.

Finance: expenses of parish council.

The expenses of a parish council may not, without the consent of a parish meeting, exceed the amount of a rate of threepence in the £ for the financial year; but with the consent of the parish meeting the limit may be increased to sixpence, exclusive of expenses under the adoptive acts. If it is necessary to borrow, the consent of the parish meeting and of the county council must be obtained. The expenses are payable out of the poor rate by the overseers on the precept of the parish council.

One of the most important powers conferred upon a parish council is that which enables them to prevent stoppage or diversion of any public right of way without their consent and without the approval of the parish meeting. The council may also complain to the county council that the district council have failed to sewer their parish or provide a proper water-supply, or generally to enforce the provisions of the Burial Acts; and upon such complaint, if ascertained to be well founded, the county council may transfer to themselves the powers and duties of the district council, or may appoint a competent person to perform such powers and duties. In a parish which is not sufficiently large to have a parish council, most of the powers and duties conferred or imposed on the parish council are exercised by the parish meeting. It may be convenient here to add that where, under the Local Government Act 1894, the powers of a parish council are not already possessed by an urban district council, the Local Government Board may by order confer such powers on the urban council. This has been done almost universally, as far as regards the power to appoint overseers and assistant overseers, and in many cases urban councils have also obtained powers to appoint trustees of parochial charities.

General observations.

The foregoing is a sketch of the scheme of local government carried out in England and Wales. No attempt has been made to deal with poor law (*q.v.*) or education (*q.v.*). The local administration of justice devolving upon the justices in quarter or petty sessions is hardly a matter of local government, although in one important respect, that, namely, of the licensing of premises for the sale of intoxicating liquors, it may be thought that the duties of justices fall within the scope of local government. It will be seen that the scheme, as at present existing, has for its object the simplification of local government by the abolition of unnecessary independent authorities, and that this has been carried out almost completely, the principal exception being that in some cases burial boards still exist which have not been superseded either by urban district councils or by parish councils or parish meetings. There are also some matters of local administration arising under what are called commissions of sewers. These exist for the purpose of regulating drainage, and providing defence against water in fen lands or lands subject to floods from rivers or tidal waters. The commissioners derive their authority from the Sewers Commission Acts, which date from the time of Henry VIII., from the Land Drainage Act 1861, and from various local acts. It is unnecessary, however, to consider in any detail the powers exercised by commissioners of sewers in the few areas under their control.

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Early in the 20th century the *Victoria History of the Counties of England* (dedicated to Queen Victoria) began to appear; its volumes deal with each county from every aspect—natural history, prehistoric and historic antiquities, ethnography, history, economic conditions, topography and sport being dealt with by authorities in all branches.

The maps of the Ordnance, Geological and Hydrographic Surveys delineate the configuration and geology of England and the adjacent seas with a completeness unsurpassed in any other country. For ordinary detailed work the best series of maps is found in Bartholomew's *Survey Atlas of England and Wales* (Edinburgh Geographical Institute, 1903), which, besides small distributional, physical and other maps and letterpress, contains a magnificent series of coloured-contour maps on the scale of ½ in. to 1 m. (also issued in larger separate sheets).

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ENGLAND, THE CHURCH OF. The Church of England claims to be a branch of the Catholic and Apostolic Church; it is episcopal in its essence and administration, and is established by law in that the state recognizes it as the national church of the English people, an integral part of the constitution of the realm. It existed, in name and in fact, as the church of the English people centuries before that people became a united nation, and, in spite of changes in doctrine and ritual, it remains the same church that was planted in England at the end of the 6th century. From it the various tribes which had conquered the land received a bond of union, and in it they beheld a pattern of a single organized government administered by local officers, to which they gradually attained in their secular polity. In England, then, the state is in a sense the child of the church. The doctrines of the English Church may be gathered from its Book of Common Prayer (see PRAYER, BOOK OF COMMON) as finally revised in 1661, with the form of ordaining and consecrating bishops, priests and deacons, with the exception of the services for certain days which were abrogated in 1859; from the XXXIX Articles (see Creeds), published with royal authority in 1571; and from the First and Second Books of Homilies of 1549 and 1562 respectively, which are declared in Article XXXV. to contain sound doctrine.

Christianity in Roman Britain.

Precursors.—Christianity reached Britain during the 3rd century, and perhaps earlier, probably from Gaul. An early tradition records the death of a martyr Alban at Verulamium, the present St Albans. A fully grown British Church existed in the 4th century: bishops of London, York and Lincoln attended the council of Arles in 314; the church assented to the council of Nicaea in 325, and some of its bishops were present at the council of Rimini in 359. The church held the Catholic faith. Britons made pilgrimages, to Rome and to Palestine, and some joined the monks who gathered round St Martin, bishop of Tours. Among these was Ninian, who preached to the southern Picts, and about 400 built a church of stone on Wigton Bay; its whiteness struck the people and their name for it is commemorated in the modern name Whithorn. From northern Britain, St Patrick (see Patrick, St) went to accomplish his work as the apostle of Ireland. Early in the 5th century Britain was infected by the heresy of Pelagius, himself a Briton by birth, but in 429 Germanus, bishop of Auxerre, and Lupus, bishop of Troyes, recalled the church to orthodoxy and, according to tradition, led their converts to victory, the "Hallelujah victory," over the Picts and Scots. When the Britons were hard pressed by Saxon invaders large bodies of them found shelter in western Armorica, in a lesser Britain, which gave its name to Brittany. A British Church was founded there, and bishops, scholars and recluses of either Britain seem constantly to have visited the other. The Saxon invasion cut off Britain from communication with Rome; and the British Church having no share in the progressive life of the Roman Church, differences gradually arose between them. The organization of the British Church was monastic, its bishops being members, usually abbots, of monasteries, and not strictly diocesan, for the monasteries to which the clergy were attached had a tribal character. The monastic communities were large, Bangor numbered 2000 monks. From Gildas, a British monk, who wrote about 550, we gather that the bishops were rich and powerful and claimed apostolical succession; that though governed by synods the church lacked discipline; that simony was rife, and that bishops and clergy were neglectful. He evidently draws too dark a picture, for religious activity was not extinct. Gildas himself and others preached in Ireland, and from them the Scots, the dominant people of Ireland, received a ritual. The organization of the Scotic Church in Ireland was similar to that of the British Church. Its monastic settlements or schools were many and large, and were the abodes of learning. Bishops dwelt in them and were reverenced for their office, but each was subject to the direction of the abbot and convent. In 565 (?) St Columba, the founder and head of several Scotic monasteries, left Ireland and founded a monastery in Hii or Iona, which afforded gospel teaching to the Scots of Dalriada and the northern Picts, and later did a great work in evangelizing many of the Teutonic conquerors of Britain. By 602 the British Church, in common with the Irish Scots, followed practices which differed from the Roman use as it then was; it kept Easter at a different date; its clergy wore a different tonsure, and there was some defect in its baptismal rite. The conquerors of Britain—Saxons, Angles and Jutes—were heathens; the Britons gradually retreated before them to Wales, and to western and northern districts, or dwelt among them either as slaves or as outlaws hiding in swamps and forests, and they made no attempts to evangelize the conquering race.

The British church.

Foundation of the English Church.

About 587 a Roman abbot, Gregory, afterwards Pope Gregory the Great, is said to have seen some English boys exposed for sale in Rome and asked of what people they were, of what kingdom and who was their king. They were "Angli," he was told, of Deira, the modern Yorkshire, and their king was Ælle. "Not 'Angli,'" said he, struck with the beauty of the fair-haired boys, "but 'angeli' (angels), fleeing from wrath (*de ira*), and Ælle's people must sing Alleluia." He wished himself to go as a missionary to the English, but was prevented. After he became pope he sent a mission to England headed by Augustine. The way was prepared, for Æthelberht, king of Kent, had married a Christian, a Frankish princess Berhta, and allowed her to worship the true God. She brought with her a bishop who ministered to her in St Martin's church outside Canterbury, but evidently made no effort to spread the faith. Augustine and his band landed probably at Ebbsfleet in 597. They were well received by Æthelberht, who was converted and baptized. On the 16th of November Augustine was consecrated by the archbishop of Arles to be the archbishop of the English, and by Christmas had baptized 10,000 Kentish men. Thus the fathers of the English Church were Pope Gregory and St Augustine. Augustine restored a church of the Roman times at Canterbury to be the church of his see. The mission was reinforced from Rome; and Gregory sent directions for the rule of the infant church. There were to be two archbishops, at London and York; London, however, was not fully Christianized for some years, and the primatial see remained at Canterbury. Augustine held two conferences with British bishops; he bade them give up their peculiar usages, conform to the Roman ritual, and join him in evangelizing the English. His haughtiness is said to have offended them; they refused, and the English Church owes nothing to its British predecessor. The mission prospered, and bishops were consecrated for Rochester, and for London for the East Saxons. After Augustine and Æthelberht died a short religious reaction took place in Kent, and the East Saxons apostatized. In 627 Edwin, king of Northumbria, who had married a daughter of Æthelberht, was converted and baptized with his nobles by Paulinus, who became the first bishop of York. As Edwin's kingdom extended from the Humber to the Forth and included the Trent valley, while he exercised superiority over all the other English kingdoms, except Kent, his conversion promised well for the church, but he was slain and his kingdom overrun by Penda, the heathen king of Mercia, the central part of England. Penda's victories endangered the cause of Christianity. The Roman mission was dying out. Kent and East Anglia, which was evangelized by Felix, a Burgundian bishop sent from Canterbury, were settled in the faith. Though Bernicia, the northern part of Northumbria, was little affected by the gospel, and after Edwin's death heathenism became dominant in his kingdom, Christianity did not die out in Northumbria. The East Saxons had heard the gospel, and in 634 the conversion of the West Saxons was begun by Birinus, an Italian missionary. Central England and the South Saxons, however, were wholly untouched by Christianity.

The work of the Romans was taken up by Scotic missionaries. Oswald, under whom the Northumbrian power revived, had lived as an exile among the Scots, and asked them for a bishop to teach his people. Aidan was sent to him by the monks of Iona in 635, and fixed his see in Lindisfarne, or Holy Island, where he founded a monastery. Saintly, zealous and supported by Oswald's influence, he brought Northumbria generally to accept the gospel. The conversion of the Middle Angles and Mercians, and the reconversion of the East Saxons, were also achieved by Scots or by disciples of the Scotic mission. After Aidan's death in 651 the differences between the Roman and Scotic usages, and specially that concerning the date of Easter, led to bitter feelings, were inconvenient in practice, and must have hindered the church in its warfare against heathenism. Oswio, who reigned over both the Northumbrian kingdoms, was, like his brother Oswald, a disciple of the Scots, his son and his queen, the daughter of Edwin, held to the Roman usages, and these usages were maintained by Wilfrid, who on his return from Rome in 658 was appointed abbot of Ripon. By Oswio's command a conference between the two parties was held at the present Whitby in 664. Oswio decided in favour of the Roman usages. This was the end of the Scotic mission. The Scots left Lindisfarne, and their disciples generally adopted the Roman usages. The Scots were admirable missionaries, holy and self-devoted, and building partly on Roman foundations and elsewhere breaking new ground, they and their English disciples, as Ceadda (St Chad), bishop of the Mercians, and Cuthbert, bishop of Lindisfarne, who were by no means inferior to their teachers, almost completed the conversion of the country But they practised an excessive asceticism and were apt to abandon their work in order to live as hermits. Great as were the benefits which the English derived from their teaching, its cessation was not altogether a loss, for the church was passing beyond the stage of mission teaching and needed organization, and that it could not have received from the Scots.

Organization of the English Church.

Its organization like its foundation came from Rome. An archbishop-designate who was sent to Rome for consecration having died there, Pope Vitalian in 668 consecrated Theodore of Tarsus as archbishop of Canterbury. The Scots had no diocesan system, and the English bishoprics were vast in extent, followed the lines of the kingdoms and varied with their fortunes. The church had no system of government nor means of legislation. Theodore united it in obedience to himself, instituted national synods and subdivided the over-large bishoprics. At his death, in 690, the English dominions were divided into fourteen dioceses. Wilfrid, who had become bishop of Northumbria, resisted the division of his diocese and appealed to the pope. He was imprisoned by the Northumbrian king and was exiled. While in exile he converted the South Saxons, and their conversion led to that of the Isle of Wight, then subject to them, in 686, which completed the evangelization of the English. After long strife Wilfrid, who was supported by Rome, regained a part of his former diocese. Theodore also gave the church learning by establishing a school at Canterbury, where many gained knowledge of the Scriptures, of Latin and Greek, and other religious and secular subjects. In the north learning was promoted by Benedict Biscop in the sister monasteries which he founded at Wearmouth and Jarrow. There Bede (*q.v.*) received the learning which he imparted to others. In the year of Bede's death, 735, one of his disciples, Ecgbert, bishop of York, became the first archbishop of York, Gregory III. giving him the *pallium*, a vestment which conferred archiepiscopal authority. He established a school or university at York, to which scholars came from the continent. His work as a teacher was carried on by Alcuin, who later brought learning to the court and Frankish dominions of Charlemagne. The infant church, following the example of the Irish Scots, showed much missionary zeal, and English missionaries founded an organized church in Frisia and laboured on the lower Rhine; two who attempted to preach in the old Saxon land were martyred. Most famous of all, Winfrid, or St Boniface, the apostle of Germany, preached to the Frisians, Hessians and Thuringians, founded bishoprics and monasteries, became the first archbishop of Mainz, and in 754 was martyred in Frisia. He had many English helpers, some became bishops, and some were ladies, as Thecla, abbess of Kitzingen, and Lioba, abbess of Bischofsheim. After his death, Willehad laboured in Frisia, and later, at the bidding of Charlemagne, among the Saxons, and became the first bishop of Bremen. Religion, learning, arts, such as transcription and illumination, flourished in English monasteries. Yet heathen customs and beliefs lingered on among the people, and in Bede's time there were many pseudo-monasteries where men and women made monasticism a cloak for idleness and vice. In the latter part of the 8th century Mercia became the predominant kingdom under Offa, and he determined to have an archbishop of his own. By his contrivance two legates from Adrian I. held a council at Chelsea in 787 in which Lichfield was declared an archbishopric, and seven of the twelve suffragan bishoprics of Canterbury were apportioned to it. In 802, however, Leo III. restored Canterbury to its rights and the Lichfield archbishopric was abolished.

The rise of Wessex to power seems to have been aided by a good understanding between Ecgbert and the church, and his successors employed bishops as their ministers. Æthelred, who was specially under ecclesiastical influence, went on a pilgrimage to Rome, and before his departure made large grants for pious uses. His donation, though not the origin of tithes in England, illustrates the idea of the sacredness of the tenth of income on which laws enforcing the payment of tithes were founded. His pilgrimage was probably undertaken in the hope of averting the attacks of the pagan Danes. Their invasions fell heavily on the church; priests were slaughtered and churches sacked and burnt. Learning disappeared in Northumbria, and things were little better in the south. Bishops fought and fell in battle, the clergy lived as laymen, the monasteries were held by married canons, heathen superstitions and immorality prevailed among the laity. Besides bringing the Danish settlers in East Anglia to profess Christianity in 878, Alfred set himself to improve the religious and intellectual condition of his own people (see ALFRED). The gradual reconquest of middle and northern England by his successors was accompanied by the conversion of the Danish population. A revival of religion was effected by churchmen inspired by the reformed monasticism of France and Flanders, by Odo, archbishop of Canterbury, Oswald, archbishop of York, and Dunstan (see DUNSTAN), who introduced from abroad the strict life of the new Benedictinism. King Edgar promoted the monastic reform, and by his authority Bishop Æthelwold of Winchester turned canons out of the monasteries and put monks in their place. Dunstan sought to reform the church by ecclesiastical and secular legislation, forbidding immorality among laymen, insisting on the duties of the clergy, and compelling the payment of tithes and other church dues. After Edgar's death an anti-monastic movement, chiefly in Mercia, nearly ended in civil war. In this strife, which was connected with politics, the victory on the whole lay with the monks' party, and in many cathedral-churches the chapters remained monastic. The renewed energy of the church was manifested by councils, canonical legislation and books of sermons. In the homilies of Abbot Ælfric, written for Archbishop Sigeric, stress is laid on the purely spiritual presence of Christ in the Eucharist, but his words do not indicate, as some have believed, that the English Church was not in accord with Rome. The ecclesiastical revival was short-lived. Renewed Danish invasions, in the course of which Archbishop Alphege was martyred in 1012, and a decline in national character, injuriously affected the church and, though in the reign of Canute it was outwardly prosperous, spirituality and learning decreased. Bishoprics and abbacies were rewards of service to the king, the bishops were worldly-minded, plurality was frequent, and simony not unknown. Edward the Confessor promoted foreign ecclesiastics; the connexion with Rome was strengthened, and in 1062 the first legates since the days of Offa were sent to England by Alexander II. A political conflict led to the banishment of Robert, the Norman archbishop of Canterbury. An Englishman Stigand received his see, but was excommunicated at Rome, and was regarded even in England as schismatical. When William of Normandy planned his invasion of England, Alexander II., by the advice of Hildebrand, afterwards Gregory VII., moved doubtless by this schism and by the desire to bring the English Church under the influence of the Cluniac revival and into closer relation with Rome, gave the duke a consecrated banner, and the Norman invasion had something of the character of a holy war.

Later Anglo-Saxon times.

Norman times.

Before the Norman Conquest the church had relapsed into deadness: English bishops were political partisans, the clergy were married, and discipline and asceticism, then the recognized condition of holiness, were extinct. The Conqueror's relations with Rome ensured a reform; for the papacy was instinct with the Cluniac spirit. In 1070 papal legates were received and held a council by which Stigand was deposed. Lanfranc, abbot of Bec, was appointed archbishop of Canterbury and worked harmoniously with the king in bringing the English Church up to the level of the church in Normandy. Many native bishops and abbots were deposed, and the Norman prelates who succeeded them were generally of good character, strict disciplinarians, and men of grander ideas. A council of 1075 decreed the removal of bishops' sees from villages to towns, as on the continent; the see of Sherborne, for example, was removed to Old Sarum, and that of Selsey to Chichester, and many churches statelier than of old were built in the Norman style which the Confessor had already adopted for his church at Westminster. In another council priests and deacons were thenceforward forbidden to marry. William and Lanfranc also worked on Hildebrandine lines in separating ecclesiastical from civil administration. Ecclesiastical affairs were regulated in church councils held at the same time as the king's councils. Bishops and archdeacons were no longer to exercise their spiritual jurisdiction in secular courts, as had been the custom, but in ecclesiastical courts and according to canon law. The king, however, ruled church as well as state; Gregory granted him control over episcopal elections, he invested bishops with the crozier and they held their temporalities of him, and he allowed no councils to meet and no business to be done without his licence. Gregory claimed homage from him; but while the king promised the payment of Peter's pence and such obedience as his English predecessors had rendered, he refused homage; he allowed no papal letters to enter the kingdom without his leave, and when an anti-pope was set up, he and Lanfranc treated the question as to which pope should be acknowledged in England as one to be decided by the crown. The Conquest brought the church into closer connexion with Rome and gave it a share in the religious and intellectual life of the continent; it stimulated and purified English monasticism, and it led to the organization of the church as a body with legislative and administrative powers distinct from those of the state. The relations established by the Conqueror between the crown, the church and the pope, its head and supreme judge, worked well as long as the king and the primate were agreed, but were so complex that trouble necessarily arose when they disagreed. William Rufus tried to feudalize the church, to bring its officers and lands under feudal law; he kept bishoprics and abbacies vacant and confiscated their revenues. He quarrelled with Anselm (*q.v.*) who succeeded Lanfranc. Anselm while at Rome heard the investiture of prelates by laymen denounced, and he maintained the papal decree against Henry I. Bishops were vassals of the king, holding lands of him, as well as officers of the church. How were they to be appointed? Who should invest them with the symbols of their office? To whom was their homage due? (see INVESTITURE). These questions which agitated western Europe were settled as regards England by a compromise: Henry surrendered investiture and kept the right to homage. The substantial gain lay with the crown, for, while elections were theoretically free, the king retained his power over them. Though Henry in some degree checked the exercise of papal authority in England, appeals to Rome without his sanction were frequent towards the end of his reign. Stephen obtained the recognition of his title from Innocent II., and was upheld by the church until he violently attacked three bishops who had been Henry's ministers. The clergy then transferred their allegiance to Matilda. His later quarrel with the papacy, then under the influence of St Bernard, added to his embarrassments and strengthened the Angevin cause.

The Angevin kings.

During Stephen's reign the church grew more powerful than was for the good either of the state or itself. Its courts encroached on the sphere of the lay courts, and further claimed exclusive criminal jurisdiction over all clerks whether in holy or minor orders, with the result that criminous clerks, though degraded by a spiritual court, escaped temporal punishment. Henry II., finding ecclesiastical privileges an obstacle to administrative reform, demanded that the bishops should agree to observe the ancient customs of the realm. These customs were, he asserted, expressed in certain constitutions to which he required their assent at a council at Clarendon in 1164. In spirit they generally maintained the rights of the crown as they existed under the Conqueror. One provided that clerks convicted of temporal crime in a spiritual court and degraded should be sentenced by a lay court and punished as laymen. Archbishop Becket (see BECKET) agreed, repented and refused his assent. The king tried to ruin him by unjust demands; he appealed to Rome and fled to France. A long quarrel ensued, and in 1170 Henry was forced to be reconciled to Becket. The archbishop's murder consequent on the king's hasty words shocked Christendom, and Henry did penance publicly. By agreement with the pope he renounced the Constitutions, but the encroachments of the church courts were slightly checked, and the king's decisive influence on episcopal elections and some other advantages were secured. The church in Wales had become one with the English Church by the voluntary submission of its bishops to the see of Canterbury in 1192 and later. The Irish Church remained distinct, though the conquest of Ireland, which was sanctioned by the English pope Adrian IV. (Nicholas Breakspear), brought it into the same relations with the crown as the English Church and into conformity with it. Under the guidance of ecclesiastics employed as royal ministers, the church supported the crown until, in 1206, Innocent III. refused to confirm the election of a bishop nominated by King John to Canterbury; and representatives of the monks of Christ Church, in whom lay the right of election, being at his court, the pope bade them elect Stephen Langton whom he consecrated as archbishop. John refused to receive Langton and seized the estates of Christ Church. Innocent laid England under an interdict in 1208; the king confiscated the property of the clergy, banished bishops and kept sees vacant. Papal envoys excommunicated him and declared him deposed in 1211. Surrounded by enemies, he made his peace with the pope in 1213, swore fealty to him before his envoy, acknowledged that he held his kingdom of the Roman see, and promised a yearly tribute for England and Ireland. Finally he surrendered his crown to a legate and received it back from him. The banished clergy returned and an agreement was made as to their losses. Langton guided the barons in their demands on the king which were expressed in Magna Carta. The first clause provided, as charters of Henry I. and Stephen had already provided, that the English Church should be "free," adding that it should have freedom of election, which John had promised in 1214. As John's suzerain, Innocent annulled the charter, suspended Langton, and excommunicated the barons in arms against the king. On John's death, Gualo, legate of Honorius III., with the help of the earl marshal, secured the throne for Henry III., and he and his successor Pandulf, as representatives of the young king's suzerain, largely directed English affairs until 1221, when Pandulf's departure restored Langton to his rightful position as head in England of the church. Reforms in discipline and clerical work were inculcated by provincial legislation, and two legates, Otho in 1237 and Ottoboni in 1268, promulgated in councils constitutions which were a fundamental part of the canon law in England. Religious life was quickened by the coming of the friars (see FRIARS). Parochial organization was strengthened by the institution of vicars in benefices held by religious bodies, which was regulated and enforced by the bishops. It was a time of intellectual activity, in character rather cosmopolitan than national. English clerks studied philosophy and theology at Paris or law at Bologna; some remained abroad and were famous as scholars, others like Archbishops Langton, and Edmund Rich, and Bishop Grosseteste returned to be rulers of the church, and others like Roger Bacon to continue their studies in England. The schools of Oxford, however, had already attained repute, and Cambridge began to be known as a place of study. The spirit of the age found expression in art, and English Gothic architecture, though originally, like the learning of the time, imported from France, took a line of its own and reached its climax at this period. Henry's gratitude for the benefits which in his early years he received from Rome was shown later in subservience to papal demands. Gregory IX., and still more Innocent IV., sorely in need of money to prosecute their struggle with the imperial house, laid grievous taxes on the English clergy, supported the king in making heavy demands upon them, and violated the rights of patrons by appointing to benefices by "provisions" often in favour of foreigners. Churchmen, and prominently Grosseteste, the learned and holy bishop of Lincoln, while recognizing the pope as the divinely appointed source of all ecclesiastical jurisdiction, were driven to resist papal orders which they held to be contrary to apostolic precepts. Their remonstrances were seldom effectual, and the state of the national church was noted by the Provisions of Oxford in 1258 as part of the general misgovernment which the baronial opposition sought to remedy. The alliance between the crown and the papacy in this reign diminished the liberties of the church.

13th and 14th centuries.

Edward I., who was a strong king, checked an attempt to magnify the spiritual authority by the writ *Circumspecte agatis*, which defined the sphere of the ecclesiastical courts, put a restraint on religious endowments by the Statute of Mortmain, and desiring that every estate in the realm should have a share in public burdens and counsels, caused the beneficed clergy to be summoned to send proctors to parliament. The clergy preferred to make their grants in their own convocations, and so lost the position offered to them. For some years clerical taxation by the crown was carried on with the good-will of the papacy; it was not oppressive for unbeneficed clergy and incomes below ten marks were exempt, and in theory the clergy were celibate. Papal demands, however, were additional burdens. In 1296 Boniface VIII., by his bull *Clericis laicos*, forbade the clergy to grant money to lay princes, and Edward's request for a clerical subsidy was in 1297 refused by convocation led by Archbishop Winchelsea. The king thereupon outlawed the clergy. The northern province yielded, the southern held out longer; but finally the clergy made their peace severally, each paying his share, and the royal victory was complete. Winchelsea joined the baronial opposition which forced Edward to grant the "Confirmation of the Charters." Edward procured his disgrace from Clement V., and in return allowed Clement to exact so much from the church that the doings of the papal agents provoked an indignant remonstrance from parliament in 1307. With that exception the king's dealings with the church were statesmanlike. He employed clerical ministers and paid them by church preferments, but his nominations to bishoprics did not always receive papal confirmation which had become recognized as essential. His weak son Edward II. yielded readily to papal demands. The majority of the bishops of the reign, and specially those engaged in politics, were unworthy men; religion was at a low ebb; plurality and non-residence were common. By the constitution *Execrabilis* John XXII. ordered that all cures held in plurality save one should be vacated, and, which was not so well, "reserved" all benefices so vacated for his own appointment. As the residence of the popes at Avignon from 1308 to 1377 brought them under French influence, Englishmen during the war with France were specially displeased that large sums should be drawn from the kingdom for them and that they should exercise patronage there. In the reign of Edward III. the popes, though appointing to bishoprics by provision, did not give them to foreigners, but they appointed foreigners, enemies of England, to lesser preferments, deaneries and prebends. In 1351 the Statute of Provisors declared provisions unlawful. Capitular elections, however, remained mere forms; the king nominated, and the popes provided, and took advantage of their claim to appoint to sees vacant by translation. Papal interference in suits concerning temporalities was checked by a law of 1353 (the first statute of *Praemunire*), which made punishable by outlawry and forfeiture the carrying before a foreign tribunal of causes cognizable by English courts. This measure was extended in 1365, and in 1393 by the great statute of *Praemunire*. Indignant at the law of 1365, Urban V. demanded payment of the tribute promised by John, which was then thirty-three years in arrear, but parliament repudiated the claim. The Black Death disorganized the church by thinning the ranks of the clergy, who did their duty manfully during the plague. In the diocese of Norwich, for example, 800 parishes lost their incumbents in 1349, 83 of them twice over (Jessopp). Large though insufficient numbers were instituted to benefices and unfit persons received holy orders. The value of livings decreased and many lay vacant. Some incumbents deserted their parishes to take stipendiary work in towns or secular employments, and unbeneficed clergy demanded higher stipends. Greediness infected the church in common with society at large. Yet Chaucer's ideal parish priest must have represented a familiar type, so that we may believe that much good work was here and there unobtrusively done by the clergy. Prominent among abuses were the sale of pardons, and the extortions of the ecclesiastical courts; their decrees were enforced by excommunication, and on a writ issued to the sheriff an excommunicated person would be imprisoned until he satisfied the demands of the church. The state needed money and attacks were made in parliament on the wealth of the church. Already, in 1340, Edward III., who quarrelled with Archbishop Stratford on political grounds, had appointed lay ministers, and in 1371 William of Wykeham, bishop of Winchester, and other clerical ministers were turned out of office and succeeded by laymen. A political crisis in 1376 was followed by a struggle between the bishops and John of Gaunt, duke of Lancaster, the head of the anticlerical party, who allied himself with John Wycliffe (*q.v.*). He was unpopular, and when the bishops cited Wycliffe before them in St Paul's, the duke's conduct provoked a riot and the proceedings ended abruptly. Wycliffe held that the church was corrupted by wealth; that only those in grace had a right to God's gifts, and that temporal power belonged only to laymen and not to popes nor priests. Later he attacked the papacy itself, which in 1378 was distracted by the great schism; by 1380 he condemned pilgrimages, secret confession and masses for the dead. While holding the presence of Christ in the Eucharist, he denied a change of substance in the elements, arguing that accidents or qualities, such as form and colour, could not exist without substance. He taught that Holy Scripture was the only source of religious truth, to the exclusion of church authority and tradition, and he and his followers made the first complete English version of the Bible. His opinions were spread by the poor priests whom he sent out to preach and by his English tracts. That his teaching had any direct effect on the insurrection of 1381, though commonly believed, appears to be an unfounded idea; many priests were concerned in the rising, and specially the mendicant orders, Wycliffe's bitter enemies, but the motives of the insurrection were essentially secular (Oman, *The Great Revolt of 1381*). The reaction which followed extended to religion, and Wycliffe's doctrines were condemned by a church council in 1382. Nevertheless he died in peace. He had many disciples, especially in Oxford and in industrial centres. The Lollards, as his followers were called, had supporters in parliament and among people of high rank in the court of Richard II., and the king's marriage to Anne of Bohemia brought about the importation of Wycliffe's writings into Bohemia, where they had a strong influence on the religious movement led by Hus. At first the bishops were not inclined to persecute, and the earlier Lollards mostly recanted under pressure, but their number increased.

The 15th century.

With the accession of the Lancastrian house the crown allied itself with the church, and the bishops adopted a repressive policy towards the Lollards. By the canon law obstinate heretics were to be burnt by the secular power, and though England had hitherto been almost free from heresy, one or two burnings had taken place in accordance with that law. In 1401 a statute, *De heretico comburendo*, ordered that heretics convicted in a spiritual court should be committed to the secular arm and publicly burned, and, while this statute was pending, one Sawtre was burned as a relapsed heretic. Henry V. was zealous for orthodoxy and the persecution of Lollards increased; in 1414 Sir John Oldcastle, Lord Cobham, who had been condemned as a heretic, escaped and made an insurrection; he was taken in 1417 and hanged and burned. Lollardism was connected with an insurrection in 1431; it then ceased to have any political importance, but it kept its hold in certain towns and districts on the lower classes; many Lollards were forced to recant and others suffered martyrdom. The church was in an unsatisfactory state. As regards the papacy, the crown generally maintained the position taken up in the previous century, but its policy was fitful, and the custom of allowing bishops who were made cardinals to retain their sees strengthened papal influence. The bishops were largely engaged in secular business; there was much plurality, and cathedral and collegiate churches were frequently left to inferior officers whose lives were unclerical. The clergy were numerous and drawn from all classes, and humble birth did not debar a man from attaining the highest positions in the church. Candidates for holy orders were still examined, but clerical education seems to have declined. Preaching was rare, partly from neglectfulness and partly because, in 1401, in order to prevent the spread of heresy, priests were forbidden to preach without a licence. While the marriage of the clergy was checked, irregular and temporary connexions were lightly condoned. Discipline generally was lax, and exhortations against field-sports, tavern haunting and other unclerical habits seem to have had little effect. Monasticism had declined. Papal indulgences and relics were hawked about chiefly by friars, though these practices were discountenanced by the bishops. On the other hand, all education was carried on by the clergy, and religion entered largely into the daily life of the people, into their gild-meetings, church-ales, mystery-plays and holidays, as well as into the great events of family life—baptisms, marriages and deaths. Many stately churches were built in the prevailing Perpendicular style, often by efforts in which all classes shared, and many hamlet chapels supplemented the mother church in scattered parishes. The revival of classical learning scarcely affected the church at large. Greek learning was regarded with suspicion by many churchmen, but the English humanists were orthodox. The movement had little to do with the coming religious conflicts, which indeed killed it, save that it awoke in some learned men like Sir Thomas More a desire for ecclesiastical, though not doctrinal, reform, and led many to study the New Testament of which Erasmus published a Greek text and Latin paraphrases.

The Reformation era.

During the earlier years of the 16th century Lollardism still existed among the lower classes in towns, and was rife here and there in country districts. Persecution went on and martyrdoms are recorded. The old grievances concerning ecclesiastical exactions remained unabated and were further strengthened by an ill-founded rumour that Richard Hunne, a Londoner who had refused to pay a mortuary, was imprisoned for heresy in the Lollards' tower, and was found hanged in his cell in 1514, had been murdered. Lutheranism affected England chiefly through the surreptitious importation of Tyndale's New Testament and heretical books. In 1521 Henry VIII. wrote a book against Luther in which he maintained the papal authority, and was rewarded by Leo X. with the title of Defender of the Faith. Henry, however, whose will was to himself as the oracles of God, finding that the pope opposed his intended divorce from Catherine of Aragon, determined to allow no supremacy in his realm save his own. He carried out his ecclesiastical policy by parliamentary help. Parliament was packed, and was skilfully managed; and he had on his side the popular impatience of ecclesiastical abuses, a new feeling of national pride which would brook no foreign interference, the old desire of the laity to lighten their own burdens by the wealth of the church, and a growing inclination to question or reject sacerdotal authority. He used these advantages to forward his policy, and when he met with opposition, enforced his will as a despot. The parliament of 1529 lasted until 1536; it broke the bonds of Rome, established royal supremacy over the English Church, and effected a redistribution of national wealth at the expense of the spirituality. It began by acts abolishing ecclesiastical exactions, such as excessive mortuaries and fees for probate, and by prohibiting pluralities except in stated cases, application to Rome for licence to evade the act being made penal. Henry having crushed his minister Cardinal Wolsey, archbishop of York, declared the whole body of the clergy involved in a *praemunire* by their submission to Wolsey's legatine authority, and ordered the convocation to purchase pardon by a large payment, and by acknowledging him as "Protector and Supreme Head of the English Church and Clergy." After much debate, the acknowledgment was made in 1531, with the qualification "so far as the law of Christ allows." A "supplication" against clerical jurisdiction and legislation by convocation was obtained from the Commons in 1532, and Henry received from convocation the "submission of the clergy," surrendering its legislative power except on royal licence, and consenting to a revision of the canon law by commissioners to be appointed by the king. A bill for conditionally withholding the payment of *annates*, or first-fruits, to Rome was passed, and Henry took advantage of the fear of the Roman court lest it should lose these payments, to obtain without the usual fees bulls promoting Cranmer to the see of Canterbury in 1533, and thus was enabled to gain his divorce. Cranmer pronounced his marriage to Catherine null, and declared him lawfully married to Anne Boleyn. Clement VII. retorted by excommunicating the king, but for that Henry cared not. Appeals to Rome were forbidden by statute, and the council ordained that the pope should thenceforth only be spoken of as bishop of Rome, as not having authority in England. In 1534 the restraint of annates was confirmed by law, all payments to Rome were forbidden, and it was enacted that, on receiving royal licence to elect, cathedral chapters must elect bishops nominated by the king. The papal power was extirpated by statute, parliament at the same time declaring that neither the king nor kingdom would vary from the "Catholic faith of Christendom." The submission of the clergy was made law. Appeals from the archbishops' courts were to be to the king in chancery, and were to be heard by commissioners, whence arose the Court of Delegates as the court of final appeal in ecclesiastical cases. The first-fruits and tenths of benefices were given to the king, and his title as "Supreme Head in earth of the Church of England" was declared by parliament without the qualification added by convocation. Fisher, bishop of Rochester, and Sir Thomas More, lately chancellor, the two most eminent Englishmen, were beheaded in 1535 on an accusation of attempting to deprive the king of this title, and some Carthusian monks suffered a more cruel martyrdom in the same cause. Meanwhile New Testaments were burnt, and heretics, or reformers, forced to abjure or, remaining steadfast, were sent to the stake, for though the heresy law of Henry IV. was repealed, heresy was still punishable by death, and persecution was not abated. By breaking the bonds of Rome Henry did not give the church freedom; he substituted a single despotism for the dual authority which pope and king had previously exercised over it. In 1535 Cromwell, the king's vicar-general, began a visitation of the monasteries. The reports (*comperta*) of his commissioners having been delivered to the king and communicated to parliament in 1536, parliament declared the smaller monasteries corrupt, and granted the king all of less value than £200 a year. A rebellion in Lincolnshire and another in the north, the formidable Pilgrimage of Grace, followed. The suppression of the greater houses was effected gradually, surrenders were obtained by pressure, and three abbots who were reluctant to give up the possessions of their convents for confiscation were hanged. Monastic shrines and treasuries were sacked and the spoil sent to the king, to whom parliament granted all the houses, their lands and possessions. Of the enormous wealth thus gained Henry spent a part on national defence, a little on the foundation of the bishoprics of Westminster, dissolved in 1550, Bristol, Chester, Gloucester, Oxford and Peterborough, and gave the lands to men either useful to or favoured by himself, or sold them to rich purchasers. In 1536 he dictated the belief and ceremonial of the church by issuing Ten Articles which were subscribed by convocation. This first formulary of the English Church as separate from Rome did not contravene Catholic doctrine, though it showed the influence of Lutheran models. Another exposition of Anglican doctrine was made in the *Institution of a Christian Man* or "Bishops' book," in some respects more likely to satisfy those attached to the tenets of Rome, in others, as in the distinct repudiation of purgatory and the declaration that salvation depended solely on the merits of Christ, showing an advance. It was published in 1537 with Henry's sanction but not by authority. In that year licence was granted for the sale of a translation of the Bible, and in 1538 another version called Matthew's Bible, was ordered to be kept in all churches (see

Bible). Pilgrimages were suppressed and images used for worship destroyed. Denial of the king's supremacy, denial of the corporal presence in the Eucharist, and insults to Catholic rites were alike punished by cruel death. The publication abroad of the king's excommunication rendered an assertion of orthodoxy advisable for political reasons, and in 1539 came the Act of the Six Articles attaching extreme penalties to deviations from Catholic doctrines. The backward swing of the pendulum continued; Cromwell was beheaded and three reforming preachers were burnt in 1540. Prosecutions for heresy under the act were fitful: four gospellers were burnt in London in 1546, of whom the celebrated Anne Askew was one. Cranmer, however, did not lose the king's favour. A fresh attempt to define doctrine was made in the *Necessary Doctrine and Erudition of a Christian Man*, the "King's Book," published by authority in 1543, which, while repudiating the pope, was a declaration of Catholic orthodoxy. A *Primer*, or private prayer-book, of which parts were in English, as the litany composed by Cranmer, and virtually the same as at present, was issued in 1546, and further liturgical change seemed probable when Henry died in 1547.

Henry, while changing many things in the church, would not allow any deviation in essentials from the religion of Catholic Europe, which was not then so dogmatically defined as it was later by the council of Trent. Edward VI. was a child, and the Protector Somerset and the council favoured further changes, which were carried out with Cranmer's help. They issued a book of *Homilies* and a set of injunctions which were enforced by a royal visitation. Pictures and much painted glass were destroyed in churches, frescoed walls were whitewashed, and in 1548, the removal of all images was decreed. Parliament ordered that bishops should be appointed by letters patent and hold their courts in the king's name. An act of the last reign granting the king all chantries and gilds was enlarged and enforced with cruel injustice to the poor. On the petition of convocation parliament allowed the marriage of priests; and it further ordered that the laity should receive the cup in communion. A communion book was issued by the council in English, the Latin mass being retained for a time. Many German reformers came to England, were favoured by the council, and gained influence over Cranmer. The first Book of Common Prayer was authorized by an Act of Uniformity in 1549; it retained much from old service books, but the communion office is Lutheran in character. It excited discontent, and a serious insurrection broke out in the West, the insurgents demanding the revival of the Act of the Six Articles and the withdrawal of the new service as "like a Christmas game." After Somerset's fall the government rapidly pushed forward reformation. A new *Ordinal* issued with parliamentary approval in 1550 was significant of the change in sacramental doctrine, and the four minor orders disappeared. Altars were destroyed and tables substituted. Five bishops, Bonner of London, Gardiner of Winchester, and Heath of Worcester, then already in prison, and two others, were deprived; and the Lady Mary, who would not give up the mass, was harshly treated. The reformers were not tolerant; for a woman was burnt for Arianism in 1550 and a male Anabaptist in 1551. Under the influence of foreign reformers, who took a lower view of the Eucharist than the Lutheran divines, Cranmer soon advanced beyond the prayer-book of 1549. A second prayer-book, departing further from the old order, appeared in 1552, and without being accepted by convocation was enforced by another Act of Uniformity, and in 1553 a catechism and forty-two articles of religion were authorized by Edward for subscription by the clergy, though not laid before convocation. A revision of the canon law in accordance with the act for "submission of the clergy" was at last undertaken in 1551, but the only result was a document entitled *Reformatio legum ecclesiasticarum*, which never received authority. Edward died in 1553. Apart from matters of faith, the church had fared ill under a royal supremacy exercised by self-seeking nobles in the name of the boy-king. Convocation lost all authority and bishops were treated as state officials liable to deprivation for disobedience to the council. Means of worship were diminished, and the poor were shamefully wronged by the suppression of chantries, gilds and holy days; even the few sheep of the poor brethren of a gild were seized to swell a sum which from 1550 was largely diverted from public purposes to private gain. Churches were despoiled of their plate; the old bishops were forced, the new more easily persuaded, to give up lands belonging to their sees, and rich men grew richer by robbing God.

When Mary succeeded her brother, the deprived bishops were restored, some reforming bishops were imprisoned, and Cranmer, who was implicated in the plot on behalf of Lady Jane Grey, was attainted of treason. As regards doctrine, religious practices and papal supremacy, Mary was set on bringing back her realm to the position existing before her father's quarrel with Rome. Her first parliament repealed the ecclesiastical legislation of Edward's reign, and convocation formally accepted transubstantiation. Seven bishops were deprived in 1554, four of them as married, and about a fifth of the beneficed clergy, though some received other benefices after putting away their wives. Apparently Mary at first believed that her authority would be accepted in religious matters; but she met with opposition, partly provocative, for Wyat's rebellion consequent on her intended marriage to Philip of Spain was closely connected with religion, and more largely passive in the noble resolution of those who chose martyrdom rather than denial of their faith. To the nation at large, though not averse from the old doctrines and practices of the church, a return to the Roman obedience was distasteful. Nevertheless, Cardinal Pole was received as legate, and the title of Supreme Head of the Church having been dropped, a parliament carefully packed, and the fears of the rich appeased by the assurance that they would not have to surrender the monastic lands, he absolved the nation in parliament and reunited it to the Church of Rome on November 30, 1554, the clergy being absolved in convocation. Parliament repealed all acts against the Roman see since the twentieth year of Henry VIII. The heresy laws were revived, and a horrible persecution of those who refused to disown the doctrines of the prayer-book began in 1555, and lasted during the remainder of the reign. Nearly 300 persons were burned to death as heretics in these four years, among them being five bishops: Hooper of Gloucester, Ferrar of St David's, Ridley of London, and Latimer (until 1539) of Worcester in 1555, and Archbishop Cranmer in 1556. The chief responsibility for these horrors rests with the queen; the bishops who examined the accused were less zealous than she desired. The most prominent among them in persecution was Bonner of London. The exiles for religion were received at Frankfort, Strassburg and Zürich. At Frankfort a party among them objected to the ceremonies retained in the prayer-book, and, encouraged by Calvin and by Knox, who came to them from Geneva, quarrelled with those who desired to keep the book unchanged. Mary died in 1558. Her reign arrested the rapid spoliation of the church and possibly prevented the adoption of doctrines which would have destroyed its apostolic character; the persecution by which it was disgraced strengthened the hold of the reformed religion on the people and made another acceptance of Roman supremacy for ever impossible.

Elizabethan settlement.

Elizabeth's accession was hailed with pleasure; she was known to dislike her sister's ecclesiastical policy, and a change was expected. An Act of Supremacy restored to the crown the authority over the church held by Henry VIII., and provided for its exercise by commissioners, whence came the court of High Commission nominated by the crown, as a high ecclesiastical court; but Elizabeth rejected the title of Supreme Head, and used that of Supreme Governor, as "over all persons and in all cases within her dominions supreme." An Act of Uniformity prescribed the use of the prayer-book of 1552 in a revised form which raised the level of its doctrine, and injunctions enforced by a royal visitation re-established the reformed order. All the Marian bishops save two refused the oath of supremacy and were deprived, and eight were imprisoned. Of the clergy generally few refused it; for only some 200 were deprived for religion during the first six years of the reign. Bishops for the vacant sees were nominated by the crown and elected by their chapters as in Henry's reign; Matthew Parker was canonically consecrated archbishop of Canterbury. The orthodoxy of the church was vindicated by Bishop Jewel's *Apologia ecclesiae Anglicanae*. Adherents to Rome vainly tried to obtain papal sanction for attending the church services, and were forced either to disobey the pope or become "recusants"; many were fined, and those who attended mass were imprisoned. Meanwhile a party, soon known as Puritans, rebelled against church order; the exiles who had come under Genevan influence objecting on their return to vestments and ceremonies enjoined by the prayer-book. There was much nonconformity in the church which the queen ordered the bishops to correct. Parker, though averse to violent measures, insisted on obedience to his "Advertisements" of 1566, which, though not formally authorized by the queen, expressed her will, and became held as authoritative, and some of the refractory were punished. A company engaged in irregular worship was discovered in London in 1567 and a few persons were imprisoned by the magistrate. Active opposition to the government was stirred up by Pius V., and in 1569 a rebellion in the north, where the old religion was strong, was aided by papal money and encouraged by hopes of Spanish intervention. In 1570 Pius published a bull excommunicating and deposing the queen. Thenceforward recusants had to choose between loyalty to the queen and loyalty to the pope. They lay under suspicion, and severe penal laws were enacted against Romish practices. About 1579 many seminary priests and Jesuits came over to England as missionaries; some actively engaged in treason, all were legally traitors. The country was threatened with foreign invasion, plots against the government were detected, and the queen's life was held to be endangered. The council hunted down these priests and their abettors, and many were executed, martyrs to the doctrine of the pope's power of deposition. The number put to death in this reign under the penal laws was 187. The papal policy defeated itself; a large number of the old religion while retaining their faith chose to be loyal to the queen rather than lend themselves to the designs of her enemies. From 1571 recusants can no longer be reckoned as nonconforming members of the English Church: the law recognized them as separate from it. The church's doctrine was defined in the catechism of 1570, and in the revised articles of religion which appeared as the XXXIX. Articles in 1571, and its law by a body of canons published with authority in 1576, the attempt at codification made in the *Reformatio legum* having been laid aside.

The Nonconformists.

From 1574 the Protestant Nonconformists strove to introduce Presbyterianism. Cause for grievance existed in the state of the church which had suffered from the late violent changes. Elizabeth plundered it, and laymen who owned the rectories formerly held by monasteries followed her example; bishoprics were impoverished by the queen and parish cures by her subjects, and the reform of abuses was checked by self-interest. As bishops, along with some able men, Elizabeth chose others of an inferior stamp who consented to the plunder of their sees and whom she could use to report on recusants and harry nonconformists. Separation, or Independency, began about 1578 with the followers of Robert Browne, who repudiated the queen's ecclesiastical authority; two Brownists were executed in 1583. The nonconformists remained in the church and continued their efforts to subvert its episcopal system. Elizabeth, though personally little influenced by religion, understood the political value of the church, and would allow no slackness in enforcing conformity. Archbishop Grindal was sequestrated for defending "prophesyings," or meetings of the Puritan clergy for religious exercises. The House of Commons, in which there was a Puritan element, repeatedly attempted to discuss church questions and was sharply silenced by the queen, who would not allow any interference in ecclesiastical matters. Whitgift, who succeeded Grindal in 1583, though kind-hearted, was strict in his administration of the law. Violent attacks were made upon the bishops in the Martin Marprelate tracts printed by a secret press; their author is unknown, but some who were probably connected with them were executed for publishing seditious libels. Whitgift's firmness met with success. During the last years of the reign the movement towards Presbyterianism was checked and nonconformity was less prominent. The church regained a measure of orderliness and vigour; its claims on allegiance were advocated by eminent divines and expounded in the stately pages of Hooker. The queen, who had so vigorously ordered ecclesiastical affairs, died in 1603.

The Puritan rebellion.

On the accession of James I. the Puritans expressed their desire for ecclesiastical change in the Millenary Petition which purported to come from 1000 clergy; their requests were moderate, a sign of the success of Whitgift's policy, but some could not have been granted without causing widespread dissatisfaction. At a conference between divines of the two parties at Hampton Court in 1604, James roughly decided against the Puritans. Some small alterations were made in the prayer-book, and a new version of the Bible was undertaken, which appeared in 1611 as the "authorized version." In 1604 convocation framed a code of canons which received royal authorization. Refusal to obey them was punished with deprivation, and, according to S. R. Gardiner, about 300 clergy were deprived, though a 17th century writer (Peter Heylyn) puts the number at 49 only, which W. H. Frere (*History of the English Church, 1558–1625*, p. 321) thinks more credible. Conformity could still be enforced, but before long the Puritan party grew in strength partly from religious and partly from political causes. They would not admit any authority in religion that was not based on the scriptures; their opponents maintained that the church had authority to ordain ceremonies not contrary to the scriptures. In doctrine the Puritans remained faithful to the Calvinism in which most Englishmen of the day had been brought up; they called the high churchmen Arminians, and asserted that they were inclined to Rome. The Commons became increasingly Puritan; they were strongly Protestant and demanded the enforcement of the laws against recusants, who suffered much, specially after the Gunpowder Plot of 1605, though they were sometimes shielded by the king. The Commons regarded ecclesiastical jurisdiction with dislike, specially the Court of High Commission, which had developed from the ecclesiastical commissions of Elizabeth and was hated as a means of coercion based on prerogative. The bishops derived their support from the king, and the church in return supported the king's claim to absolutism and divine right. It suffered heavily from this alliance. As men saw the church on the side of absolutism, Puritanism grew strong both among the country gentry, who were largely represented in the Commons, and among the nation at large, and the church lost ground through the king's political errors. A restoration of order and decency in worship and the introduction of more ceremonial begun in James's reign were carried on by Laud (*q.v.*) under Charles I. Laud aimed at silencing disputes about doctrine and enforcing outward uniformity; the Puritans hated ceremonial and wished to make every one accept their doctrines. Many of the reforms introduced by Laud after he became archbishop in 1633 were needful, but they offended the Puritans and were enforced in a harsh and tyrannical manner, for he lacked wisdom and sympathy. Under his rule nonconforming clergy were deprived and sometimes imprisoned. The cruel punishments inflicted by the Court of Star Chamber of which he was a member, the unpopularity of the High Commission Court, his own harsh dealing, and the part which he took in politics as a confidential adviser of the king, combined to bring odium upon him and upon the ecclesiastical system which he represented. The church was weak, for the Laudian system was disliked by the nation. A storm of discontent with the course of affairs both in church and state gathered. In 1640 Charles, after dissolving parliament, prolonged the session of convocation, which issued canons magnifying the royal authority and imposing the so-called "*et cetera* oath" against innovations on all clergy, graduates and others. The Long Parliament voted the canons illegal; Laud was imprisoned, and in 1642 the bishops were excluded from parliament. The civil war began in 1642; in 1643 a bill was passed for the taking away of episcopacy, in 1645 Laud was beheaded, and parliament abolished the prayer-book and accepted the Presbyterian directory, and from 1646 Presbyterianism was the legal form of church government. Many, perhaps 2000, clergy were deprived; some were imprisoned and otherwise maltreated, though a fifth of their former revenues was assigned to the dispossessed. The king, who was beheaded in 1649, might have extricated himself from his difficulties if he had consented to the overthrow of episcopacy, and may therefore be held a martyr to the church's cause. The victory of the army over the parliament secured England against the tyranny of Presbyterianism, but did not better the condition of the episcopal clergy; the toleration insisted on by the Independents did not extend to "prelacy." Churchmen, however, occasionally enjoyed the ministrations of their own clergy in private houses, and though their worship was sometimes disturbed they were not seriously persecuted for engaging in it. Non-delinquent or non-sequestrated private patronage and the obligation of tithes were retained. Community of suffering and the execution of Charles I. brought the royalist country gentry into sympathy with the clergy, and at the Restoration the church had the hold upon the affection of the laity which it lacked under the Laudian rule.

The Restoration period.

On the king's restoration the survivors of the ejected clergy quietly regained their benefices. The Presbyterians helped to bring back the king and looked for a reward. Charles II. promised them a limited episcopacy and other concessions, but his plan was rejected by the Commons. A conference at the Savoy between leading Presbyterians and churchmen in 1661 was ineffectual, and a revision of the prayer-book by convocation further discontented nonconformists. The parliament of 1661 was violently anti-Puritan, and in 1662 passed an Act of Uniformity providing that all ministers not episcopally ordained or refusing to conform should be deprived on St Bartholomew's day, the 14th of August following. About 2000 ministers are said to have been ejected; and in 1665 ejected ministers were forbidden to come within five miles of their former cures. Though some bishops and clergy showed kindness to the ejected, churchmen generally approved of this oppressive legislation; they could not forget the wrongs inflicted on their church by the once triumphant Puritans. Nonconformist worship was made punishable by fine and imprisonment, and on the third offence by transportation. In 1672 Charles, who had secretly promised the French king openly to profess Roman Catholicism, issued a Declaration of Indulgence which applied both to Romanists and Protestant Nonconformists, but parliament compelled him to withdraw it, and, in 1673, passed a Test Act making reception of the holy communion and a denial of transubstantiation necessary qualifications for public office. Later, when the dissenters found friends among the party in parliament opposed to the crown, the church supported the king, and the doctrine of passive obedience was generally accepted by the clergy. The church was popular, and among the great preachers and theologians who adorned it in the Caroline period were Jeremy Taylor, Pearson, Bull, Barrow, South and Stillingfleet. The lower clergy were mostly poor, and their social position was consequently often humble, but the pictures of clerical humiliation after 1660 are generally overcoloured; the assertion that they commonly married servants or cast-off mistresses of their patrons has been disproved, and it is certain that men of good family entered holy orders. In accordance with an agreement between Archbishop Sheldon and Lord Chancellor Clarendon, the clergy ceased to tax themselves in convocation, and from 1665 have been taxed by parliament. James II., though a Romanist, promised to protect the church, and the clergy were on his side in the rebellion of the duke of Monmouth, who was supported by dissenters. The church and the nation, however, were strongly Protestant and were soon alarmed by his efforts to Romanize the country. James dispensed with the law by prerogative and appointed Romanists to offices in defiance of the Test Act. In 1688 he ordered that his declaration for liberty of conscience, issued in the interest of Romanism, should be read in all churches. His order was almost universally disobeyed. Archbishop Sancroft and six bishops who remonstrated against it were brought to trial, and were acquitted to the extreme delight of the nation. James's attack on the church cost him his crown.

Revolution period.

Sancroft and eight bishops would not belie their belief in the doctrines of divine right and passive obedience by swearing allegiance to William and Mary, and the archbishop, five bishops and over 400 clergy were deprived. Certain of these nonjuring bishops consecrated others and a schism ensued. The loss to the church was heavy; for among the nonjurors were many men of holy lives and eminent learning, and the fact that some suffered for conscience' sake seemed a reproach on the rest of the clergy. After 1715 the secession became unimportant. Protestantism was secured from further royal attack by the Bill of Rights; and in 1701 the Act of Succession provided that all future sovereigns should be members of the Church of England. That the king's title rested on a parliamentary decision was destructive of the clerical theory of divine right, and encouraged Erastianism, then specially dangerous to the church; for William, a Dutch Presbyterian, gave bishoprics to men personally worthy, but more desirous of union with other Protestant bodies than jealous for the principles of their own church. A bill for union was rejected in the Commons, where the church party had a majority, though one for toleration of Protestant dissenters became law. William, anxious for concessions to dissenters, appointed a committee of convocation for altering the liturgy, canons and ecclesiastical courts, but the Tory party in the lower house of convocation was strong and the scheme was abortive. A long controversy began between the two houses: the bishops were mostly Whigs with latitudinarian tendencies, the lower clergy Tories and high churchmen. During most of the reign convocation was suspended and the church was governed by royal injunctions, a system injurious to its welfare. It had been the bulwark of the nation against Romanism under James II., and the affection of the nation enabled it to preserve its distinctive character amid dangers of an opposite kind under William III. Its religious life was active; associations for worship and the reformation of manners led to more frequent services, the establishment of schools for poor children, and the foundation of the Society for Promoting Christian Knowledge (S.P.C.K.) and for the Propagation of the Gospel in Foreign Parts (S.P.G.). This activity and the discord between the two houses of convocation continued during Anne's reign. Anne was a strong churchwoman, and under her the church reached its highest point of popularity and influence. Its supposed interests were used by the Tories for political ends. Hence the Occasional Conformity Act, to prevent evasion of the Test Act, and a tyrannical Schism Act, both repealed in 1718, belong rather to the history of parties than to that of the church. So, too, does the case of Dr Sacheverell, who was prosecuted for a violently Tory sermon. His trial, in 1710, caused much excitement; mobs shouted for "High Church and Dr Sacheverell," and the lightness of his sentence was hailed as a Tory victory. Queen Anne is gratefully remembered by the church for her "Bounty," which gave it the first-fruits and tenths (see ANNATES and QUEEN ANNE'S BOUNTY).

The 18th century.

With the accession of the Hanoverian line the church entered on a period of feeble life and inaction: many church fabrics were neglected; daily services were discontinued; holy days were disregarded; Holy Communion was infrequent; the poor were little cared for; and though the church remained popular, the clergy were lazy and held in contempt. In accepting the settlement of the crown the clergy generally sacrificed conviction to expediency, and their character suffered. Promotion largely depended on a profession of Whig principles: the church was regarded as subservient to the state; its historic position and claims were ignored, and it was treated by politicians as though its principal function was to support the government. This change was accelerated by the silencing of convocation. A sermon by Hoadly, bishop of Bangor, impugned the existence of a visible church, and the "Bangorian controversy" which ensued threatened to end in the condemnation of his opinions by convocation, or at least by the lower house. As this would have weakened the government, convocation was prorogued, letters of business were withheld, and from 1717 until 1852 convocation, the church's constitutional organ of reform, existed only in name. Walpole during his long ministry, from 1721 to 1742, discouraged activity in the church lest it should become troublesome to his government. Preferment was shamelessly sought after even by pious men, and was begged and bestowed on the ground of political services. In this the clergy, apart from the sacredness of clerical office, were neither better nor worse than the laity; in morality and decency they were better even at the lowest point of their decline, about the middle of the century. While the church was inactive in practical work, it showed vigour in the intellectual defence of Christianity. Controversies of earlier origin with assailants of the faith were ably maintained by, among others, Daniel Waterland, William Law, a nonjuror, Bishop Butler, whose *Analogy* appeared in 1736, and Bishop Berkeley. A revival of spirituality and energy at last set in. Its origin has been traced to Law's *Serious Call*, published in 1728. Law's teaching was actively carried out by John Wesley (*q.v.*), a clergyman who from 1739 devoted himself to evangelization. Though his preaching awoke much religious feeling, specially among the lower classes, the excitement which attended it led to a horror of religious enthusiasm, and his methods irritated the parochial clergy. Some of them seconded his efforts, but far more regarded them with violent and often unworthily expressed dislike. While he urged his followers to adhere to the church, he could not himself work in subordination to discipline; the Methodist organization which he founded was independent of the church's system and soon drifted into separation. Nevertheless, he did much to bring about a revival of life in the church. Several clergy became his allies, and some preached in Lady Huntingdon's chapels before her secession. These were among the fathers of the Evangelical party: they differed from the Methodists in not forming an organization, remaining in the church, working on the parochial system, and generally holding Calvinistic doctrine, being so far nearer to Whitfield than to Wesley, though Calvinism gradually ceased to be a mark of the party. The Evangelicals soon grew in number, and their influence for good was extensive. They laid stress on the depravity of human nature, and on the importance of conscious conversion, giving prominence to the necessity of personal salvation rather than of incorporation with, and abiding in, the church of the redeemed. Prominent among their early leaders after they became distinct from the Methodists were William Romaine, Henry Venn and John Newton. Bishop Porteus of London sympathized with them, Lord Dartmouth was a liberal patron, and Cowper's poetry spread their doctrines in quarters where sermons might have failed to attract. Religion was also forwarded in the church by the example of George III. During his reign the progress of toleration, though slow and fitful, greatly advanced both as regards Roman Catholics and Protestant dissenters. The spirit of rationalism, which had been manifested earlier in attacks on revelation, appeared in a movement against subscription to the Articles demanded of the clergy and others which was defeated in parliament in 1772. The alarm consequent on the French Revolution checked the progress of toleration and was temporarily fatal to free-thinking; it strengthened the position of the church, which was regarded as a bulwark of society against the spread of revolutionary doctrines; and this caused the Evangelicals to draw off more completely from the Methodists. The church was active: the Sunday-school movement, begun in 1780, flourished; the crusade against the slave-trade was vigorously supported by Evangelicals; and the Church Missionary Society (C.M.S.), a distinctly Evangelical organization, was founded. Excellent as were the results of the revival generally, the Evangelicals had defects which tended to weaken the church. Some characteristics of their teaching were repellent to the young; they were deficient in theological learning, and often in learning of any kind; they took a low view of the church, regarding it as the offspring of the Protestant reformation; they expounded the Bible without reference to the church's teaching, and paid little heed to the church's directions. Dissent consequently grew stronger. By the Act of Union with Ireland the Churches of England and Ireland were united from the 1st of January 1801, and the continuance of the united church was declared an essential part of the union. No provision, however, was made giving the Irish clergy a place in convocation, which was evidently held unlikely to revive. The union of the churches was dissolved in 1871 by an act of 1869 for disestablishing the Irish Church.

The Oxford Movement.

Apart from the Evangelical revival, religion was advanced in the church. In 1811 the education of the poor was provided for on church principles by the National Society; the Church Building Society was founded in 1818; and the colonial episcopate was started by the establishment of bishoprics in Calcutta in 1814, and in Jamaica and Barbados in 1824. Yet reforms were urgently needed. In 1813, out of about 10,800 benefices, 6311 are said to have been without resident incumbents (*The Black Book*, p. 34); the value of some great offices was enormous, while many of the parochial clergy were wretchedly poor. The repeal of the Test Act, long practically inoperative, in 1828, and Catholic emancipation in 1829, mark a change in the relations of church and state; and the Reform Bill of 1832 transferred political power from a class which generally supported the church to classes in which dissent was strong. The national zeal for reform was directed towards the church, not always in a friendly spirit. Yet wholesome changes were effected by legislation: dioceses were rearranged and two new bishoprics founded at Manchester and Ripon, the bishopric of Bristol, however, being suppressed; plurality and non-residence were abolished; tithes were commuted, and the Ecclesiastical Commission, which has effected reforms in respect of endowments, was permanently established in 1836. Some changes and proposals alarmed churchmen, specially as legislation for the church proceeded from parliament, while convocation remained silenced. Latitudinarian opinions revived, and the church was regarded merely as a human institution. Among the clergy generally ritual observance was neglected and rubrical directions disobeyed. A few churchmen, including Keble and Newman, set themselves to revive church feeling, and Oxford became the centre of a new movement. The publication of Keble's *Christian Year* prepared its way, and its aims were declared in his assize sermon at Oxford on "National Apostasy" in 1833. Its promoters urged their views in *Tracts for the Times*, and were strengthened by the adhesion of Pusey. Hence they were nicknamed Tractarians or Puseyites. Their cardinal doctrine was that the Church of England was a part of the visible Holy Catholic Church and had unbroken connexion with the primitive church; they inculcated high views of the sacraments, and emphasized points of agreement with those branches of the Catholic Church which claim apostolic succession. Their party grew in spite of the opposition of low and broad churchmen, who, specially on the publication of Tract XC. by Newman in 1841, declared that its teaching was Romanizing. In 1845 Newman and several others seceded to Rome. Newman's apostasy was a severe blow to the church, though permanent injury was averted by the steadfastness of Pusey. The Oxford movement was wrecked, but its effect survived both in the new high church party and in the church at large. As a body the clergy rated more highly the responsibilities and dignity of their profession, and became more zealous in the performance of its duties and more ecclesiastically minded. High churchmen carried out rubrical directions, and after a while began to introduce changes into the performance of divine service which had not been adopted by the early leaders of the party, were deprecated by many bishops, and excited opposition.

In 1833 the supreme jurisdiction of the Court of Delegates was transferred to the judicial committee of the privy council. Before this court came an appeal by a clerk named Gorham, the Solent, the strait west of the Isle of Wight, and later by way of Spithead, the eastern strait. Finally the effect of the tidal stream entering the Channel through the Strait of Dover from the North Sea must be considered. The set of this stream towards the Strait of Dover from the east corresponds in time with that of the Channel stream (*i.e.* the stream within an area defined by Start Point, the Casquets, Beachy Head and the mouth of the Somme) towards the strait from the west; the set of the two streams away from the strait also corresponds, and consequently they alternately meet and separate. The area in which the meeting and separation take place lies between Beachy Head and the North Foreland, the mouth of the Somme and Dunkirk. Within this area, therefore, a stream is formed, known as the intermediate stream, which, running at first with the Channel stream and then with the North Sea stream, changes its direction throughout its length almost simultaneously, and is never slack. Under these conditions, the time of high water eastward of Selsey Bill as far as Dover is almost the same at all points, though somewhat earlier at the east than at the west of this stretch of coast. The configuration of the French coast causes a very strong tidal flow in the Gulf of St Malo, with an extreme range at spring tides of 42 ft. at St Germain, compared with a range of 12 ft. at Exmouth and 7 ft. at Portland. In the neighbourhood of Beer Head and Portland and Weymouth Roads the streams are found to form vortices with only a slight movement. On the eastern (Selsey-Dover) section of the English coast the *maximum* range of tide is found at Hastings, with a decrease both eastward and westward of this point.

Westerly winds are most prevalent in the Channel. The total number of gales recorded in the period 1871–1885 was 190, of which 104 were south-westerly. Gales are most frequent from October to January (November during the above period had more than any other month, with an average of 2·1), and most rare from May to July. It appears that gales are generally more violent and prolonged when coincident with spring tides than with neaps. The winds have naturally a powerful effect on the tidal streams and currents, the latter being in these seas simply movements of the water set up by gales, which may themselves be far distant. Thus under the influence of westerly winds prevailing west of the Iberian Peninsula a current may be set up from the Bay of Biscay across the entrance of the Channel; this is called Rennell's current. Fogs and thick weather are common in the Channel, and occur at all seasons of the year. Observations during the period 1876–1890 at Dover, Hurst Castle and the Scilly Isles showed that at the two first stations fogs most frequently accompany anticyclonic conditions in winter, but at the Scilly Isles they are much more common in summer than in winter, and accompany winds of moderate strength more frequently than in the case of the up-Channel stations.

(O. J. R. H.)

Salinity and Temperature.—The waters of the English Channel are derived partly from the west and partly from the English and French rivers, and all observations tend to show that there is a slow and almost continuous current through it from west to east. The western supply comes from two sources, one of which, the more important, is the relatively salt and warm water of the Bay of Biscay, which enters from the south-west and has a salinity sometimes reaching 35·6 pro mille (parts of salt per thousand by weight); the other consists of a southerly current from the Irish Channel, and is colder and has a salinity of 35·0 to 35·2 pro mille. As the water passes eastwards it mixes with the fresher coastal water, so that the salinities generally rise from the shore to the central line, and from east to west, though south of Scilly Islands there is often a fall due to the influence of the Irish Channel. The mean annual salinity decreases from between 35·4 and 35·5 pro mille in the western entrance to 35·2 pro mille at the Strait of Dover on the central axis, and to about 34·7 pro mille under the Isle of Wight and off the Bay of the Seine. The English Channel may be divided into two areas by a line drawn from Start Point to Guernsey and the Gulf of St Malo. In the eastern area the water is thoroughly mixed owing to the action of the strong tidal currents and its comparatively small depth, and salinities and temperatures are therefore generally the same from surface to bottom; while westward of this line there is often a strongly marked division into layers of different salinity and temperature, especially in summer and autumn, when the fresher water of the Irish Channel is found overlying the salt water of the Bay of Biscay. The salinity of the English Channel undergoes an annual change, being highest in winter and spring and lowest in summer, and this change is better marked in the eastern area, where the mean deviation from the annual mean reaches 0·3 pro mille, than it is farther west with a mean deviation of 0·1 pro mille. There is also reason to believe that there is a regular change with a two-year period, years of high maximum and low minimum alternating with years of low maximum and high minimum. Variations of long period or unperiodic also occur, which are probably, and in one case (1905) almost certainly, due to changes taking place some months earlier far out in the Atlantic Ocean.

The mean annual *surface* temperature increases from between 11° C. and 11·5° C. at the Strait of Dover to over 12° C. at the western entrance.[1] The yearly range in the eastern area is considerable, reaching 11° C. off the Isle of Wight and 10° C. in the Strait of Dover; westward it gradually decreases to 5° C. a short distance north-west of Ushant. The mean maximum temperature, over 16° C., is found under the English coast from Start Point to the Strait of Dover about the 1st of September and off the French coast eastward of Cape la Hague about eleven days later. In the western area the maximum temperature is about 15° C. and occurs between September 1 and 11. The mean minimum surface temperature is between 5° C. and 6° C. at the eastern end, and increases to over 9° C. off the coast of Brittany. Owing to the thorough mixing of the water in the eastern area the temperatures are here generally the same at all depths, and the description of the surface conditions applies equally to the bottom. In the western entrance, on the other hand, the bottom temperature is often much lower than on the surface; the range here is also much less, about 3° C., and the maximum is not reached till about the 1st of October, or from three weeks to a month later than on the surface.

A detailed account of the mean conditions in the English Channel will be found in *Rap. et procès-verbaux*, vol. vi., and *Bulletin supplémentaire* (1908) of the Conseil Permanent International pour l'Exploration de la Mer (Copenhagen). (D. J. M.)

Cross-Channel Communication.—An immense amount of time and thought has been expended in the elaboration of schemes to provide unbroken railway communication between Great Britain and the continent of Europe and enable passengers and goods to be conveyed across the Channel without the delay and expense involved by transhipping them into and out of ordinary steamers. These schemes have taken three main forms: (1) tunnels, either made through the ground under the sea, or consisting of built-up structures resting upon the sea bed; (2) bridges, either elevated high above the sea-level so as to admit of the unimpeded passage of ships under them, or submerged below the surface; and (3) train ferries, or vessels capable of conveying a train of railway vehicles with their loads. A tunnel was first proposed at the very beginning of the 19th century by a French mining engineer named Mathieu, whose scheme was for a time favourably regarded by Napoleon, but it was first put on a practical basis more than fifty years later by J. A. Thomé de Gamond (1807–1876), whose plans were submitted to the French emperor in 1856. This engineer had begun to work at the problem of cross-Channel communication twenty years previously, and had considered the possibility of a submerged tunnel or tube resting on the sea-level, of steam ferries plying between huge piers thrown out from both coasts, and of a bridge, for which he prepared five different plans. He again brought forward his scheme for a tunnel, in a modified form, in 1867, and exhibited his plans in the Universal Exhibition of that year. About the same time an English engineer, William Lowe, of Wrexham, was also working at the idea of a tunnel. Geological investigation convinced him that between Fanhole, a point half a mile west of the South Foreland light, and Sangatte on the French coast, 4 m. W. of Calais, the Dover grey chalk was continuous from side to side, and he considered that this stratum, owing to its comparative freedom from water and the general absence of cracks and fissures, offered exceptional advantages for a tunnel. He and Thomé de Gamond joined forces, and their plans were adopted by an international committee whose object was to popularize the idea of a tunnel both in England and France. Its engineers on the English side were Lowe, Sir James Brunlees and Sir John Hawkshaw, the last of whom in 1866 had made trial borings at St. Margaret's and near Sangatte; and on the French side Thomé de Gamond, Paulin Talabot and Michael Chevalier. In 1868 they reported that there was a reasonable prospect of completing the tunnel in ten or twelve years at a cost not exceeding ten millions sterling. They admitted, however, that there was some risk of an influx of the sea, but pointed out that this risk could be determined by driving preliminary driftways, as suggested by Lowe, and for this purpose asked for financial aid from the imperial treasury. A commission of inquiry then appointed by the French ministry of public works reported favourably on the plans, though it declined to recommend a grant of money; but the further progress of the scheme was interrupted by the outbreak of the Franco-German war.

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[1] 50° F. = 10° C.; 60·8° F. = 16° C.

The tunnel was by no means the only plan in evidence at this period for securing continuous railway communication between England and France. An iron tube, resting on the bottom of the sea, had been proposed by Tessier de Mottray in 1803, and had again been considered by Thomé de Gamond in 1833; but after 1850 projects of this kind might almost be counted by the dozen. Some of the structures were to be of iron, others of concrete or masonry, and some were to be floated a moderate distance below the surface. One of the most carefully worked out plans was that of J. F. Bateman and J. Revy, who proposed to construct a continuous tube, 13 ft. in internal diameter, of iron rings each 10 ft. long, each ring being built out from the completed portion of the tube by means of a horizontal chamber or bell, which slid telescopically over the last few rings previously put in place, and was moved forward by hydraulic power. About the same time Zerah Colburn produced plans for a tube constructed of 1000 ft. sections, which were to be built in dry dock and then successively attached by a ball and socket joint to the completed portion, the whole being raised from the bottom and dragged out to sea, by the aid of a large number of ships, as each section was attached and launched. Thomas Page, again, the builder of Westminster Bridge, proposed to place eight conical steel shafts at intervals across the Strait of Dover, and to connect them by long sections of tube lowered from the surface, the whole structure being covered with concrete when finished. No attempt was made to put any of these plans into execution, and the same was true of several bridge schemes propounded about the same time; in one of these, spans one-half or three-quarters of a mile in length were contemplated, while another required 100 towers, 500 ft. apart and rising 500 ft. above the water-level, which obviously would have constituted an intolerable nuisance to navigation. The case, however, was different with a train ferry which was vigorously advocated by Sir John Fowler. His proposal was to employ steamers 450 ft. long, with a beam of 57 ft. and a speed of 20 knots, having railway lines laid down on their decks on and off which railway vehicles could be run directly at each side of the strait. Dover was to be the English port, while on the French coast a new harbour was to be formed at Audresselles, between Calais and Boulogne. This plan in 1872 received the sanction of the House of Commons, but was rejected in the House of Lords by the casting vote of the chairman of the committee. According to another similar ferry scheme, which was worked out by Admiral Dupuy de Lôme in 1870, a new maritime station was to be constructed at Calais, so far off the shore that it would command deep water at every state of the tide, and connected with the French railways by a bridge.

After the conclusion of the Franco-Prussian War, negotiations concerning the tunnel were resumed between the French and British governments, and in 1872 the latter intimated that it had "no objection in principle." After some further communications between the two governments in 1874, settling the basis on which the enterprise should be allowed to proceed, a joint commission was appointed to arrange details relating to jurisdiction, the right of blocking the tunnel, &c., and this commission's report was accepted as a basis of agreement between the governments. In 1875 the Channel Tunnel Company obtained an act authorizing it to undertake certain preliminary works at St Margaret's Bay. In the same year the French Submarine Railway Company obtained a concession, with the obligation to spend a minimum of 2,000,000 francs in making investigations; in fact it took over 3000 samples from the bottom of the sea in the strait, and made over 7000 soundings, and also sunk a shaft at Sangatte and started a heading. The English company did not do so much, for it failed to raise the money it required and its powers expired in 1880. Moreover, it was not the only company in the field, and its programme was not universally accepted as the best possible. Some authorities, such as Sir Joseph Prestwich, doubted whether the tunnel should be attempted in the chalk because of the likelihood of fissures being encountered while others who thought the chalk suitable were dissatisfied with the actual plans and formed a rival "Anglo-French Submarine Railway Company." In 1882 another tunnel company made its appearance. In 1874 the South Eastern Railway Company had obtained powers to sink experimental shafts on its property between Dover and Folkestone, and in 1881 to acquire lands, including the beach and foreshore, in that area in connexion with a Channel tunnel. These powers resulted, in 1882, in the formation of the Submarine Continental Railway Company which in that year sought parliamentary sanction for a tunnel, starting from a point west of Dover, at Shakespeare's Cliff; and at the same time the resuscitated Channel Tunnel Company applied for powers to make one from Fanhole, instead of St Margaret's Bay as in its former scheme. The whole question of the tunnel was then widely discussed and considered by various committees, the last of which—a joint select committee of the Lords and Commons—in 1883 expressed the opinion by a majority that it was "inexpedient that parliamentary sanction should be given to a submarine communication between England and France." This decision for the time being disposed of the question of making a tunnel, and though Sir Edward Watkin, one of its most prominent advocates, brought bill after bill before parliament to authorize experimental works in connexion with it, all were rejected. In 1882 the government interfered with the operations then in progress, and they were ultimately discontinued. They included a driftway 7 ft. in diameter which was driven for a distance of about 2300 yds. eastwards under the sea at an inclination of 1 in 72 from the bottom of a shaft sunk to a depth of 164 ft. in the chalk marl at Shakespeare's Cliff.

About this time the Channel Bridge and Railway Company took in hand the design of a bridge, the preliminary plans for which were exhibited in the Paris Exhibition of 1889. The terminal points were Folkestone and Cap Grisnez, and for the sake of facilitating the laying of the pier foundations it was proposed to take the bridge over the Varne and Colbart shoals. The main girders were to be nearly 59 yds. above the sea-level, the railway itself being more than 20 ft. higher still, and the spans were to vary in length between 540 and 108 yds. As the result of a survey of the sea bottom made in 1890, a modification in the line of the bridge was adopted, and it was taken direct from Cap Blancnes to the South Foreland. It was found that in this way an excellent bottom would be obtained for the foundations, and the length of the bridge would be 3 m. less, the number of piers, by employing spans of 434 and 542 yds. alternately, being reduced to 72. The cost of this structure was estimated at £28,320,000, exclusive of interest on capital during the period of construction, which was put at seven years. The same company also worked out plans for a moving chariot or platform, capable of holding a railway train and supported by long legs on a submerged causeway or track constructed of steel on armoured concrete 45 or 50 ft. below low-water level. No attempt has been made actually to carry out either this project or that of a bridge.

In 1905 the question of establishing a train ferry from Dover across the Channel was brought forward by the Intercontinental Railway Company, and in the following year the Channel Ferry (Dover) Act was passed authorizing the work. About the same period the Channel Tunnel Company, which had amalgamated with the Submarine Railway Company, awoke to activity and started a campaign in favour of its scheme; but the bill which it promoted was opposed by the government and accordingly was withdrawn in March 1907.

See *Blue-book, Correspondence respecting the proposed Channel Tunnel*, Commercial No. 6 (1875); *Blue-book, Correspondence with reference to the proposed Construction of a Channel Tunnel*, C. 3358 (1882); *Blue-book, Report from the Joint Select Committee of the House of Lords and House of Commons on the Channel Tunnel* (1883); F. J. Bramwell, "The Making and Working of a Channel Tunnel," *Proc. Roy. Inst.*, May 1882; Tylden Wright, "The Channel Tunnel," *North of England Inst. Min. and Mech. Eng.* vol. 33 (1882); W. Boyd Dawkins, "The Channel Tunnel," *Manchester Geol. Soc.*, May 1882, and *Brit. Assoc. Rep.* (1882, 1899); E. de Rodakowski, *The Channel Ferry* (London, 1905). (H. M. R.)

ENGLISH FINANCE. The history of the English fiscal system affords the best example known of continuous financial development, in respect both of institutions and methods. Though certain great periods of change can be readily noticed, yet from the time of the Norman Conquest to the beginning of the 20th century the line of connexion is substantially unbroken. Perhaps the most revolutionary changes occurred in the 17th century, as the outcome of the Civil War, and, later on, the revolution of 1688. But even in this case there was no real breach of continuity. It is, therefore, possible to trace the normal growth and expansion of British finance as one of the aspects of the nation's history.

The primitive financial institutions of England centre round the king's household, or, in other words, the royal economy precedes the national one. Revenue dues collected by the king's agents, rents, or rather returns of produce, from land, and special levies for emergencies form the elements of the royal income, which gradually acquired greater regularity and consistency. There is, however, little or no evidence of any effective financial organization until we approach the 11th century. The influence exercised from Normandy, which so powerfully affected the English rulers at this time, tended towards the creation of records of revenue claims and also of a central treasury.

With the union of England and Normandy under the same head the idea of settled administrative methods was definitely fixed and became of special importance in the field of finance. The systematizing spirit, so characteristic of both the Norman and Angevin kings, produced the great institution of the exchequer (*q.v.*) with its judicial and administrative sides, and its elaborate forms of account and control. Even before this organization was developed the Domesday Survey (see DOMESDAY BOOK)—now recognized as having a purely fiscal object (in Maitland's words "a tax book, a geld book")—shows the movement towards careful observation of the sources of revenue. It is clear that William I. initiated a policy which was followed by his successors, in spite of the serious difficulties of the period of anarchy during Stephen's nominal reign. The obscure question as to the real origin of the special contrivances employed by the exchequer is, strictly speaking, irrelevant to the financial inquirer, who may be content to hold that, granting the existence of some Old English analogies, the system, as it appears in the 12th century, was a peculiar product of the conceptions as to fiscal organization formed by Norman subtlety. It is the manner in which this institution held together and focused the revenues and expenditure of the kingdom that has to be considered. The picture presented by the "Dialogue of the Exchequer" (*c.* 1176) is that of a comprehensive system which secured the receipt of the royal income, and provided a thorough audit of the accounts by employing processes adapted to the circumstances of the time. It is, in fact, through the description of financial institutions that it is possible to ascertain the forms of revenue possessed by the crown. The ingenuity expended on the administrative machinery of the exchequer had as its aim the increase of the king's resources, an object in which the official class of churchmen and lawyers was deeply interested.

In order to understand the character of English finance in the middle ages it is absolutely essential to bear constantly in mind the identification of the king with the state. Though feudalism (*q.v.*) was, in one of its aspects, a powerful instrument for division of political authority, it, nevertheless, in the particular form in which the Conqueror introduced it into England, enabled the fiscal rights of the crown to be established in a more definite shape than was possible under the older condition. For, in the first place, the actual property of the crown was more carefully administered as each royal manor came under the system of accounting. Again, the various claims or dues of the king took more decidedly the feudal type and received stricter legal definition. Further, the higher judicial organization assisted the expansion of court fees; while, above all, the increased authority of the state made the casual receipts (for such they were) from trade more profitable.

In a broad view the sources of revenue fall under the following heads:—(1) The royal estates which were distributed over England, derived in part from the possessions of the old English kings, but increased by the confiscations that followed the events of the Conqueror's reign, as well as by the doctrine that unowned land was the king's (*terra regis*). Over fourteen hundred manors appear in Domesday as royal property. The forests, placed under special laws, yielded little revenue, except in the form of penalties on offenders. The rural tenants, who at first paid their rents in produce, gradually commuted them into money payments. As the royal demesne was favourable for the growth of towns the rents derived from urban tenants became a valuable part of the yield from the demesne; this, later, took the shape of a payment from the town as a unit (the *firma burgi*), a method which secured to the burghers freedom from the exactions of the sheriff and which was purchased by special payments. (2) The feudal rights. These included the claim to military service; the three regular aids and the payments of relief at succession to a fief, as also the profits on wardships and marriages. Escheats and forfeitures completed the list. The yield from this source varied with the power of the king and was kept within bounds by the resistance of the tenants as shown in the provisions of Magna Carta. (3) The administration of justice was a lucrative prerogative of the crown. Suitors had to pay for securing the hearing of their cases in addition to the fees for writs, and both amercements and compositions increased the receipts under this head. (4) Two special classes contributed to the royal exchequer. As a great deal of the wealth of the country was in the hands of the church the opportunities afforded by the vacancies of sees, abbacies and priories were utilized for the purpose of securing the profits of these offices during the time in which there was no occupant; and this term was frequently prolonged by the king's action or inaction. The Jews, until their expulsion, were an even more profitable class to the revenue. Being under the absolute control of the crown, they could be taxed at pleasure, either by taking a percentage of their property (*e.g.* in one case one-fourth), or by levies for alleged offences. The existence of a separate exchequer for the Jews is an indication of their fiscal value. (5) Direct taxation formed an extraordinary or occasional head of revenue. The Danegeld was succeeded by the carucage, and the commutation of military service introduced the scutage, but these forms were of little immediate importance, though very significant for the future course of development. (6) Lastly come the dues claimed at the ports, which contain in germ the customs system of later times, though they rather resemble the harbour charges of modern ports and were very trivial in amount.

The history of the English financial system consists largely in the exhibition of the different fortunes of these several component parts of the exchequer receipts; for it must be remembered that the sheriff was bound to account to that tribunal for all that he should have received, and by this agency the local contributions passed into the king's possession for the service of the state. During the century and a half that lay between the Conquest and the granting of the Great Charter the account given above holds good. The character of the ruler affected the vigour of the fiscal, as well as the general, administration. Henry I. and Henry II. secured much better results than Stephen or John; but the collection of the rent and profits of the royal manors and the feudal and other dues continued as the mainstay of revenue. Indications of change are, however, to be found. Thus the substitution of the "carucage" or plough tax for the "Danegeld" marks an advance towards direct taxation of land through its produce, and the introduction of "scutage" is not only further evidence of the same tendency, but also a step in the development of "money economy" in place of the earlier "natural economy", or system of payments in kind. The special levies or "tallages" imposed at times of need on the towns in the king's demesne appear to have been a doubtful exercise of the royal prerogative, but scientifically they belong to the same class as the Danegeld and scutage. Perhaps the most important advance made in this period is the beginning of taxation of movables, first applied in the Saladin tithe of 1189 and, later, expanded into a general system.

In the reign of John (1199–1216) the loss of Normandy and the concession of the barons' demands by the issue of Magna Carta rendered financial readjustments inevitable. During the long reign of Henry III. the struggle to maintain the privileges granted by the Charter acted on the fiscal system by checking the arbitrary use of tallages, and as a consequence, encouraging the regular assessment of the tax on movables, which was becoming more prominent. The fruitful idea that it was necessary to obtain the consent of the payers of taxes before the imposition operated powerfully in favour of the establishment of bodies representing the several estates. It is through the reaction of constitutional on fiscal development that the transition from feudal to parliamentary taxation in its earlier form is made.

Almost at the opening of the age of parliamentary taxation one of the older sources of revenue ceased. The pressure of popular opinon forced Edward I. to decree the expulsion of the Jews (1290), though he naturally desired to retain such profitable subjects. It is, indeed, probable that, owing to the exactions practised on them, the Jewish usurers had become less serviceable to the exchequer; while it is certain that the general resources of the kingdom had so increased as to make their contribution relatively much smaller. The first effects of the representative influence in the fiscal domain are the abandonment of the tallages on towns and the decline of scutage as a mode of levy. The tax on movables was framed in a more systematic way. Instead of distinct charges on different classes, or variations in proportion of levy from one-fourth to one-fortieth, the policy of imposing a tax of one-tenth on the towns and one-fifteenth on the counties was adopted. Greater strictness in assessment was sought by the appointment of commissioners for each county, supplied with special instructions as to taxable goods and exemptions. This method continued in force for the tax on movables from 1290 till 1334, though in some cases the proportions imposed on the towns and counties were varied (*e.g.* an eighth and a fifth were granted in 1297, and a tenth and a sixth in 1322). A more general influence was the growing national economy which led to greater activity on the part of the king as administrator, and which also increased the need of the state for revenue. Though the doctrine that "The king should live of his own" was generally accepted as a constitutional maxim, the force of events was making it obsolete. From being an infrequent and uncertain kind of taxation the direct tax on movables, which was practically absorbing the older forms, became usual and regular. Under medieval conditions the collection of a general property tax (for such, in fact, was the nature of "the tenth and fifteenth") presented serious difficulties. Each locality gained by keeping its assessment down to the lowest point, while the borough authorities were naturally not eager to enforce the charge on their fellow-citizens. England in the 14th century was not ripe for a system that has been found hard to make effective in more advanced societies. Hence, from 1334 onward, the method of "apportionment" was employed, *i.e.* the tenth and fifteenth was taken as affording a definite sum measured by the yield on the ancient valuation. As this gave, in the aggregate, between £38,000 and £39,000, "the tenth and fifteenth" became for the future "practically a fiscal expression for a sum of about £39,000"; the total to be divided or "apportioned" between the several counties, cities and boroughs according to their former payments. This settlement, which remained in force for centuries and affected all the later direct taxes, had the great advantages of certainty and adaptability. The inhabitants of any particular town knew their total liability and could distribute it amongst themselves in the manner most convenient to them. From the royal standpoint also the arrangement was satisfactory, for the "tenth and fifteenth" could be multiplied (*e.g.* in 1352 three "tenths and fifteenths" were voted for three years), and supplied a stable revenue for the service of the kingdom. To the parliament the power of regulating the policy of the crown by the bestowal or refusal of grants was naturally agreeable. Thus, all sections of the nation united in support of the system established in 1334, just before the opening of the Hundred Years' War, in connexion with which it was particularly serviceable.

Akin to the tax that has just been described, at least in its nature as a direct impost, is the poll or capitation tax. Financial pressure at the close of Edward III.'s reign (1377) led to the adoption of a tax of fourpence per head on all persons in the kingdom (mendicants and persons under fourteen years being excepted). This "tallage of groats," which seems to be derived by analogy from the hearth money for Peter's pence, was followed by the graduated poll taxes of 1379 and 1380. In the former the scale ranged from ten marks (£6:13:4) imposed on the royal dukes and the viscounts, through six marks on earls, bishops and abbots, and three on barons, down to the groat or fourpence payable by all persons over sixteen years of age. Such a form of taxation approximated—as Adam Smith saw—to an income tax, but it proved to be unproductive, only half of the estimated yield of £50,000 being obtained. The tax of 1380 varied within narrower limits; from twenty shillings to fourpence (or sixty groats to three), with the proviso that "the strong should aid the weak." But this particular tax is chiefly memorable as the occasion—whatever may have been the real causes—of the great "Peasants' Revolt" of 1381. This unlucky association sealed the fate of the poll tax as a fiscal expedient. It was abandoned, with one exception, for nearly three hundred years; and its occasional employment in the 17th century did not result in its permanent revival. Apart from special circumstances it is plain that the "tenth and fifteenth" was better suited than the poll tax for the purpose of English finance. The machinery for collection was ready to hand for the former, while special agents had to gather the latter, even from the poorest classes. In fact, the episode of the poll taxes may be regarded as an attempt—fortunately unsuccessful—to relieve the propertied classes at the expense of the peasants and poorer burghers. Failure in this respect helped in the maintenance of the settlement of direct taxation devised in 1334.

Parallel with the evolution of direct taxation, but decidedly lagging behind, is the progress of indirect taxation. As already mentioned, the right of levying dues on goods entering or leaving English ports belonged from very early times to the king. Whether this power was, in its origin, due to the protection afforded to traders and thus a kind of insurance, or the result of the royal prerogative of pre-emption is immaterial for finance. What is established is that the "prisage" of wine or levy of one cask in ten, and the taking of one-tenth or one-fifteenth of other commodities was in force. Attempts to impose additional dues were forbidden by an important article (41) of the Great Charter which recognized "the ancient and just customs." One of the earliest effects of parliamentary influence is manifested in the establishment of duties on wool, woolfells and leather by Edward I.'s first parliament. After some efforts by the king to gather increased duties, the "Confirmation of the Charters"

(1297) forbade any increases on the amounts fixed in 1275, which were henceforth known as the ancient customs. Another attempt was made to obtain a higher scale of duties by arrangement with the merchants. The foreign traders consented to the royal proposals, which comprised duties on wine, wool, hides and wax, as well as a general tax of 1½% on all imports and exports. Thus, in addition to the old customs of half a mark (6s. 8d.) per sack of wool and on each three hundred woolfells, and one mark (13s. 4d.) per last or load of leather, the foreign merchants paid an extra duty (or surtax) of 50% and also 2s. on the tun of wine—the so-called "butlerage." The privileges granted in the Carta Mercatoria (1303) were probably the consideration for accepting these enhanced dues. The English merchants, however, for the time, successfully resisted the application in their case of the higher charges, and consequently remained under the old prisage of wine. In spite of parliamentary opposition, on the ground that they amounted to an infringement of the Great Charter, the new customs were maintained in force. After being suspended in 1311 they were revived in 1322, confirmed by royal authority in 1328, and finally sanctioned by parliament in the Statute of the Staple (1353). They became a part of the permanent crown revenue from the ports, and, with the old customs, were the basis for further development.

Just as the old direct taxes were first supplemented by, and then absorbed in, the general taxation of movables, so the customs, in the strict sense, were followed by the subsidies or parliamentary grants. One great source of English wealth in the 14th century was the export of the peculiarly fine wool of the country, and the political circumstances of Edward III.'s time suggested the manipulation of the trade in this commodity for purposes of policy as well as revenue. Sometimes, in order to influence the towns of Flanders, the export of wool was absolutely prohibited; at others, export duties of varying amounts were imposed on wool, skins and leather. In the early years of the reign these arrangements were settled by agreement with the merchants. The subsidies of this class began in 1340 and henceforward were frequently granted, though complaints were very often made. Thus, in 1348 the Commons objected to the subsidy of an export duty of £2 per sack on wool on the ground that it was really a tax on the landowners, who received a lower price for their wool in consequence of the duty. Bargains between the king and the merchants were forbidden, and this species of taxation was brought under parliamentary control by statutes passed in 1362 and 1371. Along with the special duties on wool there was an increase of the imposts on wine and general goods. By agreement with the merchants a charge of 2s. per tun on wine and 2½% on goods was levied in 1347. Between 1371 and 1376 these dues were established as parliamentary grants under the names of "Tunnage" and "Poundage," leaving the older dues intact.

One class or "estate" occupied a peculiar position. The clergy still claimed the privilege of self-taxation, and therefore it was convocation, not parliament, that voted the tenths imposed on clerical property. In some instances much heavier charges (*e.g.* in 1296 one-third) were decreed by the king, but the taxation of the clergy declined in productiveness during the 14th century. By the close of the reign of Richard II. the results of the transition from feudalism to a parliamentary constitution were practically complete. In respect to finance the most important of these were: (1) The disappearance or reduction to unimportance of the feudal dues. The fact that this change occurred at, relatively speaking, so early a date is of special significance for English development. (2) The royal demesne, though it had not suffered the losses that the grants of later times inflicted on it, had also lost some of its value as a source of revenue. (3) In compensation the direct taxation of property had become a ready means of supplying the growing requirements of the administration, and the mode of levy had been reduced to a well-recognized form, unsatisfactory experiments—such as the poll tax—being withdrawn. (4) The growth of import and export duties through the "old" and "new" customs and the subsidies furnished a large part of the requisite funds. In fact, in the course of a little over three hundred years the constituent parts of the public income had, without any violent change, been completely altered in relative value and in organization.

The period of the Lancastrian kings, extending over two-thirds of the 15th century (1399–1471), is noticeable for various experiments in the system of direct taxation. The standard tax—"the tenth and fifteenth"—failed to suit the changed conditions. In consequence of the decay of some of the towns allowances had to be made to them, amounting to over 15% (£6000), which, with other deductions, lowered the yield from a "tenth and fifteenth" to £31,000. As a supplement a land tax, affecting only the large owners, was voted at the rate of 5% in 1404, and repeated with wider scope, but at the lower rate of 1⅓%, in 1411. A house tax made its appearance in 1428. Taxes on knight's fees and other freeholds were also tried, while in 1435 and 1450 the graduated income tax was employed. The minimum rate, 2½%, applied to incomes under £100 (or under £20 in the tax of 1450), and rose to 10% on the higher incomes. These devices are evidence of the demand for larger revenue, and also of the increasing unfitness of the existing direct taxation. It may be added that they indicate a disposition to adopt foreign models, particularly the methods of taxation in use in France and Italy. As to indirect taxation the receipts seem at first to have declined, and the subsidies were only granted for fixed terms (the victory of Agincourt gained a life grant to Henry V.). After the establishment of Edward IV. on the throne, the idea of a "tenth," in the literal sense, was taken up and voted (1472) by the two houses as a special military provision; but it failed to bring in the required revenue, and the king had to fall back on grants of the old-established form. Extra taxes on aliens were levied under both Lancastrian and Yorkist rulers with little profit. The most original contribution of Edward IV. to fiscal policy was the "benevolence" (*q.v.*) or payment by wealthy subjects of sums requested by the king. Voluntary in form, these payments were, in fact, compulsory, and became in later times one of the great grievances against which parliament had to struggle.

Broader issues in finance marked the course of the Tudor period, and these were connected with the general history of the time. The era of national monarchies had arrived, necessitating the maintenance of greater military and naval forces, as well as more costly machinery of administration. External policy was affected by the set of ideas that developed into mercantilism (see Mercantile System); but so also was fiscal policy. Finance reflected the actions of the personal rule that was the characteristic of the 16th century. Within the period, however, some decided contrasts are to be found. Prudence, carried to parsimony with Henry VII., is followed by lavish prodigality in the case of Henry VIII. Elizabeth, again, presents in her reign a very different financial policy from that of either her father or her grandfather. The desire for a vigorous foreign policy, the hope of encouraging native industry, and the sentiment of retaliation against the trade regulations of other countries are found to interfere with the aim—strictly followed in earlier times—of obtaining the largest possible yield. All the different parts of the public economy were regarded as existing only in order to be utilized for the furtherance of national power. It is this more complex character in policy, coupled with the new influences, that the discovery of America, the Renaissance and the Reformation brought into operation, which gives special interest to the financial problems of the 16th century.

Taking in order the great heads of public income placed at the disposal of the sovereign, it appears that the first head of the old receipts—the crown lands—had been from time to time diminished by grants to the king's relatives and favourites, but had also gained through resumptions and forfeitures. On the whole, the loss and gain down to the close of the 14th century was probably balanced. The revenue was, however, inelastic, and declined in relative importance. It has been said that "it was in the 15th century that the great impoverishment of the crown estate began." The Lancastrian kings (especially Henry VI.) lost most of the lands attached to the crown through pressure of expenditure and the wholesale plunder of officials.

Though the civil wars of the 15th century brought in many forfeited estates the grants of Edward IV. kept down the increase. But the chief opportunity for aggrandizement was afforded by the dissolution of the monasteries and gilds under Henry VIII. The great mass of property that passed into the royal possession in this way was in part assigned to nobles and officials, while most of the remainder was distributed in the reigns of his children. The dwindling importance of the public revenue from land and rent charges is as noticeable under the Tudors as in earlier times. In like manner the feudal dues had fallen into a very subordinate place notwithstanding the attempts made on particular occasions to enforce them with greater rigour. The force of personal monarchy exercised by the Tudors, depending as it did on popular support, tended to encourage the collection of dues which had a legal ground in preference to taxation of the community. Of similar character was the employment of the old right of purveyance (*q.v.*), in restraint of which a series of statutes had been passed.

Whatever possibilities of obtaining some additional revenue from the crown lands or prerogative rights may have existed in the 16th century, and these were slight, all the political and social conditions tended more and more to make the need of taxation as the principal financial resource imperative. Amongst the cases of increased calls for funds to maintain the machinery of state, the rise of prices, due to increased supplies of the precious metals, must be included as one of the chief, and its effect extends into the 17th century. It was under this influence that the old forms of revenue became less profitable and that fresh developments were necessitated.

Direct taxation still retained in one of its branches the pattern set in the reign of Edward III. "Tenths and fifteenths" continued to be voted, and for some time all attempts to introduce new methods failed. In 1488 a military grant framed on the model of the abortive tax of 1472 yielded only a little over one-third of the estimate (£27,000 out of £75,000), and the unsatisfactory result prevented further experiments on the part of Henry VII. The foreign policy of Henry VIII.—particularly his French expedition—with its attendant outlay, accounts for the graduated capitation tax of 1513, which was even less in accordance with anticipation than the tax of 1488 (it yielded only £50,000 instead of £160,000). But these failures cleared the way for a more effective form of direct impost, which appeared in the "subsidy" or general tax on land and goods. The first case of this tax (1514) was a modest one—2½%; it, however, soon took on a typical form, so that the subsidy came to mean a charge of 4s. in the pound on land and 2s. 8d. in the pound on goods, a scale evidently devised with reference to the older tenth and fifteenth, which was henceforth put in a subordinate position. The subsidy became the established mode of grant under both Tudors and Stuarts, though by degrees it underwent a change similar to that experienced by its predecessor. The taxing statutes made elaborate provisions for the assessment and collection of the tax in order to secure a full return. Old habits proved too strong and the subsidy "slipped into the same kind of groove as that of the fifteenth and tenth, and became, in practice, a grant of a sum of money of about the same amount as the yield of the last preceding subsidy" (Dowell). The consequence was that each subsidy came, in the middle of the 16th century, to be a sum of £100,000, and at its close only £80,000. The parallel vote of the clergy in convocation (which after 1533 had to be confirmed in parliament) amounted to £20,000. The usual parliamentary proceeding was to vote so many "tenths and fifteenths" and so many subsidies, *e.g.* Elizabeth's first parliament voted her "two fifteenths and tenths and a subsidy," or, taking the usual values, £160,000. At times of crisis such as the arrival of the Armada the votes were enlarged by granting more tenths and fifteenths and subsidies. The history of the subsidy is instructive as to the tendencies of direct taxation in all countries. The assessment becomes inelastic and approximates to a fixed sum. As the subsidy follows the course of the later medieval taxation, so it is the undesigned model of the later land and property tax.

In the history of the port duties under the Tudors the first point for notice is the life grant to each of the sovereigns of the subsidies on wool, hides and leather, together with tunnage at 3s. and poundage at 5%; thus, with the hereditary customs, supplying a considerable revenue for the crown's use. No better indication of the increased power and popularity of the monarchy could be found. The contrast with the suspicious and grudging attitude of the Plantagenet and Lancastrian parliaments is significant of the change in national sentiment. A duty on malmsey (1490) had a retaliatory rather than a fiscal aim, being directed against the Venetians who had imposed restrictions on English trade. In several later cases wine became liable to extra duties, chiefly applied to French trade in further pursuance of the policy of retaliation. Restrictions on import and export as well as the hostile measures against foreign merchants were matters of economic policy rather than finance, but they had the indirect effect of increasing the control exercised at the ports. The loss of Calais (1558) dislocated the system of the staple and cut off one centre of customs revenue; and it was also probably the cause of an important change in the mode of valuing goods for duty. For the declaration on oath of the merchant a fixed valuation was substituted and set forth in a book of rates, the first of its class (1558). Following this reform came more stringent regulations against smuggling and fraud on the part of officials. All through the Tudor period the cost of collection was unduly high. For the first six years of Elizabeth it has been estimated at one-sixth of the gross receipts.

Just as in the 14th century the subsidy had followed the "old" and "new" customs, so in the 16th the "impositions" levied by royal prerogative formed a supplement to the parliamentary subsidy; but the principal employment of this expedient occurs in the next century. Another significant indication of the future course of indirect taxation was furnished by the grants of monopolies to inventors, producers and traders. These privileges, when they affected important commodities, operated in the same way as taxes farmed out to collectors, and, though the profit to the crown was small, they enhanced prices and excited discontent. The wisdom of Elizabeth (or her ministers) was shown in the promise of redress after the hostile debate of 1601.

From one point of view it may fairly be said that the great struggle of the Stuart kings with the parliament centred round financial issues. It is, at all events, beyond dispute that questions of taxation were the chosen ground of conflict. Taking the period from the accession of James I. to the opening of the Civil War (1603–42) it appears that the legal basis of indirect taxation was tested for the port duties in the "Great Case of Impositions" (known as Bates' case, see BATES, JOHN), while that of direct taxation was considered in the even more famous "Ship Money" case (for ever associated with the name of Hampden). In parliament the debates deal with impositions, monopolies, the grounds for voting subsidies, and the proper application of the funds granted; in fact, with nearly all the financial questions of the time. Notwithstanding these difficulties and disputes the financial system shows evident signs of expansion and adaptation to the needs of the state.

The direct grants of the parliaments of James I. far exceeded those of earlier periods (in 1606 six "fifteenths and tenths," three lay and four clerical subsidies), but the efforts to extend the other sources of revenue by the exercise of the prerogative naturally reacted on this spirit of liberality. The last "fifteenth and tenth" was voted in 1624, from which date this old-established form disappears, and the subsidy alone is used. In spite of Charles I.'s high-handed policy five subsidies were voted after the Petition of Right had been accepted, and even the Long Parliament made similar grants. Almost at the outbreak of the Civil War it also gave the king a graduated capitation tax. Other modes of direct taxation were used without parliamentary sanction. The collection of the antiquated feudal dues was enforced through the special courts (particularly the Star Chamber) with a rigour long unknown; James had tried the French device of a "tariff of honors." Both kings employed the "benevolence" until the Petition of Right made such a levy illegal. But by far the most serious innovation was the collection of the "ship money," a course forced on Charles by his determination not to meet the representatives of the nation. The writs "embodied the ultimate expression of the ingenuity of the king's advisers in the invention of means to enable him to rule without a parliament." The first writs secured over £100,000, and were followed by five further issues (1634-1639) bringing in an average return of £200,000 or about three lay subsidies. Like the "benevolence," the ship money was declared to be illegal (1641).

The contest respecting monopolies, settled by Elizabeth's withdrawal, was revived under James I., and had to be finally closed by the Statute of Monopolies (1624), declaring such grants to be utterly void. Certain exceptions (as in the case of the soap-boilers) permitted the raising of revenue by what was in fact a rudimentary excise, and plans for a general excise were discussed, especially as a substitute for the feudal dues, though they were not reduced to practice. In the earlier 17th century the customs show a steady increase. From £127,000 in 1604 they rose to nearly £500,000 in 1641. This fourfold increase was due in part to the growth of English trade, but it was also influenced by the adoption of new "Books of rates" in 1608 and 1635, fixing higher valuations, and by the inclusion of new commodities with definite duties. Wine, currants (the subject of controversy in Bates' case) and tobacco are particularly noticeable. Sugar also appears as a contributory. An interesting development was the adoption on a larger scale of the "farming" system, an evident imitation from France. A distinction was made between the "great," the "petty" and the "sugar" farms, and opportunities for gain were afforded to the officials. On the constitutional side the life grant of subsidies, made in accordance with Tudor usage to James, was temporarily withheld from Charles, a restriction which his own overbearing policy led the parliament to maintain. Practically, the whole customs revenue between 1628 and 1640 was raised by the use of the prerogative without any parliamentary sanction. The Tunnage and Poundage Act of 1641 pronounced definitely against the legality of any extra parliamentary customs and thus closed another of the constitutional problems of finance.

In the progress from the Conquest to the crisis of the Great Rebellion there is noticeable a practically complete shifting of the classes of revenue. The king had ceased "to live of his own"; the royal demesne and the prerogative rights included in feudalism had become very subordinate. The direct taxation of property and income, and the indirect taxation on imported or exported commodities became the principal forms of receipt.

In the long course of English financial history the nearest approach to the new departure and an abandonment of old devices is found at the time of the Civil War and Commonwealth. The actual outlines of the now existing system made their appearances, while the older portions of the revenue—particularly the survivals of feudalism—are eliminated. Thus the Civil War and the Interregnum (1642-60) may be regarded as marking a watershed in the financial history of the country. At the beginning of the struggle both sides had to rely on voluntary contributions. Plate and ornaments were melted down and useful commodities were furnished by the adherents of the king and by those of the parliament. As holding possession of London and the central organization the parliament voted subsidies and a poll tax. Such imports could hardly be levied with success and new forms became necessary. The direct taxation took the shape of a "monthly assessment" which was fixed from time to time, and which was collected under strict regulations, in marked contrast to the lax management of the former subsidies. As the amount for each district was fixed, the systematic collection secured "the more equitable adjustment of the burden of the tax as regards the various taxpayers" without hardship to the community. In spite of its origin, the "assessment" was the model for later taxation of property. The yield of this tax—exceeding for the whole period £32,000,000—is a proof of its importance. Minor contrivances, *e.g.* the "weekly meal" tax, indicate the financial difficulties of the parliament, but are otherwise unimportant. Owing to its control of the sea and the principal ports the parliament was able to command the customs revenue; and in this case also it remodelled the duties, abolishing the wool subsidy and readjusting the general customs by a new book of rates. A more extensive tariff was adopted in 1656, and various restrictions in harmony with the mercantilist ideas of the time were enforced. Thus French wines, silk and wool were excluded from 1649 to 1656. Far more revolutionary in its effects was the introduction of the excise or inland duties on goods—a step which Elizabeth, James I. and Charles I. had hesitated to take. Beginning (1643) with duties on ale, beer and spirits, it was soon extended to meat, salt and various textiles. Meat and domestic salt were relieved in 1647, and the taxation became definitely established under the administration of commissioners appointed for the purpose. Powers to let out the collection to farmers were granted, and a bid for both excise and customs amounted in 1657 to £1,100,000. Confiscations of church lands and those belonging to royalists, feudal charges and special collections helped to make up the total of £83,000,000 raised during the nineteen years of this revolutionary period. Another mark of change was the removal of the exchequer to Oxford, leaving, however, the real fiscal machinery at the disposal of the committees that directed the affairs of the parliament. Under Cromwell the exchequer was re-established (1654) in a form suited for the changes in the finances, the office of treasurer being placed in the hands of commissioners.

A complete reconstruction of the revenue system became necessary at the Restoration. The feudal tenures and dues, with the prerogative rights of purveyance and pre-emption, which had been abolished by order of the parliament, could not be restored. Their removal was confirmed, and the new revenues that had been developed were resorted to as a substitute. Careful inquiry showed that just before the Civil War the king's annual revenue had reached nearly £900,000. The needs of the restored monarchy were estimated at £1,200,000 per annum, and the loyal spirit of the commons provided sources of revenue deemed sufficient for this amount. An hereditary excise on beer and ale was voted as a compensation for the loss of the feudal dues, and temporary excises on spirits, vinegar, coffee, chocolate and tea were added. All differences of "old" and "new" customs and subsidies had disappeared under the Commonwealth. The general or "great statute" (1660) provided a scale of duties—5% on imports and exports, with special duties on wines and woollen cloths—accompanied by a new book of rates. A house tax, levied after the French pattern, on each hearth, was introduced in 1662 and became established. Poll taxes were used as an extraordinary resource, as were the last subsidies, voted in 1663, and then for ever abandoned. Licences on retailers and fees on law proceedings were further aids to the revenue, which, in the later years of Charles II. and in the short reign of his successor, was with difficulty kept up to the level of the increasing expenditure. The Commonwealth assessments were revived on several occasions, and indirect taxation was made more rigorous by the imposition of extra duties on brandy, tobacco and sugar, as also on French linens and silks. A very important development was the placing of the customs (1670) and the excise (1683) in the hands of special commissioners, instead of the system of farming them out to private collectors. The approach to modern conditions is further evidenced by the greater care in the administration. Amongst expert officials Dudley North (*q.v.*), as commissioner of customs, was the most distinguished. In this period, too, the beginning of the public debt as in the appropriation of the bankers' deposits may be found.

The Revolution of 1688 may be regarded both on its constitutional and financial sides as the completion of the work of the Long Parliament. In the latter respect its chief effects were: (1) the transfer of the administration of the finances from the king's nominees to officials under parliamentary control, (2) the consequent application of the revenue to the purposes designated by parliamentary appropriation, (3) the rapid expansion of the various kinds of revenue, particularly the indirect taxes, (4) the rise and growth of the national debt, combined with the creation of an effective banking system. The greater part of the 18th century was occupied with the working out of these results.

The government of William III. had to face the expenses of a great war and to allay discontent at home. As a preliminary step to the necessary settlement of the revenue a return was prepared, showing the tax receipts at over £1,800,000 and the peace expenditure at about £1,100,000. Parliament accepted the view that £1,200,000 per annum would suffice for the ordinary requirements of the kingdom. It, further, introduced the system of the Civil List (*q.v.*) and assigned £600,000 for the fixed payments placed under that head, leaving the remainder to be appropriated for the other needs of the state. As the "hearth money" had proved to be a very unpopular charge, it was, in spite of its yield (£170,000), given up. The temporary excise duties were voted for "their majesties' lives" and the customs for a limited term. These branches of revenue were altogether insufficient to meet the pressure of the war outlay, and in consequence new heads of taxation—or old ones revived—came into use. A series of poll and capitation taxes were imposed between 1689 and 1698, but were after that date abandoned for the same reason as that for the repeal of the hearth money. The monthly assessment was tried in 1688; then came an income tax followed by "twelve months'" assessments in 1690 and 1691. The way was thus prepared for the property tax of 1692, imposing a rate of 4s. in the pound on real estate, offices and personal property. The old difficulties of securing returns made the tax chiefly one on land. It was under the name of "the land tax" that it was generally known. The 4s. rate brought in £1,922,712, a return which declined in the following years. To meet this a fixed quota of nearly half a million (a 1s. rate) was adopted in 1697, the amount to be apportioned in specified sums to the several counties and towns. The framework of the tax remained without substantial change till 1798, the time of Pitt's redemption scheme. In 1696 houses were taxed 2s. each, with higher rates for extra windows. The beginning of the "window tax," licences on pedlars, and a temporary tax on the stocks of companies complete the imposts of this kind. Stamp duties—imitated from Holland—were adopted in 1694 and extended in 1698: they mark the beginnings of the modern duties on transactions and the "death duties." Large additions were made to the excise. Breweries and distilleries were placed under charge, and such important commodities as salt, coal, malt, leather and glass were included in the list of taxable articles, but the two last mentioned were soon relieved for the time. The customs rates were also increased. In 1698 the general 5% duty was raised by the new subsidy to 10%. French goods became liable to surtaxes, first of 25%, afterwards of 50%; those of other countries had to pay similar charges of smaller amount. Spirits, wines, tea and coffee were taxed at special rates. How great was the expansion of the fiscal system may be best realized from the fact that during the comparatively short reign of William III. (1689–1702) the land tax produced £19,200,000, the customs £13,296,000, and the excise £13,650,000, or altogether £46,000,000. In the last year of the reign, the opening one of the 18th century, the returns from these taxes respectively were: land tax (at 2s.), £990,000, customs £1,540,000, excise £986,000, or a total exceeding three and a half millions. The removal of the regular export duties in respect of (*a*) domestic woollen manufactures, (*b*) corn, was the only alleviation of taxation, and in both cases it was due to special reasons of policy.

Quite as remarkable as the growth of revenue is the sudden appearance of the use of public loans. In earlier periods a ruler had accumulated treasure (Henry VII. left £1,800,000) or had pledged "his jewels or the customs or occasionally the persons of his friends for the payment" of his borrowings. Edward III.'s dealings with the Florentine bankers are well known; but it was only after the Revolution that the two conditions essential for a permanent public debt were realized, viz.: (1) the responsibility of the government to the people, and (2) an effective market for floating capital. At the close of the war in 1697 a debt of £21,500,000 had been incurred, over £16,000,000 of which remained due at William III.'s death. Connected with the public debt is the foundation of the Bank of England (see Banks and Banking), which more and more became the agent for dealing with the state revenue and expenditure; though the exchequer continued to exist until 1834 as a real, even if antiquated institution.

Thus it is clear that by the end of the 17th century the new influences which date from the Civil War had brought into being all the elements of the modern financial system. Expenditure, revenue, borrowing to meet deficiencies are all, in a sense, developed into their present-day form. Increase in amount and some refinements in procedure, combined with improved views of public policy, are the only changes that occur later on.

Regarded broadly, the 18th and 19th centuries exhibit several distinct periods with definite financial aspects. In the ninety years from the death of William III. (1702) to the outbreak of the Revolutionary War with France (1793) there are four serious wars, covering nearly thirty-five years. There is the long peace administration of Walpole, and there are the shorter intervals of rest following each of the contests. From the beginning of the war with the French Republic to the year of Waterloo there is a nearly unbroken war time of over twenty years. The forty years' peace is closed by the Crimean War (1854–56); and another forty years of peace ends with the South African War (1899–1902). During this time the older mercantilism passes into protectionism; and this, again, gives way before the gradual adoption of the free trade policy. At each time of war, taxation (particularly in the indirect form) and debt increase. Financial reform is connected with the maintenance of peace. Among the great financial ministers Walpole, the younger Pitt, Peel and Gladstone are conspicuous; while Huskisson's services in the kindred field of economic policy deserve special notice in their financial bearing.

By taking the several great heads of revenue in order it is comparatively easy to understand the nature of the progress made in subsequent years. (1) The land tax, established on a definite basis in 1692, was the great 18th century form of direct taxation. Varying in rate from 1s. (as in 1731) to 4s. (as in most war years), it was converted by Pitt in 1798 into a redeemable charge on the lands of each parish, and by this process has sunk from the amount of £1,911,000 in 1798 to £730,000 in 1907–1908. The great increase in other heads had impaired the value of the land tax as a fiscal support. (2) Parallel with the movement of the land tax but showing much more rapid growth was the excise of the 18th century. Most of the articles of common consumption were permanently taxed. Soap, salt, candles and leather are described by Adam Smith as taxed, and that taxation is unreservedly condemned by him. In 1739 the excise duties brought in £3,000,000. By 1792 they had risen to £10,000,000. Their continued expansion was due both to the wider area covered and to the increased consuming power of the country. (3) The customs were equally serviceable, and in their case the increased duties were even more considerable. The general 10% of 1698 became 15% in 1704, a fourth 5% was imposed in 1748, and in 1759 the general duties were raised to 25%. Coincidently with this general extension of the customs duties special articles such as tea were subjected to increased duties. The American War of Independence brought about a further general increase of 10%, together with special extra duties on tobacco and sugar. In 1784 the customs revenue came to over £3,000,000. Two circumstances account for this slower growth. (1) The extreme rigour of the duties and prohibitions, aimed chiefly against French trade; and (2) the absence of care in estimating the point of maximum productiveness for each duty. Swift's famous saying that "in the arithmetic of the customs two and two sometimes made only one" is well exemplified in England at this time. The smuggler did a great deal of the foreign trade of the country. Efforts at reform were not, however, altogether wanting. Walpole succeeded in carrying several useful adjustments. He abolished the general duties on exports and also several of those on imported raw materials such as silk, beaver, indigo and colonial timber. His most ambitious scheme —that for the warehousing of wine and tobacco in order to relieve exporters—failed, in consequence of the popular belief that it was the forerunner of a general excise. Walpole's treatment of the land tax, which he kept down to the lowest figure (1s.), and his earlier funding plan deserve notice. His determination to preserve peace assisted his fiscal reforms. Pitt's administration from 1783 to 1792 marks another great period of improvement. The consolidation of the customs laws (1787), the reduction of the tea duty to nearly one-tenth of its former amount, the conclusion of a liberal commercial treaty with France, and the attempted trade arrangement with Ireland, tend to show that "Pitt would have anticipated many of the free trade measures of later years if it had been his lot to enjoy ten more years of peaceful administration." One of the financial problems which excited the interest and even the alarm of the students of public affairs was the rapid increase of the public debt. Each war caused a great addition to the burden; the intervals of peace showed very little diminution in it. From sixteen millions in 1702, the debt rose to £53,000,000 at the treaty of Utrecht (1713). In 1748 it reached £78,000,000, at the close of the Seven Years' War it was £137,000,000, and when the American colonies had established their independence it exceeded £238,000,000. Apprehensions of national bankruptcy led to the adoption of the device of a sinking fund, and in this case Pitt's usual sagacity seems to have failed him. The influence of R. Price's theory induced the policy of assigning special sums for debt reduction, without regard to the fundamental condition of maintaining a real surplus.

The revolutionary and Napoleonic wars mark an important stage in English finance. The national resources were strained to the utmost, and the "whip and spur" of taxation was used on all classes of the community. In the earlier years of the struggle the expedient of borrowing enabled the government to avoid the more oppressive forms of charge; but as time went on every possible expedient was brought into play. One class of taxes had been organized during peace—the "assessed taxes" on houses, carriages, servants, horses, plate, &c. These duties were raised by several steps of 10% each until, in 1798, their total charge was increased threefold (for richer persons four- or fivefold) under the plan of a "triple assessment." The comparative failure of this scheme (which did not bring in the estimated yield of £4,500,000) prepared the way for the most important development of the tax system—the introduction of the income-tax in 1798. Though a development of the triple assessment, the income-tax was also connected with the permanent settlement of the land tax as a redeemable charge. It is possible to trace the progress of direct taxation from the scutage of Norman days through "the tenth and fifteenth," the Tudor "subsidies," the Commonwealth "monthly assessments," and the 18th century land tax, to the income-tax as applied by Pitt, and, after an interval of disuse, revived by Peel (1842). The immediate yield of the income-tax was rather less than was expected (£6,000,000 out of £7,500,000); but by alteration of the mode of assessment from that of a general declaration to returns under the several schedules, the tax became, first at 5%, afterwards at 10%, the most valuable part of the revenue. In 1815 it contributed 22% of the total receipts (*i.e.* £14,600,000 out of £67,000,000). If employed at the beginning of the war, it would probably have obviated most of the financial difficulties of the government. The window tax, which continued all through the 18th century, had been supplemented in the American War by a tax on inhabited houses (one of Adam Smith's many suggestions), a group to which the assessment taxes were naturally joined. During the 18th century the probate duty had been gradually raised, and in 1780 the legacy duty was introduced; but these charges were moderate in character and did not affect land. Though the direct and quasi-direct taxes had been so largely increased, their growth was eclipsed by that of the excise and customs. With each succeeding year of war new articles for duties were detected and the rates of old taxes raised. The maxim, said to have guided the financiers of another country—"Wherever you see an object, tax it"—would fairly express the guiding policy of the English system of the early 19th century. Eatables, liquors, the materials of industry, manufactures, and the transactions of commerce had in nearly all their forms to pay toll. To take examples:—salt paid 15s. per bushel; sugar 30s. per cwt.; beer 10s. per barrel (with 4s. 5d. per bushel on malt and a duty on hops); tea 96% *ad valorem*. Timber, cotton, raw silk, hemp and bar iron were taxed, so were leather, soap, glass, candles, paper and starch. In spite of the need of revenue, many of the customs duties were framed on the protective system and thereby gave little returns; *e.g.* the import duty on salt in 1815 produced £547, as against £1,616,124 from excise; pill-boxes brought in 18s. 10d., saltpetre 2d., with 1d. for the war duties. The course of the war taxation was marked by varied experiments. Duties were raised, lowered, raised again, or given some new form in the effort to find additional revenue. Some duties, *e.g.* that on gloves, were abandoned as unproductive; but the conclusion is irresistible that the financial system suffered from over-complication and absence of principle. In the period of his peace administration Pitt was prepared to follow the teaching of *The Wealth of Nations*. The strain of a gigantic war forced him and his successors to employ whatever heads of taxation were likely to bring in funds without violating popular prejudices. Along with taxation, debt increased. For the first ten years the addition to it averaged £27,000,000 per annum, bringing the total to over £500,000,000. By the close of the war period in 1815 the total reached over £875,000,000, or a somewhat smaller annual increase—a result due to the adoption of more effective tax forms, and particularly the income tax. The progress of English trade was another contributing agency towards securing higher revenue. The import of articles such as tea advanced with the growing population; so that the tea duty of 96% yielded in 1815 no less than £3,591,000. It is, however, true that by the year just mentioned the tax system had reached its limit. Further extension (except by direct confiscation of property) was hardly possible. The war closed victoriously at the moment when its prolongation seemed unendurable.

A particular aspect of the English financial system is its relation to the organization of the finance of territories connected with the English crown. The exchequer may be plausibly held to have been derived from Normandy, and wherever territory came under English rule the methods familiar at home seem to have been adopted. With the loss of the French possessions the older cases of the kind disappeared. Ireland, however, had its own exchequer, and Scotland remained a distinct kingdom. The 18th century introduced a remarkable change. One of the aims of the union with Scotland was to secure freedom of commerce throughout Great Britain, and the two revenue systems were amalgamated. Scotland was assigned a very moderate share of the land tax (under one-fortieth), and was exempted from certain stamp duties. The attempt to apply selected forms of taxation—custom duties (1764), stamp duties (1765), and finally the effort to collect the tea duty (1773)—to the American colonies are indications of a movement towards what would now be called "imperialist" finance. The complete plan of federation for the British empire, outlined by Adam Smith, is avowedly actuated by financial considerations. Notwithstanding the failure of this movement in the case of the colonies, the close of the century saw it successful in respect to Ireland, though separate financial departments were retained till after the close of the Napoleonic War and some fiscal differences still remain. By the consolidation of the English and Irish exchequers and the passage from war to peace, the years between 1815 and 1820 may be said to mark a distinct step in the financial development of the country. The connected change in the Bank of England by the resumption of specie payments supports this view. Moreover, the political conditions in their influence on finance were undergoing a revolution. The landed interest, though powerful at the moment, had henceforth to face the rivalry of the wealthy manufacturing communities of the north of England, and it may be added that the influence of theoretic discussion was likely to be felt in the treatment of the financial policy of the nation. Canons as to the proper system of administration, taxation and borrowing come to be noticed by statesmen and officials.

These influences may be followed out in their working by observing the chief lines of adjustment and modification that followed the conclusion of peace. Relieved from the extraordinary outlay of the preceding years, the government felt bound to propose reductions. With commendable prudence it was resolved to retain the income-tax at 5% (one-half of the former rate), and to join with this reduction the removal of some war duties on malt and spirits. Popular feeling against direct taxation was so strong that the income-tax had to be surrendered *in toto*, a course which seriously embarrassed the finances of the following years. For over twenty-five years the income-tax remained in abeyance, to the great detriment of the revenue system. Its revival by Peel (1842), intended as a temporary expedient, proved its services as a permanent tax: it has continued and expanded considerably since. Both the excise and customs at the close of the war were marked by some of the worst defects of a vicious kind of taxation. The former had the evil effect of restricting the progress of industry and hampering invention. The raw materials and the auxiliary substances of industry were in many cases raised in price. The duties on salt and glass specially illustrated the bad results of the excise. New processes were hindered and routine made compulsory. The customs duties were still more restrictive of trade; as they practically excluded foreign manufactures, and were both costly and in many instances unproductive of revenue. As G. R. Porter has shown, the really profitable customs taxes were few in number. Less than a score of articles contributed more than nineteen-twentieths of the revenue from import duties. The duties on transactions, levied chiefly by stamps, were ill-graded and lacking in comprehensiveness. From the standpoint of equity the ground for criticism was equally plain. The great weight of taxation fell on the poorer classes. The owners of land escaped giving any return for the property that they held under the state, and other persons were not taxed in proportion to their abilities, which had been long recognized as the proper criterion.

The grievance as to distribution has been modified, if not removed, by the great development of (1) the income-tax, (2) the "death" or inheritance duties. Beginning at the rate of 7d. per pound (1842–1854), the income-tax was raised to 1s. 4d. for the Crimean War, and then continued at varying rates; reduced to 2d. in 1874, it rose to 5d., then in 1894 to 8d., and by 1909 appeared to be fixed as a minimum at 1s., or 5% on income from property. The yield per penny on the £ has risen almost uninterruptedly. From £710,000 in 1842, it now exceeds £2,800,000, though the exemptions and abatements are much more extensive. In fact, all incomes of £3 per week are absolutely free (£160 per annum is the precise exemption limit), and an income of £400 derived from personal exertion pays less than 5½d. per pound, or 2¼%. The great productiveness of the tax is equally remarkable. From £5,600,000 in 1843 (with a rate of 7d.) the return rose to £32,380,000 in 1907–1908, having been at the maximum of £38,800,000 in 1902–1903, with a tax rate of 6¼%. The income-tax thus supplies about one-fifth of the total revenue, or one-fourth of that obtained by taxation. Several fundamental questions of finance are connected with the taxation of income and have been dealt with by English practice. Small incomes claim lenient treatment, and, as mentioned above, this leniency means in England complete freedom. Again, earned incomes appear to represent lower ability to pay than unearned ones. Long refused on practical grounds (as by Gladstone and Lowe), the concession of an abatement of 25% on earned incomes of £2000 and under was granted in 1907. The question whether savings should be exempt from taxation as income has (with the exception of life insurance premiums) been decided in the negative. Allowances for depreciation and cost of repairs are partially recognized. Far more important than these special problems is the general one of increased tax rates on large incomes. Up to 1908–1909 the tax above the abatement limit of £700 remained strictly proportional; but opinion showed a decided tendency in favour of extra rates or a "super tax" on incomes above an assigned amount (*e.g.* £5000), and this was included in the budget of 1909–1910 (see INCOME-TAX).

In close relation with the income-tax is the estate duty, with its adjuncts of Legacy and Succession Duties. After Pitt's failure to carry the succession duty in 1790, no change was made till Gladstone's introduction in 1853 of a duty on land and settled property parallel to the legacy duty on free personality. Apart from certain minor alterations, the really vital change was the extension in 1894 of the old Probate Duty into a comprehensive impost (entitled the Estate Duty) applicable to all the possessions of a deceased person. This "Inheritance Tax"—to give it its scientific title—operates as a complementary property tax, and is thus an addition to the contribution from incomes derived from large properties. By graduation the charges on large estates in 1908–1909 (before the proposal for further increase in 1909–1910) came to 10% on £1,000,000, and reached the maximum of 15% at £3,500,000. From the several forms of the "Inheritance Taxes" the national revenue gained £14,500,000, with 4½ millions as a supplementary yield for local finance. The immense expansion of direct taxation is evident on comparing 1840 with 1908. In the former year the Probate and legacy duties brought in about one million; the other direct taxes, even including the "House duty," did not raise the total to £3,000,000. In 1908 the direct taxation of property and income supplied £51,500,000, or one-third of the total receipts as against less than one-twentieth in 1840.

But though this wider employment of direct taxation—a characteristic of European finance generally—reduced the *relative* position of the taxation of commodities, there was a growth in the absolute amount obtained from this category of duties. There were also considerable alterations, the result of changes in the views respecting fiscal policy. At the close of the Great War the excise duties were at first retained, and even in some cases increased. After some years reforms began. The following articles amongst others were freed from charge: salt (1825); leather and candles (1830); glass (1845); soap (1853); and paper (1860). The guiding principles were: (1) the removal of raw materials from the list of goods liable to excise, (2) the limitation of the excise to a small number of productive articles, with (3) the placing of the greater part (practically nearly the whole) of this form of taxation on alcoholic drinks. Apart from breweries and distilleries, the excise had little field for its work. The large revenue of £35,700,000 in 1907–1908 was derived one-half from spirits (£17,900,000), over one-third from beer, while most of the remainder was obtained from business taxation in the form of licences, the raising of which was one of the features of the budget in 1909. As a feeder of the revenue the excise might be regarded as equal to the income-tax, but less to be relied on in times of depression. Valuable as were the reforms of the excise after 1820, they were insignificant as compared with the changes in the customs. The particular circumstances of English political life have led to perhaps undue emphasis being placed on this particular branch of financial development. Between 1820 and 1860 the customs system was transformed from a highly complicated arrangement of duties, pressing with severity on nearly all foreign imports, into a simple and easily understood set of charges on certain specially selected commodities. All favours or preferences to home or colonial producers disappeared. Expressed in financial terms, all duties were imposed "for revenue only," and estimated in reference to their productiveness. An assimilation between the excise and customs rates necessarily followed. The stages of the development under the guidance of (1) Huskisson, (2) Peel, and (3) Gladstone are commonly regarded as part of the movement for Free Trade; but the financial working of the alteration is understood only by remembering that the duties removed by "tens" or by "hundreds" were quite trivial in yield, and did not involve any serious loss to the revenue. Perhaps the most remarkable feature of the English customs of the 19th century was the steadiness of the receipts. In spite of trade depressions, commercial crises and sweeping changes in rates, the annual revenue in the period 1815–1900 only varied between £19,000,000 and £24,000,000; though, on balance, duties amounting to £30,000,000 were remitted. The potential resources of this branch of revenue were made evident in the rapid rise of the yield by the new taxation imposed for the South African War (1899–1902). In consequence of this increase the customs became equal to the excise in return, and, combined, they collected over £60,000,000 annually from the consumption of commodities. They accordingly afforded a counterpoise to the burden put on income and property, or, more accurately speaking, they obtained due, or somewhat more than due, contribution from the smaller incomes, particularly those of the working class.

The exemption of raw materials and food; the absence of duties on imported, as on home manufactures; the selection of a small number of articles for duty; the rather rigorous treatment of spirits and tobacco, were the salient marks of the English fiscal system which grew up in the 19th century. The part of the system most criticised was the very narrow list of dutiable articles. Why, it was asked, should a choice be made of certain objects for the purpose of imposing heavy taxation on them? The answer has been that they were taken as typical of consumption in general and were easily supervised for taxation. Moreover, the sumptuary element is introduced by the policy of putting exceptionally heavy duties on spirits and tobacco, with lighter charges on the less expensive wines and beers. Facility of collection and distribution of taxation over a larger class appear to be the grounds for the inclusion of the tea and coffee duties, which are further supported by the need for obtaining a contribution of, roughly speaking, over half the tax revenue by duties on commodities. The last consideration led, at the beginning of the 20th century, to the sugar tax and the temporary duties on imported corn and exported coal.

As a support to the great divisions of income-tax, Death Duties, Excise and Customs, the stamps, fees and miscellaneous taxes are of decided service. A return of £9,000,000 was secured by stamp duties.

In recent years the so-called "non-tax" revenue largely increased, owing to the extension of the postal and telegraphic services. The real gain is not so great, as out of gross receipts of £22,000,000 over £17,500,000 is absorbed in expenses, while the carriage of ordinary letters seems to be the only profitable part of these services. Crown lands and rights (such as vintage charges) are of even less financial value.

One cardinal principle of the greatest English finance ministers has been the avoidance of deficits or undue surpluses. Gladstone's inheritance of doctrine from Peel "was to estimate expenditure liberally, to estimate revenue carefully, to make each year pay its own expenses, and to take care that your charge is not greater than your income." This method of treatment requires that taxation shall be productive in yield, and that it shall be so elastic as to admit of expansion, a function specially assigned to the income-tax. It may also be said to involve due care in the treatment of the national resources. The reaction of ill-chosen taxes on industry is a hindrance to their productiveness and their growth.

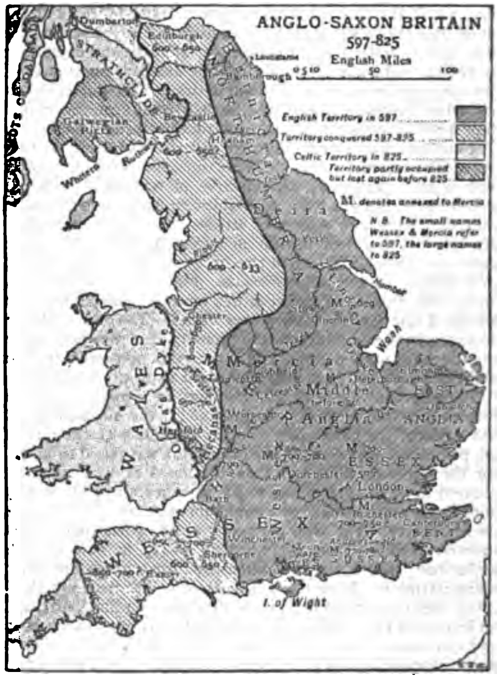
Authorities.—The constitutional historians—Stubbs, Gneist, Hallam—deal with the legal and constitutional aspects of finance. Special financial histories are: Sir J. Sinclair, *History of the Public Revenue of the British Empire* (3 vols., 3rd ed., London, 1803); S. Dowell, *History of Taxation and Taxes in England* (4 vols., 2nd ed., London, 1888); Schanz, *Englische Handelspolitik* (2 vols., Leipzig, 1881), and H. Hall, *History of the Customs Revenue of England* (2 vols., London, 1885), are valuable for the earlier periods. W. Cunningham, *Growth of English Industry and Commerce* (2 vols., Cambridge, 1903–1907); H. O. Meredith, *Economic History of England* (London, 1908), devote sections to finance. A. Smith, *Wealth of Nations* (1776), Tooke and Newmarch, *History of Prices* (6 vols., London, 1837–1856), give financial details. G. R. Porter, *Progress of the Nation* (3rd ed., London, 1851); Sir S. Northcote, *Twenty Years of Financial Policy* (London, 1862); S. Buxton, *Finance and Politics* (2 vols., London, 1888); J. R. McCulloch, *Taxation and Funding* (3rd ed., London, 1863); W. M. J. Williams, *The King's Revenue* (London, 1908), for 19th-century finance.

(C. F. B.)

ENGLISH HISTORY.—The general account of English history which follows should be supplemented for the earlier period by the article Britain. See also Scotland, Ireland, Wales.

I. From the Landing of Augustine to the Norman Conquest (600–1066)

With the coming of Augustine to Kent the darkness which for nearly two centuries had enwrapped the history of Britain begins to clear away. From the days of Honorius to those of Gregory the Great the line of vision of the annalists of the continent was bounded by the Channel. As to what was going on beyond it, we have but a few casual gleams of light, just enough to make the darkness visible, from writers such as the author of the life of St Germanus, Prosper Tiro, Procopius, and Gregory of Tours. These notices do not, for the most part, square particularly well with the fragmentary British narrative that can be patched together from Gildas's "lamentable book," or the confused story of Nennius. Nor again do these British sources fit in happily with the English annals constructed long centuries after by King Alfred's scribes in the first edition of the *Anglo-Saxon Chronicle*. But from the date when the long-lost communication between Britain and Rome was once more resumed, the history of the island becomes clear and fairly continuous. The gaps are neither broader nor more obscure than those which may be found in the contemporary annals of the other kingdoms of Europe. The stream of history in this period is narrow and turbid throughout the West. Quite as much is known of the doings of the English as of those of the Visigoths of Spain, the Lombards, or the later Merovingians. The 7th century was the darkest of all the "dark ages," and England is particularly fortunate in possessing the *Ecclesiastica historia* of Bede, which, though its author was primarily interested in things religious, yet contains a copious chronicle of things secular. No Western author, since the death of Gregory of Tours, wrote on such a scale, or with such vigour and insight.



Conversion of England.

The conversion of England to Christianity took, from first to last, some ninety years (A.D. 597 to 686), though during the last thirty the ancestral heathenism was only lingering on in remote corners of the land. The original missionary impulse came from Rome, and Augustine is rightly regarded as the evangelist of the English; yet only a comparatively small part of the nation owed its Christianity directly to the mission sent out by Pope Gregory. Wessex was won over by an independent adventurer, the Frank Birinus, who had no connexion with the earlier arrivals in Kent. The great kingdom of Northumbria, though its first Christian monarch Edwin was converted by Paulinus, a disciple of Augustine, relapsed into heathenism after his death. It was finally evangelized from quite another quarter, by Irish missionaries brought by King Oswald from Columba's monastery of Iona. The church that they founded struck root, as that of Paulinus and Edwin had failed to do, and was not wrecked even by Oswald's death in battle at the hands of Penda the Mercian, the one strong champion of heathenism that England produced. Moreover, Penda was no sooner dead, smitten down by Oswald's brother Oswio at the battle of the Winwaed (A.D. 655), than his whole kingdom eagerly accepted Christianity, and received missionaries, Irish and Northumbrian, from the victorious Oswio. It is clear that, unlike their king, the Mercians had no profound enthusiasm for the old gods. Essex, which had received its first bishop from Augustine's hands but had relapsed into heathenism after a few years, also owed its ultimate conversion to a Northumbrian preacher, Cedd, whom Oswio lent to King Sigeberht after the latter had visited his court and been baptized, hard by the Roman wall, in 653.

Yet even in those English regions where the missionaries from Iona were the founders of the Church, the representatives of Rome were to be its organizers. In 664 the Northumbrian king Oswio, at the synod of Whitby, declared his adhesion to the Roman connexion, whether it was that he saw political advantage therein, or whether he realized the failings and weaknesses of the Celtic church, and preferred the more orderly methods of her rival. Five years later there arrived from Rome the great organizer, Archbishop Theodore of Tarsus, who bound the hitherto isolated churches of the English kingdoms into a well-compacted whole, wherein the tribal bishops paid obedience to the metropolitan at Canterbury, and met him frequently in national councils and synods. England gained a spiritual unity long ere she attained a political unity, for in these meetings, which were often attended by kings as well as by prelates, Northumbrian, West Saxon and Mercian first learnt to work together as brothers.

The English church.

In a few years the English church became the pride of Western Christendom. Not merely did it produce the great band of missionaries who converted heathen Germany—Willibrord, Suidbert, Boniface and the rest—but it excelled the other national churches in learning and culture. It is but necessary to mention Bede and Alcuin. The first, as has been already said, was the one true historian who wrote during the dark time of the 7th–8th centuries; the second became the pride of the court of Charles the Great for his unrivalled scholarship. At the coming of Augustine England had been a barbarous country; a century and a half later she was more than abreast of the civilization of the rest of Europe.

Formation of the kingdoms.

But the progress toward national unity was still a slow one. The period when the English kingdoms began to enter into the commonwealth of Christendom, by receiving the missionaries sent out from Rome or from Iona, practically coincides with the period in which the occupation of central Britain was completed, and the kingdoms of the conquerors assumed their final size and shape. Æthelfrith, the last heathen among the Northumbrian kings, cut off the Britons of the North from those of the West, by winning the battle of Chester (A.D. 613), and occupying the land about the mouths of the Mersey and the Dee. Cenwalh, the last monarch who ascended the throne of Wessex unbaptized, carried the boundaries of that kingdom into Mid-Somersetshire, where they halted for a long space. Penda, the last heathen king of Mercia, determined the size and strength of that state, by absorbing into it the territories of the other Anglian kingdoms of the Midlands, and probably also by carrying forward its western border beyond the Severn. By the time when the smallest and most barbarous of the Saxon states—Sussex—accepted Christianity in the year 686, the political geography of England had reached a stage from which it was not to vary in any marked degree for some 200 years. Indeed, there was nothing accomplished in the way of further encroachment on the Celt after 686, save Ine's and Cuthred's extension of Wessex into the valleys of the Tone and the Exe, and Offa's slight expansion of the Mercian frontier beyond the Severn, marked by his famous dyke. The conquests of the Northumbrian kings in Cumbria were ephemeral; what Oswio won was lost after the death of Ecgfrith.

The "Bretwaldas."

That the conversion of the English to Christianity had anything to do with their slackening from the work of conquest it would be wrong to assert. Though their wars with the Welsh were not conducted with such ferocious cruelty as of old, and though (as the laws of Ine show) the Celtic inhabitants of newly-won districts were no longer exterminated, but received as the king's subjects, yet the hatred between Welsh and English did not cease because both were now Christians. The westward advance of the invaders would have continued, if only there had remained to attract them lands as desirable as those they had already won. But the mountains of Wales and the moors of Cornwall and Cumbria did not greatly tempt the settler. Moreover, the English states, which had seldom turned their swords against each other in the 5th or the 6th centuries, were engaged during the 7th and the 8th in those endless struggles for supremacy which seem so purposeless, because the hegemony which a king of energy and genius won for his kingdom always disappeared with his death. The "Bretwaldaship," as the English seem to have called it, was the most ephemeral of dignities. This was but natural: conquest can only be enforced by the extermination of the conquered, or by their consent to amalgamate with the conquerors, or by the garrisoning of the land that has been subdued by settlers or by military posts. None of these courses were possible to a king of the 7th or 8th centuries: even in their heathen days the English were not wont to massacre their beaten kinsmen as they massacred the unfortunate Celt. After their conversion to Christianity the idea of exterminating other English tribes grew even more impossible. On the other hand, local particularism was so strong that the conquered would not, at first, consent to give up their natural independence and merge themselves in the victors. Such amalgamations became possible after a time, when many of the local royal lines died out, and unifying influences, of which a common Christianity was the most powerful, sapped the strength of tribal pride. But it is not till the 9th century that we find this phenomenon growing general. A kingdom like Kent or East Anglia, even after long subjection to a powerful overlord, rose and reasserted its independence immediately on hearing of his death. His successor had to attempt a new conquest, if he felt himself strong enough. To garrison a district that had been overrun was impossible: the military force of an English king consisted of his military household of *gesiths*, backed by the general levy of the tribe. The strength of Mercia or Northumbria might be mustered for a single battle, but could not supply a standing army to hold down the vanquished. The victorious king had to be content with tribute and obedience, which would cease when he died, or was beaten by a competitor for the position of Bretwalda.

Supremacy of Northumbria.

In the ceaseless strife between the old English kingdoms, therefore, it was the personality of the king which was the main factor in determining the hegemony of one state over another. If in the 7th century the successive great Northumbrians—Edwin, Oswald, Oswio and Ecgfrith—were reckoned the chief monarchs of England, and exercised a widespread influence over the southern realms, yet each had to win his supremacy by his own sword; and when Edwin and Oswald fell before the savage heathen Penda, and Ecgfrith was cut off by the Picts, there was a gap of anarchy

Supremacy of Mercia.

before another king asserted his superior power. The same phenomenon was seen with regard to the Mercian kings of the 8th century; the long reigns of the two conquerors Æthelbald and Offa covered eighty years (716–796), and it might have been supposed that after such a term of supremacy Mercia would have remained permanently at the head of the English kingdoms. It was not so, Æthelbald in his old age lost his hegemony at the battle of Burford (752), and was murdered a few years after by his own people. Offa had to win back by long wars what his kinsman had lost; he became so powerful that we find the pope calling him *Rex Anglorum*, as if he were the only king in the island. He annexed Kent and East Anglia, overawed Northumbria and Wessex, both hopelessly faction-ridden at the time, was treated almost as an equal by the emperor Charles the Great, and died still at the height of his power. Yet the moment that he was dead all his vassals revolted; his successors could never recover all that was lost. Kent once more became a kingdom, and two successive Mercian sovereigns, Beornwulf and Ludica, fell in battle while vainly trying to recover Offa's supremacy over East Anglia and Wessex.

Supremacy of Wessex.

The ablest king in England in the generation that followed Offa was Ecgbert of Wessex, who had long been an exile abroad, and served for thirteen years as one of the captains of Charles the Great. He beat Beornwulf of Mercia at Ellandune (A.D. 823), permanently annexed Kent, to whose crown he had a claim by descent, in 829 received the homage of all the other English kings, and was for the remainder of his life reckoned as "Bretwalda." But it is wrong to call him, as some have done, "the first monarch of all England." His power was no greater than that of Oswio or Offa had been, and the supremacy might perhaps have tarried with Wessex no longer than it had tarried with Northumbria or Mercia if it had not chanced that the Danish raids were now beginning. For these invasions, paradoxical as it may seem, were the greatest efficient cause in the welding together of England. They seemed about to rend the land in twain, but they really cured the English of their desperate particularism, and drove all the tribes to take as their common rulers the one great line of native kings which survived the Danish storm, and maintained itself for four generations of desperate fighting against the invaders. On the continent the main effect of the viking invasions was to dash the empire of Charles the Great into fragments, and to aid in producing the numberless petty states of feudal Europe. In this island they did much to help the transformation of the mere Bretwaldaship of Ecgbert into the monarchy of all England.

Danish invasions.

Already ere Ecgbert ascended the throne of Kent the new enemy had made his first tentative appearance on the British shore. It was in the reign of Beorhtric, Ecgbert's predecessor, that the pirates of the famous "three ships from Heretheland" had appeared on the coast of Dorset, and slain the sheriff "who would fain have known what manner of men they might be." A few years later another band appeared, rising unexpectedly from the sea to sack the famous Northumbrian monastery of Lindisfarne (793). After that their visits came fast and furious on the shore-line of every English kingdom, and by the end of Ecgbert's reign it was they, and not his former Welsh and Mercian enemies, who were the old monarch's main source of trouble. But he brought his Bretwaldaship to a good end by inflicting a crushing defeat on them at Hingston Down, hard by the Tamar, probably in 836, and died ere the year was out, leaving the ever-growing problem to his son Æthelwulf.

Influence of viking sea-power.

The cause of the sudden outpouring of the Scandinavian deluge upon the lands of Christendom at this particular date is one of the puzzles of history. So far as memory ran, the peoples beyond the North Sea had been seafaring races addicted to piracy. Even Tacitus mentions their fleets. Yet since the 5th century they had been restricting their operations to their own shores, and are barely heard of in the chronicles of their southern neighbours. It seems most probable that the actual cause of their sudden activity was the conquest of the Saxons by Charles the Great, and his subsequent advance into the peninsula of Denmark. The emperor seemed to be threatening the independence of the North, and in terror and resentment the Scandinavian peoples turned first to strike at the encroaching Frank, and soon after to assail the other Christian kingdoms which lay behind, or on the flank of, the Empire. But their offensive action proved so successful and so profitable that, after a short time, the whole manhood of Denmark and Norway took to the pirate life. Never since history first began to be recorded was there such a supreme example of the potentialities of sea-power. Civilized Europe had been caught at a moment when it was completely destitute of a war-navy; the Franks had never been maritime in their tastes, the English seemed to have forgotten their ancient seafaring habits. Though their ancestors had been pirates as fierce as the vikings of the 9th century, and though some of their later kings had led naval armaments—Edwin had annexed for a moment Man and Anglesea, and Ecgfrith had cruelly ravaged part of Ireland—yet by the year 800 they appear to have ceased to be a seafaring race. Perhaps the long predominance of Mercia, an essentially inland state, had something to do with the fact. At any rate England was as helpless as the Empire when first the Danish and Norwegian galleys began to cross the North Sea, and to beat down both sides of Britain seeking for prey. The number of the invaders was not at first very great; their fleets were not national armaments gathered by great kings, but squadrons of a few vessels collected by some active and enterprising adventurer. Their original tactics were merely to land suddenly near some thriving seaport, or rich monastery, to sack it, and to take to the water again before the local militia could turn out in force against them. But such raids proved so profitable that the vikings soon began to take greater things in hand; they began to ally themselves in confederacies: two, six or a dozen "sea-kings' would join their forces for something more than a desultory raid. With fifty or a hundred ships they would fall upon some unhappy region, harry it for many miles inland, and offer battle to the landsfolk unless the latter came out in overpowering force. And as their crews were trained warriors chosen for their high spirit, contending with a raw militia fresh from the plough, they were generally successful. If the odds were too great they could always retire to their ships, put to sea, and resume their predatory operations on some other coast three hundred miles away. As long as their enemies were unprovided with a navy they were safe from pursuit and annihilation. The only chance against them was that, if caught too far from the base-fort where they had run their galleys ashore, they might find their communication with the sea cut off, and be forced to fight for their lives surrounded by an infuriated countryside. But in the earlier years of their struggles with Christendom the vikings seldom suffered a complete disaster; they were often beaten but seldom annihilated. Ere long they grew so bold that they would stay ashore for months, braving the forces of a whole kingdom, and sheltering themselves in great palisaded camps on peninsulas or islands when the enemy pressed them too hard. On well-guarded strongholds like Thanet or Sheppey in England, Noirmoutier at the Loire mouth, or the Isle of Walcheren, they defied the local magnates to evict them. Finally they took to wintering on the coast of England or the Empire, a preliminary to actual settlement and conquest. (See VIKING.)

Progress of Danish conquest.

King Ecgbert died long ere the invaders had reached this stage of insolence. Æthelwulf, his weak and kindly son, would undoubtedly have lost the titular supremacy of Wessex over the other English kingdoms if there had been in Mercia or Northumbria a strong king with leisure to concentrate his thoughts on domestic wars. But the vikings were now showering such blows on the northern states that their unhappy monarchs could think of nothing but self-defence. They slew Redulf—king of Northumbria—in 844, took London in 851, despite all the efforts of Burgred of Mercia, and forced that sovereign to make repeated appeals for help to Æthelwulf as his overlord. For though Wessex had its full share of Danish attacks it met them with a vigour that was not seen in the other realms. The defence was often, if not always, successful; and once at least (at Aclea in 851) Æthelwulf exterminated a whole Danish army with "the greatest slaughter among the heathen host that had been heard of down to that day," as the Anglo-Saxon chronicler is careful to record. But though he might ward off blows from his own realm, he was helpless to aid Mercia or East Anglia, and still more the distant Northumbria.

It was not, however, till after Æthelwulf's death that the attack of the vikings developed its full strength. The fifteen years (856-871) that were covered by the reigns of his three shortlived sons, Æthelbald, Æthelbert and Æthelred, were the most miserable that England was to see. Assembling in greater and ever greater confederacies, the Danes fell upon the northern kingdoms, no longer merely to harry but to conquer and occupy them. A league of many sea-kings which called itself the "great army" slew the last two sovereigns of Northumbria and stormed York in 867. Some of the victors settled down there to lord it over the half-exterminated English population. The rest continued their advance southward. East Anglia was conquered in 870; its last king, Edmund, having been defeated and taken prisoner, the vikings shot him to death with arrows because he would not worship their gods. His realm was annexed and partly settled by the conquerors. The fate of Mercia was hardly better: its king, Burgred, by constant payment of tribute, bought off the invaders for a space, but the eastern half of his realm was reduced to a wilderness.

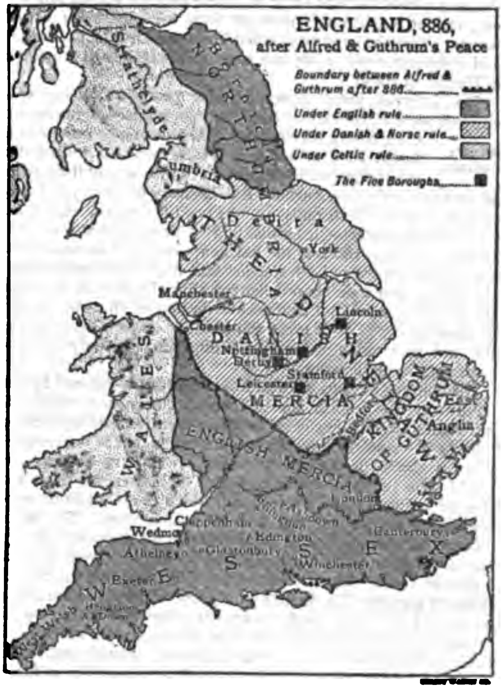
Practically masters of all that lay north of Thames, the "great army" next moved against Wessex, the only quarter where a vigorous resistance was still maintained against them, though its capital, Winchester, had been sacked in 864. Under two kings named Halfdan and Bacsceg, and six earls, they seized Reading and began to harry Berkshire, Surrey and Hampshire. King Æthelred, the third son of Æthelwulf, came out against them, with his young brother Alfred and all the levies of Wessex. In the year 871 these two gallant kinsmen fought no less than six pitched battles against the invaders. Some were victories—notably the fight of Ashdown, where Alfred first won his name as a soldier—but the English failed to capture the fortified camps of the vikings at Reading, and were finally beaten at Marten ("Maeretun") near Bedwyn, where Æthelred was mortally wounded.

Alfred the Great.

He left young sons, but the men of Wessex crowned Alfred king, because they needed a grown man to lead them in their desperate campaigning. Yet his reign opened inauspiciously: defeated near Wilton, he offered in despair to pay the vikings to depart. He must have known, from the experience of Mercian, Northumbrian and Frankish kings, that such blackmail only bought a short respite, but the condition of his realm was such that even a moderate time for reorganization might prove valuable. The enemy had suffered so much in the "year of the six battles" that they held off for some space from Wessex, seeking easier prey on the continent and in northern England. In 874 they harried Mercia so cruelly that King Burgred fled in despair to Rome; the victors divided up his realm, taking the eastern half for themselves, and establishing in it a confederacy, whose jarls occupied the "five boroughs" of Stamford, Lincoln, Derby, Nottingham and Leicester. But the western half they handed over to "an unwise thegn named Ceolwulf," who bought for a short space the precarious title of king by paying great tribute.

Alfred employed the four years of peace, which he had bought in 871, in the endeavour to strengthen his realm against the inevitable return of the raiders. His wisdom was shown by the fact that he concentrated his attention on the one device which must evidently prove effective for defence, if only he were given time to perfect it—the building of a national navy. He began to lay down galleys and "long ships," and hired "pirates"—renegade vikings no doubt—to train crews for him and to teach his men seamanship. The scheme, however, was only partly completed when in 876 three Danish kings entered Wessex and resumed the war. But Alfred blockaded them first in Wareham and then in Exeter. The fleet which was coming to carry them off, or to bring them reinforcements, fought an indecisive engagement with the English ships, and was wrecked immediately after on the cliffs of the Isle of Purbeck, where more than 100 galleys and all their crews perished. On hearing of this disaster the vikings in Exeter surrendered the place on being granted a free departure.

Yet within a few months of this successful campaign Alfred was attacked at midwinter by the main Danish army under King Guthrum. He was apparently taken by surprise by an assault at such an unusual time of the year, and was forced to escape with his military household to the isle of Athelney among the marshes of the Parrett. The invaders harried Wiltshire and Hampshire at their leisure, and vainly thought that Wessex was at last subdued. But with the spring the English rallied: a Danish force was cut to pieces before Easter by the men of Devonshire. A few weeks later Alfred had issued from Athelney, had collected a large army in Selwood, and went out to meet the enemy in the open field. He beat them at Edington in Wiltshire, blockaded them in their great camp at Chippenham, and in fourteen days starved them into surrender. The terms were that they should give hostages, that they should depart for ever from Wessex, and that their king Guthrum should do homage to Alfred as overlord, and submit to be baptized, with thirty of his chiefs. Not only were all these conditions punctually fulfilled, but (what is more astonishing) the Danes had been so thoroughly cured of any desire to try their luck against the great king that they left him practically unmolested for fourteen years (878-892). King Guthrum settled down as a Christian sovereign in East Anglia, with the bulk of the host that had capitulated at Chippenham. Of the rest of the invaders one section established a petty kingdom in Yorkshire, but those in the Midlands were subject to no common sovereign but lived in a loose confederacy under the jarls of the "Five Boroughs" already named above. The boundary between English and Danes established by the peace of 878 is not perfectly ascertainable, but a document of



a few years later, called "Alfred and Guthrum's frith," gives the border as lying from Thames northward up the Lea to its source, then across to Bedford, and then along the Ouse to Watling Street, the old Roman road from London to Chester. This gave King Alfred London and Middlesex, most of Hertfordshire and Bedfordshire, and the larger half of Mercia—lands that had never before been an integral part of Wessex, though they had some time been tributary to her kings. They were now taken inside the realm and governed by the ealdorman Æthelred, the king's son-in-law. The Mercians gladly mingled with the West Saxons, and abandoned all memories of ancient independence. Twenty years of schooling under the hand of the Dane had taught them to forget old particularism.

Alfred's enlarged kingdom was far more powerful than any one of the three new Danish states which lay beyond the Lea and Watling Street: it was to be seen, ere another generation was out, that it was stronger than all three together. But Alfred was not to see the happy day when York and Lincoln, Colchester and Leicester, were to become mere shire-capitals in the realm of United England.

Alfred's reforms.

The fourteen years of comparative peace which he now enjoyed were devoted to perfecting the military organization of his enlarged kingdom. His fleet was reconstructed: in 882 he went out with it in person and destroyed a small piratical squadron: in 885 we hear of it coasting all along Danish East Anglia. But his navy was not yet strong enough to hold off all raids: it was not till the very end of his reign that he perfected it by building "long ships that were nigh twice as large as those of the heathen; some had 60 oars, some more; and they were both steadier and swifter and lighter than the others, and were shaped neither after the Frisian nor after the Danish fashion, but as it seemed to himself that they would be most handy." This great war fleet he left as a legacy to his son, but he himself in his later campaigns had only its first beginnings at his disposal.

His military reforms were no less important. Warned by the failures of the English against Danish entrenched camps, he introduced the long-neglected art of fortification, and built many "burhs"—stockaded fortresses on mounds by the waterside—wherein dwelt permanent garrisons of military settlers. It would seem that the system by which he maintained them was that he assigned to each a region of which the inhabitants were responsible for its manning and its sustentation. The landowners had either to build a house within it for their own inhabiting, or to provide that a competent substitute dwelt there to represent them. These "burh-ware," or garrison-men, are repeatedly mentioned in Alfred's later years. The old national levy of the "fyrd" was made somewhat more serviceable by an ordinance which divided it into two halves, one of which must take the field when the other was dismissed. But it would seem that the king paid even more attention to another military reform—the increase of the number of the professional fighting class, the thegnhood as it was now called. All the wealthier men, both in the countryside and in the towns, were required to take up the duties as well as the privileges of membership of the military household of the king. They became "of thegnright worthy" by receiving, really or nominally, a place in the royal hall, with the obligation to take the field whenever their master raised his banner. The document which defines their duties and privileges sets forth that "every ceorl who throve so that he had fully five hides of land, and a helm, and a mail-shirt, and a sword ornamented with gold, was to be reckoned gesithcund." A second draft allowed the man who had the military equipment complete, but not fully the five hides of land, to slip into the list, and also "the merchant who has fared thrice over the high seas at his own expense." How far the details of the scheme are Alfred's own, how far they were developed by his son Edward the Elder, it is unfortunately impossible to say. But there is small doubt that the system was working to some extent in the later wars of the great king, and that his successes were largely due to the fact that his army contained a larger nucleus of fully armed warriors than those of his predecessors.

Military reforms were only one section of the work of King Alfred during the central years of his reign. It was then that he set afoot his numerous schemes for the restoration of the learning and culture of England which had sunk so low during the long years of disaster which had preceded his accession. How he gathered scholars from the continent, Wales and Ireland; how he collected the old heroic poems of the nation, how he himself translated books from the Latin tongue, started schools, and set his scribes to write up the *Anglo-Saxon Chronicle*, is told elsewhere, as are his mechanical inventions, his buildings, and his dealings with missionaries and explorers (see ALFRED).

The test of the efficiency of his work was that it held firm when, in his later years, the Danish storm once more began to beat against the shores of Wessex. In the years 892–896 Alfred was assailed from many sides at once by viking fleets, of which the most important was that led by the great freebooter Hasting. Moreover, the settled Danes of eastern England broke their oaths and gave the invaders assistance. Yet the king held his own, with perfect success if not with ease. The enemy was checked, beaten off, followed up rapidly whenever he changed his base of operation, and hunted repeatedly all across England. The campaigning ranged from Appledore in Kent to Exeter, from Chester to Shoeburyness; but wherever the invaders transferred themselves, either the king, or his son Edward, or his son-in-law Ethelred, the ealdorman of Mercia, was promptly at hand with a competent army. The camps of the Danes were stormed, their fleet was destroyed in the river Lea in 895, and at last the remnant broke up and dispersed, some to seek easier plunder in France, others to settle down among their kinsmen in Northumbria or East Anglia.

Alfred survived for four years after his final triumph in 896, to complete the organization of his fleet and to repair the damages done by the last four years of constant fighting. He died on the 26th of October 900, leaving Wessex well armed for the continuance of the struggle, and the inhabitants of the "Danelagh" much broken in spirit. They saw that it would never be in their power to subdue all England. Within a few years they were to realize that it was more probable that the English kings would subdue them.

Edward the Elder.

The house of Wessex continued to supply a race of hard-fighting and capable monarchs, who went on with Alfred's work. His son, Edward the Elder, and his three grandsons, Æthelstan, Edmund and Edred, devoted themselves for fifty-five years (A.D. 900–955) to the task of conquering the Danelagh, and ended by making England into a single unified kingdom, not by admitting the conquered to homage and tribute, in the old style of the 7th century, but by their complete absorption. The process was not so hard as might be thought; when once the Danes had settled down, had brought over wives from their native land or taken them from among their English vassals, had built themselves farmsteads and accumulated flocks and herds, they lost their old advantage in contending with the English. Their strength had been their mobility and their undisputed command of the sea. But now they had possessions of their own to defend, and could not raid at large in Wessex or Mercia without exposing their homes to similar molestation. Moreover, the fleet which Alfred had built, and which his successors kept up, disputed their mastery of the sea, and ended by achieving a clear superiority over them. Unity of plan and unity of command was also on the side of the English. The inhabitants of the three sections of the Danelagh were at best leagued in a many-headed confederacy. Their opponents were led by kings whose orders were punctually obeyed from Shrewsbury to Dover and from London to Exeter. It must also be remembered that in the greater part of the land which they possessed the Danes were but a small minority of the population. After their first fury was spent they no longer exterminated the conquered, but had been content to make the Mercians and Deirans their subjects, to take the best of the land, and exact tribute for the rest. Only in Lincolnshire, East Yorkshire and parts of Nottinghamshire and Leicestershire do they seem to have settled thickly and formed a preponderating element in the countryside. In the rest of the Midlands and in East Anglia they were only a governing oligarchy of scanty numbers. Everywhere there was an English lower class which welcomed the advent of the conquering kings of Wessex and the fall of the Danish jarls.

Edward the Elder spent twenty-five laborious years first in repelling and repaying Danish raids, then in setting to work to subdue the raiders. He worked forward into the Danelagh, building *burhs* as he advanced, to hold down each district that he won. He was helped by his brother-in-law, the Mercian ealdorman Æthelred, and, after the death of that magnate, by his warlike sister Æthelflæd, the ealdorman's widow, who was continued in her husband's place. While Edward, with London as his base, pushed forward into the eastern counties, his sister, starting from Warwick and Stafford, encroached on the Danelagh along the line of the Trent. The last Danish king of East Anglia was slain in battle in 918, and his realm annexed. Æthelflæd won Derby and Leicester, while her brother reduced Stamford and Nottingham. Finally, in 921, not only was the whole land south of the Humber subdued, but the Yorkshire Danes, the Welsh, and even—it is said—the remote Scots of the North, did homage to Edward and became his men.

Æthelstan.

In 925 Edward was succeeded by his eldest son Æthelstan, who completed the reduction of the Danelagh by driving out Guthfrith, the Danish king of York, and annexing his realm. But this first conquest of the region beyond Humber had to be repeated over and over again; time after time the Danes rebelled and proclaimed a new king, aided sometimes by bands of their kinsmen from Ireland or Norway, sometimes by the Scots and Strathclyde Welsh. Æthelstan's greatest and best-remembered achievement was his decisive victory in 937 at Brunanburh—an unknown spot, probably by the Solway Firth or the Ribble—over a great confederacy of rebel Danes of Yorkshire, Irish Danes from Dublin, the Scottish king, Constantine, and Eugenius, king of Strathclyde. Yet even after such a triumph Æthelstan had to set up a Danish under-king in Yorkshire, apparently despairing of holding it down as a shire governed by a mere ealdorman. But its overlordship he never lost, and since he also maintained the supremacy which his father had won over the Welsh and Scots, it was not without reason that he called himself on his coins and in his charters *Rex totius Britanniae*. Occasionally he even used the title *Basileus*, as if he claimed a quasi-imperial position.

Edmund: Edred.

The trampling out of the last embers of Danish particularism in the North was reserved for Æthelstan's brothers and successors, Edmund and Edred (940–955), who put down several risings of the Yorkshiremen, one of which was aided by a rebellion of the Midland Danes of the Five Boroughs. But the untiring perseverance of the house of Alfred was at last rewarded by success. After the expulsion of the last rebel king of York, Eric Haraldson, by Edred in 948, we cease to hear of trouble in the North. When next there was rebellion in that quarter it was in favour of a Wessex prince, not of a Danish adventurer, and had no sinister national significance. The descendants of the vikings were easily incorporated in the English race, all the more so because of the wise policy of the conquering kings, who readily employed and often promoted to high station men of Danish descent who showed themselves loyal—and this not only in the secular but in spiritual offices. In 942 Oda, a full-blooded Dane, was made archbishop of Canterbury. The Danelagh became a group of earldoms, ruled by officials who were as often of Danish as of English descent.

It is notable that when, after Edred's death, there was civil strife, owing to the quarrel of his nephew Edwy with some of his kinsmen, ministers and bishops, the rebels, who included the majority of the Mercians and Northumbrians, set up as their pretender to the throne not a Dane but Edwy's younger brother Edgar, who ruled for a short time north of Thames, and became sole monarch on the death of his unfortunate kinsman.

Edgar.

The reign of Edgar (959–975) saw the culmination of the power of the house of Alfred. It was untroubled by rebellion or by foreign invasions, so that the king won the honourable title of *Rex Pacificus*. The minor sovereigns of Britain owned him as overlord, as they had owned his grandfather Edward and his uncle Æthelstan. It was long remembered "how all the kings of this island, both the Welsh and the Scots, eight kings, came to him once upon a time on one day and all bowed to his governance." The eight were Kenneth of Scotland, Malcolm of Strathclyde, Maccus of Man, and five Welsh kings. There is fair authority for the well-known legend that, after this meeting at Chester, he was rowed in his barge down the Dee by these potentates, such a crew as never was seen before or after, and afterwards exclaimed that those who followed him might now truly boast that they were kings of all Britain.

Edgar's chief counsellor was the famous archbishop Dunstan, to whom no small part of the glory of his reign has been ascribed. This great prelate was an ecclesiastical reformer—a leader in a movement for the general purification of morals, and especially for the repressing of simony and evil-living among the clergy—a great builder of churches, and a stringent enforcer of the rules of the monastic life. But he was also a busy statesman; he probably had a share in the considerable body of legislation which was enacted in Edgar's reign, and is said to have encouraged him in his policy of treating Dane and Englishman with exact equality, and of investing the one no less than the other with the highest offices in church and state.

Edgar's life was too short for the welfare of his people—he was only in his thirty-third year when he died in 975, and his sons were young boys. The hand of a strong man was still needed to keep the peace in the newly-constituted realm of all England, and the evils of a minority were not long in showing themselves. One section of the magnates had possession of the thirteen-year-old king Edward, and used his name to cover their ambitions. The other was led by his step-mother Ælfthryth, who was set on pushing the claims of her son, the child Æthelred. After much factious strife, and many stormy meetings of the Witan, Edward was murdered at Corfe in 978 by some thegns of the party of the queen-dowager. The crime provoked universal indignation, but since there was no other prince of the house of Alfred available, the magnates were forced to place Æthelred on the throne: he was only in his eleventh year, and was at least personally innocent of complicity in his brother's death.

Æthelred the Unready.

Danish invasions.

With the accession of Æthelred, the "Redeless," as he was afterwards called from his inability to discern good counsel from evil, and the consistent incapacity of his policy, an evil time began. The retirement from public life of Edgar's old minister Dunstan was the first event of the new reign, and no man of capacity came forward to take his place. The factions which had prevailed during the reign of Edward "the Martyr" seem to have continued to rage during his brother's minority, yet Æthelred's earliest years were his least disastrous. It was hoped that when he came to man's estate things would improve, but the reverse was the case. The first personal action recorded of him is an unjust harrying of the goods of his own subjects, when he besieged Rochester because he had quarrelled with its bishop over certain lands, and was bribed to depart with 100 pounds of silver. Yet from 978 to 991 no irreparable harm came to England; the machinery for government and defence which his ancestors had established seemed fairly competent to defend the realm even under a wayward and incapable king. Two or three small descents of vikings are recorded, but the ravaging was purely local, and the invader soon departed. No trouble occurred in the Danelagh, where the old tendency of the inhabitants to take sides with their pagan kinsmen from over the sea appears to have completely vanished. But the vikings had apparently learnt by small experiments that England was no longer guarded as she had been in the days of Alfred or Æthelstan, and in 991 the first serious invasion of Æthelred's reign took place. A large fleet came ashore in Essex, and, after a hard fight with the ealdorman Brihtnoth at Maldon, slew him and began to ravage the district north of the Thames, Instead of making a desperate attempt to drive them off, the king bribed them to depart with 10,000 pounds of silver, accepting it is said this cowardly advice from archbishop Sigeric. The fatal precedent soon bore fruit: the invaders came back in larger numbers, headed by Olaf Tryggveson, the celebrated adventurer who afterwards made himself king of Norway, and who was already a pretender to its throne. He was helped by Sweyn, king of Denmark, and the two together laid siege to London in 994, but were beaten off by the citizens. Nevertheless Æthelred for a second time stooped to pay tribute, and bought the departure of Dane and Norwegian with 16,000 pounds of silver. There was a precarious interval of peace for three years after, but in 997 began a series of invasions led by Sweyn which lasted for seventeen years, and at last ended in the complete subjection of England and the flight of Æthelred to Normandy. It should be noted that the invader during this period was no mere adventurer, but king of all Denmark, and, after Olaf Tryggveson's death in 1000, king of Norway also. His power was something far greater than that of the Guthrums and Anlafs of an earlier generation, and—in the end of his life at least—he was aiming at political conquest, and not either at mere plunder or at finding new settlements for his followers. But if the strength of the invader was greater than that of his predecessors, Æthelred also was far better equipped for war than his ancestors of the 9th century. He owned, and he sometimes used—but always to little profit—a large fleet, while all England instead of the mere realm of Wessex was at his back. Any one of the great princes of the house of Egbert who had reigned from 871 to 975, would have fought a winning fight with such resources, and it took nearly twenty years of Æthelred's tried incapacity to lose the game. He did, however, succeed in undoing all the work of his ancestors, partly by his own slackness and sloth, partly by his choice of corrupt and treacherous ministers. For the two ealdormen whom he delighted to honour and placed at the head of his armies, Ælfric and Eadric Streona, are accused, the one of persistent cowardice, the other of underhand intrigue with the Danes. Some of the local magnates made a desperate defence of their own regions, especially Ulfkytel of East Anglia, a Dane by descent; but the central government was at fault. Æthelred's army was always at the wrong place—"if the enemy were east then was the *fyrd* held west, and if they were north then was our force held south." When Æthelred did appear it was more often to pay a bribe to the invaders than to fight. Indeed the *Danegeld*, the tax which he raised to furnish tribute to the invaders, became a regular institution: on six occasions at least Æthelred bought a few months of peace by sums ranging from 10,000 to 48,000 pounds of silver.

Canute.

At last in the winter of 1013–1014, more as it would seem from sheer disgust at their king's cowardice and incompetence than because further resistance was impossible, the English gave up the struggle and acknowledged Sweyn as king. First Northumbria, then Wessex, then London yielded, and Æthelred was forced to fly over seas to Richard, duke of Normandy, whose sister he had married as his second wife. But Sweyn survived his triumph little over a month; he died suddenly at Gainsborough on the 3rd of February 1014. The Danes hailed his son Canute, a lad of eighteen, as king, but many of the English, though they had submitted to a hard-handed conqueror like Sweyn, were not prepared to be handed over like slaves to his untried successor. There was a general rising, the old king was brought over from Normandy, and Canute was driven out for a moment by force of arms. He returned next year with a greater army to hear soon after of Æthelred's death (1016). The witan chose Edmund "Ironside," the late king's eldest son, to succeed him, and as he was a hard-fighting prince of that normal type of his house to which his father had been such a disgraceful exception, it seemed probable that the Danes might be beaten off. But Æthelred's favourite Eadric Streona adhered to Canute, fearing to lose the office and power that he had enjoyed for so long under Æthelred, and prevailed on the magnates of part of Wessex and Mercia to follow his example. For a moment the curious phenomenon was seen of Canute reigning in Wessex, while Edmund was making head against him with the aid of the Anglo-Danes of the "Five Boroughs" and Northumbria. There followed a year of desperate struggle: the two young kings fought five pitched battles, fortune seemed to favour Edmund, and the traitor Eadric submitted to him with all Wessex. But the last engagement, at Assandun (Ashingdon) in Essex went against the English, mainly because Eadric again betrayed the national cause and deserted to the enemy.

Edmund was so hard hit by this last disaster that he offered to divide the realm with Canute; they met on the isle of Alney near Gloucester, and agreed that the son of Æthelred should keep Wessex and all the South, London and East Anglia, while the Dane should have Northumbria, the "five boroughs" and Eadric's Mercian earldom. But ere the year was out Edmund died: secretly murdered, according to some authorities, by the infamous Eadric. The witan of Wessex made no attempt to set on the throne either one of the younger sons of Æthelred by his Norman wife, or the infant heir of Edmund, but chose Canute as king, preferring to reunite England by submission to the stranger rather than to continue the disastrous war.

They were wise in so doing, though their motive may have been despair rather than long-sighted policy. Canute became more of an Englishman than a Dane: he spent more of his time in his island realm than in his native Denmark. He paid off and sent home the great army with whose aid he had won the English crown, retaining only a small bodyguard of "house-carls" and trusting to the loyalty of his new subjects. There was no confiscation of lands for the benefit of intrusive Danish settlers. On the contrary Canute had more English than Danish courtiers and ministers about his person, and sent many Englishmen as bishops and some even as royal officers to Denmark. It is strange to find that—whether from policy or from affection—he married King Æthelred's young widow Emma of Normandy, though she was somewhat older than himself—so that his son King Harthacnut and that son's successor Edward the Confessor, the heir of the line of Wessex, were half-brothers. It might have been thought likely that the son of the pagan Sweyn would have turned out a mere hard-fighting viking. But Canute developed into a great administrator and a friend of learning and culture. Occasionally he committed a harsh and tyrannical act. Though he need not be blamed for making a prompt end of the traitor Eadric Streona and of Uhtred, the turbulent earl of Northumbria, at the commencement of his reign, there are other and less justifiable deeds of blood to be laid to his account. But they were but few; for the most part his administration was just and wise as well as strong and intelligent.

As long as he lived England was the centre of a great Northern empire, for Canute reconquered Norway, which had lapsed into independence after his father's death, and extended his power into the Baltic. Moreover, all the so-called Scandinavian colonists in the Northern Isles and Ireland owned him as overlord. So did the Scottish king Malcolm, and the princes of Wales and Strathclyde. The one weak point in his policy that can be detected is that he left in the hands of Malcolm the Bernician district of Lothian, which the Scot had conquered during the anarchy that followed the death of Æthelred. The battle of Carham (1018) had given this land to the Scots, and Canute consented to draw the border line of England at the Tweed instead of at the Firth of Forth, when Malcolm did him homage. Strangely enough it was this cession of a Northumbrian earldom to the Northern king that ultimately made Scotland an English-speaking country. For the Scottish kings, deserting their native Highlands, took to dwelling at Edinburgh among their new subjects, and first the court and afterwards the whole of their Lowland subjects were gradually assimilated to the Northumbrian nucleus which formed both the most fertile and the most civilized portion of their enlarged realm.

The fact that England recovered with marvellous rapidity from the evil effects of Æthelred's disastrous reign, and achieved great wealth and prosperity under Canute, would seem to show that the ravages of Sweyn, widespread and ruthless though they had been, had yet fallen short of the devastating completeness of those of the earlier vikings. He had been more set on exacting tribute than on perpetrating wanton massacres. A few years of peace and wise administration seem to have restored the realm to a satisfactory condition. A considerable mass of his legislation has survived to show Canute's care for law and order.

Canute died in 1035, aged not more than forty or forty-one. The crown was disputed between his two sons, the half-brothers Harold and Harthacnut; it was doubtful whether the birth of the elder prince was legitimate, and Queen Emma strove to get her own son Harthacnut preferred to him. In Denmark the younger claimant was acknowledged by the whole people, but in England the Mercian and Northumbrian earls chose Harold as king, and Wessex only fell to Harthacnut. Both the young kings were cruel, dissolute and wayward, most unworthy sons of a wise father. It was to the great profit of England that they died within two years of each other, the elder in 1040, the younger in 1042.

Edward the Confessor.

On Harthacnut's death he was succeeded not by any Danish prince but by his half-brother Edward, the elder son of Æthelred and Emma, whom he had entertained at his court, and had apparently designated as his heir, for he had no offspring. There was an end of the empire of Canute, for Denmark fell to the great king's nephew, Sweyn Estrithson, and Norway had thrown off the Danish yoke. Engaged in wars with each other, Dane and Norseman had no leisure to think of reconquering England. Hence Edward's accession took place without any friction. He reigned, but did not rule, for twenty-four years, though he was well on in middle age before he was crowned. Of all the descendants of Alfred he was the only one who lived to see his sixtieth birthday—the house of Wessex were a short-lived race. In character he differed from all his ancestors—he had Alfred's piety without his capacity, and Æthelred's weakness without his vices. The mildest of men, a crowned monk, who let slip the reins of government from his hands while he busied himself in prayer and church building, he lowered the kingly power to a depth to which it had never sunk before in England. His sole positive quality, over and above his piety, was a love for his mother's kin, the Normans. He had spent his whole life from 1013 to 1040 as an exile at the court of Rouen, and was far more of a Norman than an Englishman. It was but natural, therefore, that he should invite his continental relatives and the friends of his youth to share in his late-coming prosperity. But when he filled his court with them, made them earls and bishops, and appointed one of them, Robert of Jumièges, to the archbishopric of Canterbury, his undisguised preference for strangers gave no small offence to his English subjects. In the main, however, the king's personal likes and dislikes mattered little to the realm, since he had a comparatively small share in its governance. He was habitually overruled and dominated by his earls, of whom three, Leofric, Godwine and Siward—all old servants of Canute—had far more power than their master. Holding respectively the great earldoms of West Mercia, Wessex and Northumbria, they reigned almost like petty sovereigns in their domains, and there seemed some chance that England might fall apart into semi-independent feudal states, just as France had done in the preceding century. The rivalries and intrigues of these three magnates constitute the main part of the domestic politics of Edward's reign. Godwine, whose daughter had wedded the king, was the most forcible and ambitious of the three, but his pre-eminence provoked a general league against him and in 1051 he was cast out of the kingdom with his sons. In the next year he returned in arms, raised Wessex in revolt, and compelled the king to in-law him again, to restore his earldom, and to dismiss with ignominy the Norman favourites who were hunted over seas. The old earl died in 1053, but was succeeded in power by his son Harold, who for thirteen years maintained an unbroken mastery over the king, and ruled England almost with the power of a regent. There seems little doubt that he aspired to be Edward's successor: there was no direct heir to the crown, and the nearest of kin was an infant, Edgar, the great-nephew of the reigning sovereign and grandson of Edmund Ironside. England's experience of minors on the throne had been unhappy—Edwy and Æthelred the Redeless were warnings rather than examples. Moreover, Harold had before his eye as a precedent the displacement of the effete Carolingian line in France, by the new house of Robert the Strong and Hugh Capet, seventy years before. He prepared for the crisis that must come at the death of Edward the Confessor by bestowing the governance of several earldoms upon his brothers. Unfortunately for him, however, the eldest of them, Tostig, proved the greatest hindrance to his plans, provoking wrath and opposition wherever he went by his high-handedness and cruelty.

Harold.

Harold's governance of the realm seems to have been on the whole successful. He put down the Scottish usurper Macbeth with the swords of a Northumbrian army, and restored Malcolm III. to the throne of that kingdom (1055-1058). He led an army into the heart of Wales to punish the raids of King Griffith ap Llewelyn, and harried the Welsh so bitterly that they put their leader to death, and renewed their homage to the English crown (1063). He won enthusiastic devotion from the men of Wessex and the South, but in Northumbria and Mercia he was less liked. His experiment in taking the rule of these earldoms out of the hands of the descendants of Siward and Leofric proved so unsuccessful that he had to resign himself to undoing it. Ultimately one of Leofric's grandsons, Edwin, was left as earl of Mercia, and the other, Morcar, became earl of Northumbria instead of Harold's unpopular brother Tostig. It was on this fact that the fortune of England was to turn, for in the hour of crisis Harold was to be betrayed by the lords of the Midlands and the North.

Origin of the Norman Conquest.

Somewhere about the end of his period of ascendancy, perhaps in 1064, Harold was sailing in the Channel when his ship was driven ashore by a tempest near the mouth of the Somme. He fell into the hands of William the Bastard, duke of Normandy, King Edward's cousin and best-loved relative. The duke brought him to Rouen, and kept him in a kind of honourable captivity till he had extorted a strange pledge from him. William alleged that his cousin had promised to make him his heir, and to recommend him to the witan as king of England. He demanded that Harold should swear to aid him in the project. Fearing for his personal safety, the earl gave the required oath, and sailed home a perjured man, for he had assuredly no intention of keeping the promise that had been extorted from him. Within two years King Edward expired (Jan. 5, 1066) after having recommended Harold as his successor to the thegns and bishops who stood about his deathbed. The witan chose the earl as king without any show of doubt, though the assent of the Mercian and Northumbrian earls must have been half-hearted. Not a word was said in favour of the claim of the child Edgar, the heir of the house of Alfred, nothing (of course) for the preposterous claim of William of Normandy. Harold accepted the crown without a moment's hesitation, and at once prepared to defend it, for he was aware that the Norman would fight to gain his purpose. He endeavoured to conciliate Edwin and Morcar by marrying their sister Ealdgyth, and trusted that he had bought their loyal support. When the spring came round it was known that William had begun to collect a great fleet and army. Aware that the resources of his own duchy were inadequate to the conquest of England, he sent all over Europe to hire mercenaries, promising every knight who would join him broad lands beyond the Channel in the event of victory. He gathered beneath his banner thousands of adventurers not only from France, Brittany and Flanders, but even from distant regions such as Aragon, Apulia and Germany. The native Normans were but a third part of his host, and he himself commanded rather as director of a great joint-stock venture than as the feudal chief of his own duchy. He also obtained the blessing of Pope Alexander II. for his enterprise, partly on the plea that Harold was a perjurer, partly because Stigand, the archbishop of Canterbury, had acknowledged the late anti-pope Benedict.

All through the summer Harold held a fleet concentrated under the lee of the Isle of Wight, waiting to intercept William's armament, while the fyrd of Wessex was ready to support him if the enemy should succeed in making a landing. By September the provisions were spent, and the ships were growing unseaworthy. Very reluctantly the king bade them go round to London to refit and revictual themselves. William meanwhile had been unable to sail, because for many weeks the wind had been unfavourable. If it had set from the south the fortune of England would have been settled by a sea-fight. At this moment came a sudden and incalculable diversion; Harold's turbulent brother Tostig, banished for his crimes in 1065, was seeking revenge. He had persuaded Harold Hardrada, king of Norway, almost the last of the great viking adventurers, to take him as guide for a raid on England. They ran into the Humber with a great fleet, beat the earls Edwin and Morcar in battle, and captured York. Abandoning his watch on the south coast Harold of England flew northward to meet the invaders; he surprised them at Stamford Bridge, slew both the Norse king and the rebel earl, and almost exterminated their army (Sept. 25? 1066). But while he was absent from the Channel the wind turned, and William of Normandy put to sea. The English fleet and the English army were both absent, and the Normans came safely to shore on the 28th of September. Harold had to turn hastily southward to meet them. On the 13th of October his host was arrayed on the hill of Senlac, 7 miles from the duke's camp at Hastings. The ranks of his thegnhood and house-carles had been thinned by the slaughter of Stamford Bridge, and their place was but indifferently supplied by the hasty levies of London, Wessex and the Home Counties. Edwin and Morcar, who should have been at his side with their Mercians and Northumbrians, were still far away—probably from treachery, slackness and jealousy.

Next morning (October 14) William marched out from Hastings and attacked the English host, which stood at bay in a solid mass of spear and axemen behind a slight breastwork on the hillside. After six hours of desperate fighting the victory fell to the duke, who skilfully alternated the use of archers and cavalry against the unwieldy English phalanx. (See HASTINGS: *Battle of.*) The disaster was complete, Harold himself was slain, his two brothers had fallen with him, not even the wreck of an army escaped. There was no one to rally the English in the name of the house of Godwine. The witan met and hastily saluted the child Edgar Ætheling as king. But the earls Edwin and Morcar refused to fight for him, and when William appeared in front of the gates of London they were opened almost without resistance. He was elected king in the old English fashion by the surviving magnates, and crowned on Christmas Day 1066.

II. THE NORMAN AND ANGEVIN MONARCHY (1066–1199)

William the Conqueror.

When William of Normandy was crowned at Westminster by Archbishop Aldred of York and acknowledged as king by the witan, it is certain that few Englishmen understood the full importance of the occasion. It is probable that most men recalled the election of Canute, and supposed that the accession of the one alien sovereign would have no more permanent effect on the realm than that of the other. The rule of the Danish king and his two short-lived sons had caused no break in the social or constitutional history of England. Canute had become an Englishman, had accepted all the old institutions of the nation, had dismissed his host of vikings, and had ruled like a native king and for the most part with native ministers. Within twenty years of his accession the disasters and calamities which had preceded his triumph had been forgotten, and the national life was running quietly in its old channels. But the accession of William the Bastard meant something very different. Canute had been an impressionable lad of eighteen or nineteen when he was crowned; he was ready and eager to learn and to forget. He had found himself confronted in England with a higher civilization and a more advanced social organization than those which he had known in his boyhood, and he accepted them with alacrity, feeling that he was thereby getting advantage. With William the Norman all was different: he was a man well on in middle age, too old to adapt himself easily to new surroundings, even if he had been willing to do so. He never even learnt the language of his English subjects, the first step to comprehending their needs and their views. Moreover, unlike his Danish predecessor, he looked down upon the English from the plane of a higher civilization; the Normans regarded the conquered nation as barbarous and boorish. The difference in customs and culture between the dwellers on the two sides of the Channel was sufficient to make this possible; though it is hard to discern any adequate justification for the Norman attitude. Probably the bar of language was the most prominent cause of estrangement. In five generations the viking settlers of Normandy had not only completely forgotten their old Scandinavian tongue, but had come to look upon those who spoke the kindred English idiom not only as aliens but as inferiors. For three centuries French remained the court speech, and the mark of civilization and gentility.

Progress of Norman settlement.

Despite all this the Conquest would not have had its actual results if William, like Canute, had been able to dismiss his conquering army, and to refrain from a general policy of confiscation. But he had won his crown not as duke of Normandy, but as the head of a band of cosmopolitan adventurers, who had to be rewarded with land in England. Some few received their pay in hard cash, and went off to other wars; but the large majority, Breton and Angevin, French and Fleming, no less than Norman, wanted land. William could only provide it by a wholesale confiscation of the estates of all the thegnhood who had followed the house of Godwine. Almost his first act was to seize on these lands, and to distribute them among his followers. In the regions of the South, which had supplied the army that fell at Hastings, at least four-fifths of the soil passed to new masters. The dispossessed heirs of the old owners had either to sink to the condition of peasants, or to throw themselves upon the world and seek new homes. The friction and hatred thus caused were bitter and long enduring. And this same system of confiscation was gradually extended to the rest of England. At first the English landowners who had not actually served in Harold's host were permitted to "buy back their lands," by paying a heavy fine to the new king and doing him homage. What would have happened supposing that England had made no further stir, and had not vexed William by rebellion, it is impossible to say. But, as a matter of fact, during the first few years of his reign one district after another took up arms and endeavoured to cast out the stranger. As it became gradually evident that William's whole system of government was to be on new and distasteful lines, the English of the Midlands, the North and the West all went into rebellion. The risings were sporadic, ill-organized, badly led, for each section of the realm fought for its own hand. In some parts the insurrections were in favour of the sons of Harold, in others Edgar Ætheling was acclaimed as king: and while the unwise earls Edwin and Morcar fought for their own hand, the Anglo-Danes of the East sent for Sweyn, king of Denmark, who proved of small help, for he abode but a short space in England, and went off after sacking the great abbey of Peterborough and committing other outrages. The rebels cut up several Norman garrisons, and gave King William much trouble for some years, but they could never face him in battle. Their last stronghold, the marsh-fortress of Ely, surrendered in 1071, and not long after their most stubborn chief, Hereward "the Wake," the leader of the fenmen, laid down his arms and became King William's man (see HEREWARD).

The only result of the long series of insurrections was to provoke the king to a cruelty which he had not at first shown, and to give him an excuse for confiscating and dividing among his foreign knights and barons the immense majority of the estates of the English thegnhood. William could be pitiless when provoked; to punish the men of the North for persistent rebellion and the destruction of his garrison at York, he harried the whole countryside from the Aire to the Tees with such remorseless ferocity that it did not recover its ancient prosperity for centuries. The population was absolutely exterminated, and the great Domesday survey, made nearly twenty years later, shows the greater part of Yorkshire as "waste." This act was exceptional only in its extent: the king was as cruel on a smaller scale elsewhere, and not contented with the liberal use of the axe and the rope was wont to inflict his favourite punishments of blinding and mutilation on a most reckless scale.

The net result of the king's revenge on the rebellious English was that by 1075 the old governing class had almost entirely disappeared, and that their lands, from the Channel to the Tweed, had everywhere been distributed to new holders. To a great extent the same horde of continental adventurers who had obtained the first batch of grants in Wessex and Kent were also the recipients of the later confiscations, so that their newly acquired estates were scattered all over England. Many of them came to own land in ten or a dozen counties remote from each other, a fact which was of the greatest importance in determining the character of English feudalism. While abroad the great vassals of the crown generally held their property in compact blocks, in England their power was weakened by the dispersion of their lands. This tendency was assisted by the fact that even when the king, as was his custom, transferred to a Norman the estates of an English landowner just as they stood, those estates were already for the most part not conterminous. Even before the Conquest the lands of the magnates were to a large extent held in scattered units, not in solid patches. Only in two cases did William establish lordships of compact strength, and these were created for the special purpose of guarding the turbulent Welsh March. The "palatine" earls of Chester and Shrewsbury were not only endowed with special powers and rights of jurisdiction, but were almost the only tenants-in-chief within their respective shires. These rare exceptions prove the general rule: William probably foresaw the dangers of such accumulation of territory in private hands. He made a complete end of the old English system by which great earls ruled many shires: there were to be no Godwines or Leofrics under the Norman rule. This particular feudal danger was avoided: where earls were created, and they were but few, their authority was usually restricted to a single shire.

Feudalism.

It remains to speak of the most important change which William's rearrangements made in the polity of England. It is of course untrue to say—as was so often done by early historians—that he "introduced the feudal system into England." In some aspects feudalism was already in the land before he arrived: in others it may be said that it was never introduced at all. He did not introduce the practice by which the small man commended himself to the great man, and in return for his protection divested himself of the full ownership of his own land, and became a customary tenant in what later ages called a "manor." That system was already in full operation in England before the Conquest. In some districts the wholly free small landowner had already disappeared, though in the regions which had formed the Danelagh he was still to be found in large numbers. Nor did William introduce the system of great earldoms, passing from father to son, which gave over-great subjects a hereditary grip on the countryside. On the contrary, as has been already said, he did much to check that tendency, which had already developed in England.

What he really did do was to reconstruct society on the essentially feudal theory that the land was a gift from the king, held on conditions of homage and military service. The duties which under the old system were national obligations resting on the individual as a citizen, he made into duties depending on the relation between the king as supreme landowner and the subject as tenant of the land. Military service and the paying of the feudal taxes—aids, reliefs, &c.—are incidents of the bargain between the crown and the grantee to whom land has been given. That grantee, the tenant-in-chief, has the right to demand from his sub-tenants, to whom he has given out fractions of his estate, the same dues that the king exacts from himself. As at least four-fifths of the land of England had fallen into the king's hands between 1066 and 1074, and had been actually regranted to new owners—foreigners to whom the feudal system was the only conceivable organization of political existence—the change was not only easy but natural. The few surviving English landholders had to fall into line with the newcomers. England, in short, was reorganized into a state of the continental type, but one differing from France or Germany in that the crown had not lost so many of its regalities as abroad, and that even the greater earls had less power than the ordinary continental tenant-in-chief.

The English people became aware of this transformation in the "theory of the state" mainly through the fact that the new tenants-in-chief, bringing with them the ideas in which they had been reared, failed to comprehend the rather complicated status of the rural population on this side of the Channel. To the French or Norman knight all peasants on his manor seemed to be villeins, and he failed to understand the distinction between freemen who had personally commended themselves to his English predecessor but still owned their land, and the mass of ordinary servile tenants. There can be no doubt that the first effect of the Conquest was that the upper strata of the agricultural classes lost the comparative independence which they had hitherto enjoyed, and were in many cases depressed to the level of their inferiors. The number of freemen began to decrease, from the encroachments of the landowner, and continued to dwindle for many years: even in districts where Domesday Book shows them surviving in considerable numbers, it is clear that a generation or two later they had largely disappeared, and became merged in the villein class.

Domesday.

In this sense, therefore, England was turned into a feudal state by the results of the work of William the Conqueror. But it would be wrong to assert that all traces of the ancient social organization of the realm were swept away. The old Saxon customs were not forgotten, though they might in many cases be twisted to fit new surroundings. Indeed William and his successors not infrequently caused them to be collected and put on record. The famous Domesday Book (*q.v.*) of 1086 is in its essential nature an inquiry into the state of England at the moment of the Conquest, compiled in order that the king may have a full knowledge of the rights that he possesses as the heir of King Edward. Being primarily intended to facilitate the levy of taxation, it dwells more on the details of the actual wealth and resources of the country in 1066 and 1086, and less on the laws and customs that governed the distribution of that wealth, than could have been wished. But it is nevertheless a monument of the permanence of the old English institutions, even after the ownership of four-fifths of the soil has been changed. The king inquires into the state of things in 1066 because it is on that state of things that his rights of taxation depend. He does not claim to have rearranged the whole realm on a new basis, or to be levying his revenue on a new assessment made at his own pleasure. Nor is it in the sphere of taxation alone that William's organization of the realm stands on the old English customs. In the military sphere, though his normal army is the feudal force composed of the tenants-in-chief and the knights whom they have enfeoffed, he retains the power to call out the *fyrd*, the old national *levée en masse*, without regard to whether its members are freemen or villeins of some lord. And in judicial matters the higher rights of royal justice remain intact, except in the few cases where special privileges have been granted to one or two palatine earls. The villein must sue in his lord's manorial courts, but he is also subject to the royal courts of hundred and shire. The machinery of the local courts survives for the most part intact.

Position of the Church.

William's dealings with the Church of England were no less important than his dealings with social organization. In the earlier years of his reign he set himself to get rid of the whole of the upper hierarchy, in order to replace them by Normans. In 1070 Archbishop Stigand was deposed as having been uncanonically chosen, and six or seven other bishops after him. All the vacancies, as well as those which kept occurring during the next few years, were immediately filled up with foreigners. By the time that William had been ten years on the throne there were only three English bishops left. At his death there was only one—the saintly Wulfstan of Worcester. The same process was carried out with regard to abbacies, and indeed with all important places of ecclesiastical preferment. By 1080 the English Church was officered entirely by aliens. Just as with the lay landholders, the change of *personnel* made a vast difference, not so much in the legal position of the new-comers as in the way in which they regarded their office. The outlook of a Norman bishop was as unlike that of his English predecessor as that of a Norman baron. The English Church had got out of touch with the ideals and the spiritual movements of the other Western churches. In especial the great monastic revival which had started from the abbey of Cluny and spread all over France, Italy and Germany had hardly touched this island. The continental churchmen of the 11th century were brimming over with ascetic zeal and militant energy, while the majority of the English hierarchy were slack and easy-going. The typical faults of the dark ages, pluralism, simony, lax observation of the clerical rules, contented ignorance, worldliness in every aspect, were all too prevalent in England. There can be no doubt that the greater part of William's nominees were better men than those who preceded them; his great archbishop, Lanfranc, though a busy statesman, was also an energetic reformer and a man of holy life. Osmund, Remigius and others of the first post-Conquest bishops have left a good name behind them. The condition of the church alike in the matter of spiritual zeal, of hard work and of learning was much improved. But there was a danger behind this revival; for the reformers of the 11th century, in their zeal for establishing the Kingdom of God on earth, were not content with raising the moral and intellectual standards prevailing in Christendom, but sought to bring the whole scheme of life under the church, by asserting the absolute supremacy of the spiritual over the temporal power, wherever the two came in contact or overlapped. The result, since the feudal and ecclesiastical systems had become closely interwoven, and the frontier between the religious and secular spheres must ever be vague and undefined, was the conflict between the spiritual and temporal powers which, for two centuries to come, was to tear Europe into warring factions (see the articles CHURCH HISTORY; PAPACY; INVESTITURE). The Norman Conquest of England was contemporaneous with the supreme influence of the greatest exponent of the theory of ecclesiastical supremacy, the archdeacon Hildebrand, who in 1073 mounted the papal throne as Gregory VII. (*q.v.*). William, despite all his personal faults, was a sincerely pious man, but it could not be expected that he would acquiesce in these new developments of the religious reformation which he had done his best to forward. Hence we find a divided purpose in the policy which he pursued with regard to church affairs. He endeavoured to keep on the best terms with the papacy: he welcomed legates and frequently consulted the pope on purely spiritual matters. He even took the hazardous step of separating ecclesiastical courts and lay courts, giving the church leave to establish separate tribunals of her own, a right which she had never possessed in Saxon England. The spiritual jurisdiction of the bishop had hitherto been exercised in the ordinary national courts, with lay assessors frequently taking part in the proceedings, and mixing their dooms with the clergy's canonical decisions. William in 1076 granted the church a completely independent set of courts, a step which his successors were to regret for many a generation.

At the same time, however, he was not blind to the possibilities of papal interference in domestic matters, and of the danger of conflict between the crown and the recently-strengthened clerical order. To guard against them he laid down three general rules: (1) that no one should be recognized as pope in England till he had himself taken cognizance of the papal election, and that no papal letters should be brought into the realm without his leave; (2) that no decisions of the English ecclesiastical synods should be held valid till he had examined and sanctioned them; (3) that none of his barons or ministers should be excommunicated unless he approved of such punishment being inflicted on them. These rules seem to argue a deeply rooted distrust of the possible encroachments of the papacy on the power of the state. The question of ecclesiastic patronage, which was to be the source of the first great quarrel between the crown and the church in the next generation, is not touched upon. William retained in his own hands the choice of bishops and abbots, and Alexander II. and Gregory VII. seem to have made no objection to his doing so, in spite of the claim that free election was the only canonical way of filling vacancies. The Conqueror was allowed for his lifetime to do as he pleased, since he was recognized as a true friend of the church. But the question was only deferred and not settled.

William's later reign.

The political history of William's later years is unimportant; his main energy was absorbed in the task of holding down and organizing his new kingdom. His rather precarious conquest of the county of Maine, his long quarrels with Philip I. of France, who suborned against him his undutiful and rebellious eldest son Robert, his negotiation with Flanders and Germany, deserve no more than a mention. It is more necessary to point out that he reasserted on at least one occasion (when King Malcolm Canmore did him homage) the old suzerainty of the English kings over Scotland. He also began that encroachment on the borders of Wales which was to continue with small interruptions for the next two centuries. The advance was begun by his great vassals, the earls of Chester, Shrewsbury and Hereford, all of whom occupied new districts on the edge of the mountains of Powys and Gwynedd. William himself led an expedition as far as St. Davids in 1081, and founded Cardiff Castle to mark the boundary of his realm north of the Bristol Channel.

Perhaps the most noteworthy event of the second portion of the Conqueror's reign was a rebellion which, though it made no head and was easily suppressed, marks the commencement of that feudal danger which was to be the constant trouble of the English kings for the next three generations. Two of the greatest of his foreign magnates, Roger, earl of Hereford, and Ralph, earl of Norfolk, rose against him in 1075, with no better cause than personal grievances and ambitions. He put them down with ease; the one was imprisoned for life, the other driven into exile, while Waltheof, the last of the English earls, who had dabbled in a hesitating way in this plot, was executed. There was never any serious danger, but the fact that under the new régime baronial rebellion was possible, despite of all William's advantages over other feudal kings, and despite of the fact that the rebels were hardly yet settled firmly into their new estates, had a sinister import for the future of England. With the new monarchy there had come into England the anarchic spirit of continental feudalism. If such a man as the Conqueror did not overawe it, what was to be expected in the reigns of his successors? William had introduced into his new realm alike the barons, with their personal ambition, and the clerics of the school of Hildebrand, with their intense jealousy for the rights of the church. The tale of the dealings of his descendants with these two classes of opponents constitutes the greater part of English history for a full century.

William Rufus.

William died at Rouen on the 7th of September 1087; on his death-bed he expressed his wish that Normandy should pass to his elder son, Robert, in spite of all his rebellions, but gave his second son William (known by the nick-name of Rufus) the crown of England, and sent him thither with commendatory letters to archbishop Lanfranc and his other ministers. There was at first no sign of opposition to the will of the late king, and William Rufus was crowned within three weeks of his father's decease. But the results of the Conquest had made it hard to tear England and Normandy apart. Almost every baron in the duchy was now the possessor of a smaller or a greater grant of lands in the kingdom, and the possibility of serving two masters was as small in 1087 as at any other period of the world's history. By dividing his two states between his sons the Conqueror undid his own work, and left to his subjects the certainty of civil war. For the brothers Robert and William were, and always had been, enemies, and every intriguing baron had before him the tempting prospect of aggrandizing himself, by making his allegiance to one of the brothers serve as an excuse for betraying the other. Robert was thriftless, volatile and easy-going, a good knight but a most incompetent sovereign. These very facts commended him to the more turbulent section of the baronage; if he succeeded to the whole of the Conqueror's heritage they would have every opportunity of enjoying freedom from all governance. William's private character was detestable: he was cruel, lascivious, greedy of gain, a habitual breaker of oaths and promises, ungrateful and irreligious. But he was cunning, strong-handed and energetic; clearly the "Red King" would be an undesirable master to those who loved feudal anarchy. Hence every turbulent baron in England soon came to the conclusion that Robert was the sovereign whom his heart desired.

The greater part of the reign of William II. was taken up with his fight against the feudal danger. Before he had been six months on the throne he was attacked by a league comprising more than half the baronage, and headed by his uncles, bishop Odo of Bayeux and Robert of Mortain. They used the name of the duke of Normandy and had secured his promise to cross the Channel for their assistance. A less capable and unscrupulous king than Rufus might have been swept away, for the rising burst out simultaneously in nearly every corner of the realm. But he made head against it with the aid of mercenary bands, the loyal minority of the barons, and the shire-levies of his English subjects. When he summoned out the fyrd they came in great force to his aid, not so much because they trusted in the promises of good governance and reduced taxation which he made, but because they saw that a horde of greedy barons would be worse to serve than a single king, however hard and selfish he might be. With their assistance William fought down the rebels, expelled his uncle Odo and several other leaders from the realm, confiscated a certain amount of estates, and then pardoned the remainder of the rebels. Such mercy, as he was to discover, was misplaced. In 1095 the same body of barons made a second and a more formidable rising, headed by the earls of Shrewsbury, Eu and Northumberland. It was put down with the same decisive energy that William had shown in 1088, and this time he was merciless; he blinded and mutilated William of Eu, shut up Mowbray of Northumberland for life in a monastery, and hanged many men of lesser rank. Of the other rebels some were deprived of their English estates altogether, others restored to part of them after paying crushing fines. This second feudal rebellion was only a distraction to William from his war with his brother Robert, which continued intermittently all through the earlier years of his reign. It was raging from 1088 to 1091, and again from 1093 to 1096, when Robert tired of the losing game, pawned his duchy to his brother and went off on the First Crusade. Down to this moment William's position had been somewhat precarious; with the Norman war generally on hand, feudal rebellion always imminent, and Scottish invasions occasionally to be repelled, he had no easy life. But he fought through his troubles, conquered Cumberland from the Scots (1092), in dealing with his domestic enemies used cunning where force failed, and generally got his will in the end. His rule was expensive, and he made himself hated by every class of his subjects, baronage, clergy and people alike, by his ingenious and oppressive taxation. His chosen instrument, a clerical lawyer named Ranulf Flambard (*q.v.*), whom he presently made bishop of Durham, was shameless in his methods of twisting feudal or national law to the detriment of the taxpayer. William supported him in every device, however unjust, with a cynical frankness which was the distinguishing trait of his character; for he loved to display openly all the vices and meannesses which most men take care to disguise. In dealing with the baronage Ranulf and his master extorted excessive and arbitrary "reliefs" whenever land passed in succession to heirs. When the church was a landholder their conduct was even more unwarrantable; every clerk installed in a new preferment was forced to pay a large sum down—which in that age was considered a clear case of simony by all conscientious men. But in addition the king kept all wealthy posts, such as bishoprics and abbacies, vacant for years at a time and appropriated the revenue meanwhile.

Anselm.

This policy, when pursued with regard to the archbishopric of Canterbury, brought on Rufus the most troublesome of his quarrels. When the wise primate Lanfranc, his father's friend, died in 1089, he made no appointment till 1093, extracting meanwhile great plunder from the see. In a moment of sickness, when his conscience was for a space troubling him or his will was weak, he nominated the saintly Anselm (*q.v.*) to the archbishopric. When enthroned the new primate refused to make the enormous gift which the king expected from every recipient of preferment. Soon after he began to press for leave to hold a national synod, and when it was denied him, spoke out boldly on the personal vices as well as the immoral policy of the king. From this time William and Anselm became open enemies. They fought first upon the question of acknowledging Urban II. as pope—for the king, taking advantage of the fact that there was an antipope in existence, refused to allow that there was any certain and legitimate head of the Western church at the moment. Then, after William had reluctantly yielded on this point, the far more important question of lay investitures cropped up. The council of Clermont (Nov. 1095) had just issued its famous decree to the effect that bishops must be chosen by free election, and not invested with their spiritual insignia or enfeoffed with their estates by the hands of a secular prince. Anselm felt himself obliged to accept this decision, and refused to accept his own pallium from William when Urban sent it across the sea by the hands of a legate. The king replied by harrying him on charges of having failed in his feudal obligation to provide well-equipped knights for a Welsh expedition, and imposed ruinous fines on him. It was even said that his life was threatened, and he fled to Rome in 1097, not to return till his adversary was dead. There was much to be said for the theory of the king as to the relations between church and state; he was indeed only carrying on in a harsh form his father's old policy. But the fact that he was a tyrant and an evil-liver, while Anselm was a saint, so much influenced public opinion that William was universally regarded as in the wrong, and the sympathy of the laity no less than the clergy was with the archbishop. For the remaining three years of his life the Red King was considered to be in a state of reprobation and at open strife with righteousness.

Yet so far as secular affairs went William seemed prosperous enough. Since his brother had pawned the duchy of Normandy to him, so that he reigned at Rouen no less than at London, the danger of rebellion was almost removed. His foreign policy was successful: he installed a nominee of his own, Edgar, the son of Malcolm Canmore, on the throne of Scotland (1097); he reconquered Maine, which his brother Robert had lost; he made successful war upon King Philip of France. His barons subdued much of South Wales, though his own expeditions into North Wales, which he had designed to conquer and annex, had a less fortunate ending. He dreamed, we are told, of attacking Ireland, even of crowning himself king at Paris. But on the 2nd of August 1100 he was suddenly cut off in the midst of his sins. While hunting with some of his godless companions in the New Forest, he was struck by an arrow, unskilfully shot by one of the party. The knight Walter Tyrrell, who was persistently accused of being the author of his master's death, as persistently denied his responsibility for it; and whether the arrow was his or no, it was not alleged that malice guided it. William's favourites had all to lose by his death.

Succession of Henry I.

The king's death was unexpected: he was only in his fortieth year, and men's minds had not even begun to ponder over the question of who would succeed him. The crown of England was left vacant for the boldest kinsman to snatch at, if he dared. William had two surviving brothers, beside several nephews. Robert's claim seemed the more likely to succeed, for not only was he the elder, but England was full of barons who desired his accession, and had already taken up arms for him in 1087 or 1095. But he was far away—being at the moment on his return journey from Jerusalem—while on the spot was his brother Henry, an ambitious prince, whose previous efforts to secure himself a territorial endowment had failed more from ill-luck than from want of enterprise or ability. Seeing his opportunity, Henry left his brother's body unburied, rode straight off to Winchester with a handful of companions, and seized the royal treasure. This and his ready tongue were the main arguments by which he convinced the few magnates present, and persuaded them to back him, despite the protests of some supporters of Robert. There was hardly the semblance of an election, and the earl of Warwick and the chancellor William Giffard were almost the only persons of importance on the spot. But Henry, once hailed as king, rode hard for London and persuaded bishop Maurice to crown him without delay at Westminster, since the primate Anselm was absent beyond seas. He certainly lost no time: Rufus was shot on Thursday, the 2nd of August—his successor was crowned on Sunday the 5th of August! The realm heard almost by the same messengers that it had lost one king and that it had gained another.

Henry at once issued a proclamation and charter promising the redress of all the grievances with which his brother had afflicted his feudal tenants, the clergy and the whole nation. He would keep the ancient laws of King Edward, as amended by his father the Conqueror, and give all men good justice. These promises he observed more faithfully than Norman kings were wont to do; if the pledge was not redeemed in every detail, he yet kept England free from anarchy, abandoned the arbitrary and unjust taxation of his brother, and set up a government that worked by rule and order, not by the fits and starts of tyrannical caprice. He was a man of a cold and hard disposition, but full of practical wisdom, and conscious that his precarious claim to the crown must be secured by winning the confidence of his subjects. Almost the first and quite the wisest of his inspirations was to wed a princess of the old English line—Edith,[1] the niece of Edgar Ætheling, the child of his sister Margaret of Scotland and Malcolm Canmore. The match, though his Norman barons sneered at it, gave him the hearts of all his English subjects, who supported him with enthusiasm, and not merely (as had been the case with Rufus) because they saw that a strong king would oppress them less than a factious and turbulent baronage. Henry won much applause at the same time by filling up all the bishoprics and abbacies which his brother had kept so long vacant, by inviting the exiled Anselm to return to England, and by imprisoning William's odious minister Ranulf Flambard. He had just time to create a favourable impression by his first proceedings, when his brother Robert, who had returned from Palestine and resumed possession of Normandy, landed at Portsmouth to claim the crown and to rouse his partisans among the English baronage. Henry bought him off, before the would-be rebels had time to join him, by promising him an annual tribute of 3000 marks and surrendering to him all his estates in Normandy (1101). His policy seemed tame and cautious, but was entirely justifiable, for within a few months of Robert's departure the inevitable feudal rebellion broke out. If the duke and his army had been on the spot to support it, things might have gone hardly with the king. The rising was led by Robert of Belesme, earl of Shrewsbury, a petty tyrant of the most ruffianly type, the terror of the Welsh marches. He was backed by his kinsmen and many other barons, but proved unable to stand before the king, who was loyally supported by the English shire levies. After taking the strong castles of Arundel, Tickhill, Bridgnorth and Shrewsbury, Henry forced the rebels to submit. He confiscated their estates and drove them out of the realm; they fled for the most part to Normandy, to spur on duke Robert to make another bid for the English crown. From the broad lands which they forfeited Henry made haste to reward his own servants, new men who owed all to him and served him faithfully. From them he chose the sheriffs, castellans and councillors through whom he administered the realm during the rest of his long reign. This minor official nobility was the strength of the crown, and was sharply divided in spirit and ambition from the older feudal aristocracy which descended from the original adventurers who had followed William the Conqueror. Yet the latter still remained strong enough to constitute a danger to the crown whenever it should fall to a king less wary and resolute than Henry himself.

Henry was by nature more of an administrator and organizer than of a fighting man. He was a competent soldier, but his wish was rather to be a strong king at home than a great conqueror abroad. Nevertheless he was driven by the logic of events to attack Normandy, for as long as his brother reigned there, and as long as many English barons retained great holdings on both sides of the Channel and were subjects of the duke as well as of the king, intrigues and plots never ceased. The Norman war ended in the battle of Tenchebrai (Sept. 28, 1106), where Duke Robert was taken prisoner. His brother shut him up in honourable confinement for the rest of his life, though otherwise he was not ill-treated. For the rest of his reign Henry was ruler of all the old dominions of the Conqueror, and none of his subjects could cloak disloyalty by the pretence of owing a divided allegiance to two masters. With this he was content, and made no great effort to extend his dominions farther; his desire was to reign as a true king in England and Normandy, rather than to build up a loosely compacted empire around them.

Henry's difficulties with the church.

Throughout the time of Henry's Norman war, he was engaged in a tiresome controversy with the primate on the question of lay investitures, the continuation of the struggle which had begun in his brother's reign. Every English king for five generations had to face the danger from the church, no less than the danger from the barons. Anselm had come back from Rome confirmed in the theories for which he had contended with Rufus—nay, taught to extend them to a further extreme. He now maintained not only that it was a sin that kings should invest prelates with their spiritual insignia, the pallium, the staff, the ring, but claimed that no clerk ought to do homage to the king for the lands of his benefice, though he himself seven years before had not scrupled to make his oath to his earlier master. He now refused to swear allegiance to the new monarch, though he had recalled him and had restored him to the possession of his see. He also refused to consecrate Henry's nominees to certain bishoprics and abbacies on the ground that they had not been chosen by free election by their chapters or their monks. The king was loath to take up the quarrel, for he highly respected the archbishop; yet he was still more loath to surrender the ancient claims and privileges of the crown. Anselm was equally reluctant to force matters to an open breach, yet would not shift from his position. There followed an interminable series of arguments, interrupted by truces, till at last Anselm, at the king's suggestion, went to Rome to see if the pope could arrange some *modus vivendi*. Paschal II. for some time refused to withdraw from his fixed theory of the relation of church and state, and Anselm, in despair, preferred to remain abroad rather than to press matters to the rupture that seemed the only logical issue of the controversy. But in 1107 the pope consented to a compromise, which satisfied the king, and yet was acceptable to the church. Bishops and abbots were for the future to be canonically elected by the clergy, and were no longer to receive the ring and staff from lay hands. But they were to do homage to the king for their lands, and since they thus acknowledged him as their temporal lord Henry was content. Moreover, he retained in practice, if not in theory, his power to nominate to the vacant offices; chapters and monasteries seldom dared to resist the pressure which the sovereign could bring to bear upon them in favour of the candidate whom he had selected. The arrangement was satisfactory, and served as the model for the similar compromise arrived at between Pope Calixtus II. and the emperor Henry V. fifteen years later.

From 1107 onward Henry was freed from both the dangers which had threatened him in his earlier years, and was free to develop his policy as he pleased. He had yet twenty-eight years to reign, for he survived to the age of sixty-seven, an age unparalleled by any of his predecessors, and by all his successors till Edward I.

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[1] As the name Edith (Eadgyth) sounded uncouth to Norman ears, she assumed the continental name Maheut or Mahelt (Eng. Mahald, later Mold and Maud), in Latin Matildis or Matilda. Sir J. H. Ramsay, *Foundations of England*, ii. 235. (Ed.)

Constitutional machinery.

It is to Henry, aided by his great justiciar, Roger, bishop of Salisbury, that England owed the institution of the machinery of government by which it was to be ruled during the earlier middle ages. This may be described as a primitive kind of bureaucracy, which gradually developed into a much more complicated system of courts and offices. Around the sovereign was his *Curia Regis* or body of councillors, of whom the most important were the justiciar, the chancellor and the treasurer, though the feudal officers, the constable and marshal, were also to be found there. The bulk of the council, however, was composed of knights and clerks selected by the king for their administrative or financial ability. The Curia, besides advising the king on ordinary matters of state, had two special functions. It sat, or certain members of it sat, under the presidency of the king or the justiciar, as the supreme court of justice of the realm. In this capacity it tried the suits of tenants-in-chief, and all appeals from the local courts. But Henry, not contented with this, adopted the custom of sending forth certain members of the Curia throughout the realm at intervals, to sit in the shire court, along with or in place of the sheriff, and to hear and judge all the cases of which the court had cognizance. From these itinerant commissioners (justices in eyre) descend the modern justices of assize. The sheriff, the original president of the shire court, was gradually extruded by them from all important business.

But there were other developments of the Curia. The justiciar, chancellor and treasurer sat with certain other members of the council as the court of exchequer, not only to receive and audit the accounts of the royal revenue, but to give legal decisions on all questions connected with finance. Twice in every year the sheriffs and other royal officials came up to the exchequer court, which originally sat at Winchester, with their bags of money and their sheaves of accounts. Their figures were subjected to a severe scrutiny, and the law was laid down on all points in which the interests of the sheriff and the king, or the sheriff and the taxpayer, came into conflict. In this way the exchequer grew into a law court of primary importance, instead of remaining merely a court of receipt. Though its members were originally the same men who sat in the Curia Regis, the character of the question to be tried settled the capacity in which they should sit, and two separate courts were evolved. (See EXCHEQUER.)

Under the superintendence of the Curia Regis and the exchequer, the sheriff still remained the king's factotum in local affairs. He led the shire-levies, collected the royal revenues both feudal and non-feudal, and presided in the shire-court as judge, till in the course of years his functions in that sphere were gradually taken over by the itinerant justices. On his fidelity the king had to rely both for military aid in times of baronial revolt and for the collection of the money which formed the sinews of war. Hence the position was one of the highest importance, and Henry's new nobility, the men of ability whom he selected and promoted, found their special occupation in holding the office of sheriff. It was they who had to see that the shire court, and in minor affairs the hundred court, did not allow cases to slip away into the jurisdiction of the feudal courts of the baronage.

Henry I. must count not merely as the father of the English bureaucracy, but as a fosterer of the municipal independence of the towns. He gave charters of a very liberal character to many places, and in especial to London, where the citizens were allowed to choose their own sheriff, and to deal directly with the exchequer in matters of revenue. He even farmed out to them the charge of the taxes of the whole shire of Middlesex, outside the city walls. Such a grant was exceptional—though Lincoln also seems to have been granted the privilege of dealing directly with the exchequer. But in many other smaller towns the first grants—the smaller beginnings of autonomy—may be traced back to this period (see BOROUGH).

Though Henry was an autocrat, and governed through bureaucratic officials who were entirely under his hand, yet a reign of law and order such as his was indirectly favourable to the growth of constitutional liberty. It was equally favourable to the growth of national unity: it was in his time that Norman and English began to melt together: intermarriage in all classes became common, and only thirty years after his death a contemporary writer could remark that it was hard for any man to call himself either Norman or English, so much had blood been intermingled.

It is unnecessary to go into the very uninteresting and unimportant history of Henry's later years. A long war with France, prosecuted without much energy, led to no results, for the French king's attempts to stir up rebellions in the name of William the Clito (*q.v.*), the son of Duke Robert, came to an end with that prince's death in 1129. But the extension of the English borders in South Wales by the conquests of the lords marcher as far as Pembroke and Cardigan deserves a word of notice.

Henry's heir.

The question of the succession was the main thing which occupied the mind of the king and the whole nation in Henry's later years. It had a real interest for every man in an age when any doubt as to the heir meant the outbreak of civil war such as had occurred at the death of the Conqueror and of Rufus. There was now a problem of some difficulty to be solved. Henry's only son William had been drowned at sea in 1120. He had no other child born in wedlock save a daughter, Matilda, who married the emperor Henry V., but had no issue by him. On the emperor's decease she wedded as her second husband Geoffrey of Anjou (1127), to whom during her father's last years she bore two sons. But the succession of a woman to the crown was as unfamiliar to English as to Norman ideas, nor did it seem natural to either to place a young child on the throne. Moreover, Matilda's husband Geoffrey was unpopular among the Normans; the Angevins had been the chief enemies of the duchy for several generations, and the idea that one of them might become its practical ruler was deeply resented. The old king, as was but natural, had determined that his daughter should be his successor; he made the great council do homage to her in 1126, and always kept her before the eyes of his people as his destined heir. But though he had forced or cajoled every leading man in England and Normandy to take his oath to serve her, he must have been conscious that there was a large chance that such pledges would be forgotten at his death. The prejudice against a female heir was strong, and there were too many turbulent magnates to whom the anarchy that would follow a disputed succession presented temptations which could not be resisted.

Matilda and Stephen.

Henry died suddenly on the 25th of November 1135, while he was on a visit to his duchy of Normandy. The moment that his death was reported the futility of oaths became apparent. A majority of the Norman barons appealed to Theobald, count of Blois, son of the Conqueror's daughter Adela, to be their duke, and to save them from the yoke of the hated Angevin. His supporters and those of Matilda were soon at blows all along the frontier of Normandy. Meanwhile in England another pretender had appeared. Stephen, count of Boulogne, the younger brother of Theobald, had landed at Dover within a few days of Henry's death, determined to make a snatch at the crown, though he had been one of the first who had taken the oath to his cousin a few years before. The citizens of London welcomed him, but he was not secure of his success till by a swift swoop on Winchester he obtained possession of the royal treasure—an all-important factor in a crisis, as Henry I. had shown in 1100. At Winchester he was acknowledged as king by the bishop, his own brother Henry of Blois, and by the great justiciar, Roger, bishop of Salisbury, and the archbishop, William of Corbeil. The allegiance of these prelates was bought by an unwise promise to grant all the demands of the church party, which his predecessor had denied, or conceded only in part. He would permit free election to all benefices, and free legislation by ecclesiastical synods, and would surrender any claims of the royal courts to have jurisdiction over clerks or the property of clerks. It then remained necessary to buy the baronage, of which only a few members had as yet committed themselves to his side. It was done by grants of lands and privileges, the first instalment of a never-ending crop of ruinous concessions which Stephen continued to make from the day of his accession down to the day of his death.

The pretender was crowned at Westminster on the 22nd of December 1135—less than a month after his uncle's death. No one yet openly withstood him, but he was well aware that his position was precarious, and that the claims of Matilda would be brought forward ere long by the section of the baronage which had not yet got from him all they desired. Meanwhile, however, he was encouraged to persevere by the fact that his brother Theobald had withdrawn his claim to the duchy of Normandy, and retired in his favour. For a space he was to be duke as well as king; but this meant merely that he would have two wars, not one, in hand ere long. Matilda's adherents were already in the field in Normandy; in England their rising was only delayed for a few months.

Stephen, though he had shown some enterprise and capacity in his successful snatch at the crown, was a man far below his three predecessors on the throne in the matter of perseverance and foresight. He was a good fighter, a liberal giver, and a faithful friend, but he lacked wisdom, caution and the power to organize. Starting his career as a perjurer, it is curious that he was singularly slow to suspect perjury in others; he was the most systematically betrayed of all English kings, because he was the least suspicious, and the most ready to buy off and to forgive rebels. His troubles began in 1136, when sporadic rebellions, raised in the name of Matilda, began to appear; they grew steadily worse, though Stephen showed no lack of energy, posting about his realm with a band of mercenary knights whenever trouble broke out. But in 1138 the crisis came; the baronage had tried the capacity of their new master and found him wanting. The outbreak was now widespread and systematic —caused not by the turbulence of a few wild spirits, but by the deliberate conspiracy of all who saw their advantage in anarchy. Matilda had a few genuine partisans, such as her half-brother Robert, earl of Gloucester, the illegitimate son of Henry I., but the large majority of those who took arms in her name were ready to sell their allegiance to either candidate in return for lands, or grants of rank or privilege. A long list of doubly and triply forsworn nobles, led by Geoffrey de Mandeville, Aubrey de Vere and Ralph of Chester, made the balance of war sway alternately from side to side, as they transferred themselves to the camp of the highest bidder. It is hard to trace any meaning in the civil war—it was not a contest between the principle of hereditary succession and the principle of elective kingship, as might be supposed. It was rather, if some explanation must be found for it, a strife between the kingly power and feudal anarchy. Unfortunately for England the kingly power was in the hands of an incapable holder, and feudal anarchy found a plausible mask by adopting the disguise of loyalty to the rightful heiress.

Civil war.

The civil war was not Stephen's only trouble; foreign invasion was added. David I., king of Scotland, was the uncle of Matilda, and used her wrongs as the plea for thrice invading northern England, which he ravaged with great cruelty. His most formidable raid was checked by the Yorkshire shire levies, at the battle of the Standard (Aug. 22, 1138). Yet in the following year he had to be bought off by the grant of all Northumberland (save Newcastle and Bamborough) to his son Earl Henry. Carlisle and Cumberland were already in his hands. Some years later the Scottish prince also got possession of the great "Honour of Lancaster." It was not Stephen's fault that the boundary of England did not permanently recede from the Tweed and the Solway to the Tyne and the Ribble.

But the affairs of the North attracted little attention while the civil war was at its height in the South. In 1139 Stephen had wrought himself fatal damage by quarrelling with the ecclesiastical bureaucrats, the kinsmen and allies of Roger of Salisbury, who had been among his earliest adherents. Jealous of their power and their arrogance, and doubting their loyalty, he imprisoned them and confiscated their lands. This threw the whole church party on to the side of Matilda; even Henry, bishop of Winchester, the king's own brother, disowned him and passed over to the other side. Moreover, the whole machinery of local government in the realm fell out of gear, when the experienced ministers who were wont to control it were removed from power.

Matilda had landed in England in the winter of 1139-1140; for a year her partisans made steady progress against the king, and on the 2nd of February 1141 Stephen was defeated and taken prisoner at the battle of Lincoln. All England, save the county of Kent and a few isolated castles elsewhere, submitted to Matilda. She was hailed as a sovereign by a great assembly at Winchester, over which Stephen's own brother Bishop Henry presided (April 7, 1141) and entered London in triumph in June. It is doubtful whether she would have obtained complete possession of the realm if she had played her cards well, for there were too many powerful personages who were interested in the perpetuation of the civil war. But she certainly did her best to ruin her own chances by showing an unwise arrogance, and a determination to resume at once all the powers that her father had possessed. When she annulled all the royal acts of the last six years, declared charters forfeited and lands confiscated, and began to raise heavy and arbitrary taxes, she made the partisans of Stephen desperate, and estranged many of her own supporters. A sudden rising of the citizens drove her out of London, while she was making preparations for her coronation. The party of the imprisoned king rallied under the wise guidance of his wife Matilda of Boulogne and his brother Henry, and many other of the late deserters adhered to it. Their army drove the lately triumphant party out of Winchester, and captured its military chief, Robert, earl of Gloucester. So much was his loss felt that his sister exchanged him a few months later for King Stephen.

After this the war went on interminably, without complete advantage to either side, Stephen for the most part dominating the eastern and Matilda the western shires. It was the zenith of the power of the baronial anarchists, who moved from camp to camp with shameless rapidity, wresting from one or other of the two rival sovereigns some royal castle, or some dangerous grant of financial or judicial rights, at each change of allegiance. The kingdom was in the desperate state described in the last melancholy pages of the *Anglo-Saxon Chronicle*, when life and property were nowhere safe from the objectless ferocity of feudal tyrants —when "every shire was full of castles and every castle filled with devils and evil men," and the people murmured that "Christ and his saints slept."

Such was England's fate till 1153, when Matilda had retired from the strife in favour of her son, Henry of Anjou, and Stephen was grown an old man, and had just lost his heir, Eustace, to whom he had desired to pass on the crown. Both parties were exhausted, both were sick of the incessant treachery of their more unscrupulous barons, and at last they came to the compromise of Wallingford (October 1153), by which it was agreed that Stephen should reign for the remainder of his life, but that on his death the crown should pass to Henry. Both sides promised to lay down their arms, to dismiss their mercenaries, and to acquiesce in the destruction of unlicensed castles, of which it is said, with no very great exaggeration, that there were at the moment over 1000 in the realm. Henry then returned to Normandy, of which his mother had been in possession since 1145, while Stephen turned his small remaining strength to the weary task of endeavouring to restore the foundations of law and order. But he had accomplished little when he died in October 1154. The task of reconstruction was to be left to Henry of Anjou: his predecessor was only remembered as an example of the evil that may be done by a weak man who has been reckless enough to seize a throne which he is incapable of defending. England has had many worse kings, but never one who wrought her more harm. If his successor had been like him, feudal anarchy might have become as permanent in England as in Poland.

Henry II.

Fortunately the young king to whom Stephen's battered crown now fell was energetic and capable, if somewhat self-willed and hasty. He was inferior in caution and self-control to his grandfather Henry I., though he resembled him in his love of strong and systematic governance. From the point of view of his English subjects his main achievement was that he restored in almost every detail the well-organized bureaucracy which his ancestor had created, and with it the law and order that had disappeared during Stephen's unhappy reign. But there was this essential difference between the position of the two Henries, that the elder aspired to be no more than king of England and duke of Normandy, while the younger strove all his life for an imperial position in western Europe. Such an ambition was almost forced upon him by the consequences of his descent and his marriage. Besides his grandfather's Anglo-Norman inheritance, he had received from his father Geoffrey the counties of Anjou and Touraine, and the predominance in the valley of the Lower Loire. But it was his marriage to Eleanor of Aquitaine, two years before his accession to the English throne, which gave him the right to dream of greatness such as his Norman forbears had never enjoyed. This lady, the divorced wife of Louis VII. of France, brought to her second husband the whole of the lands from Poitou to the Pyrenees, the accumulated gains of many warlike ancestors. In wealth and fighting strength the duchy of Aquitaine was a full third of France. Added to Anjou and Normandy it made a realm far more important than England. Hence it came that Henry's ambitions and interests were continental more than English. Unlike his grandfather he dwelt for the greater part of his time beyond seas. It must be remembered, too, that his youth had been spent abroad, and that England only came to him when he was already a grown man. The concerns of his island realm were a matter of high importance to him, but only formed a part of his cares. Essentially he was an Angevin, neither a Norman nor an Englishman, and his primary ambition was to make the house of Anjou supreme in France. Nor did this seem impossible; he owned a far broader and wealthier domain beyond the Channel than did his nominal suzerain King Louis VII., and—what was of more importance—he far excelled that prince both in vigour and in capacity

On succeeding to the English crown, however, he came over at once to take possession of the realm, and abode there for over a year, displaying the most restless energy in setting to rights the governance of the realm. He expelled all Stephen's mercenaries, took back into his hands the royal lands and castles which his predecessor had granted away, and destroyed hundreds of the "adulterine" castles which the barons and knights had built without leave during the years of the anarchy. Hardly a single magnate dared to oppose him—Bridgnorth, now a castle of the Mortimers, was the only place which he had to take by force. His next care was to restore the bureaucracy by which Henry I. had been wont to govern. He handed over the exchequer to Nigel, bishop of Ely, the nephew of the old justiciar Roger of Salisbury, and the heir of his traditions. His chancellor was a young clerk, Thomas Becket, who was recommended to him by archbishop Theobald as the most capable official in the realm. A short experience of his work convinced the king that his merits had not been exaggerated. He proved a zealous and capable minister, and such a strong exponent of the claims of the crown that no one could have foreseen the later developments by which he was to become their greatest enemy.

The machine of government was beginning to work in a satisfactory fashion, and the realm was already settling down into order, when Henry was called abroad by a rebellion raised in Anjou by his brother Geoffrey—the first of the innumerable dynastic troubles abroad which continued throughout his reign to distract his attention from his duties as an English king. He did not return for fifteen months; but when he did reappear it was to complete the work which he had begun in 1155, to extort from the greater barons the last of the royal fortresses which still remained in their hands, and to restore the northern boundaries of the realm. Malcolm IV., the young king of Scotland, was compelled to give up the earldoms of Northumberland and Cumberland, which his father Henry had received from Stephen. He received instead only the earldom of Huntingdon, too far from the border to be a dangerous possession, to which he had a hereditary right as descending from Earl Waltheof. He did homage to the king of England, and actually followed him with a great retinue on his next continental expedition. In the same year (1157) Henry made an expedition into North Wales, and forced its prince Owen to become his vassal, not without some fighting, in which the English army received several sharp checks at the commencement of the campaign.

Yet once more Henry's stay on the English side of the Channel was but for a year. In 1158 he again departed to plunge into schemes of continental conquest. This time it was an attempt to annex the great county of Toulouse, and so to carry the borders of Aquitaine to the Mediterranean, which distracted him. Naturally Louis of France was unwilling to see his great vassal striding all across his realm, and did what he could to hinder him. Into the endless skirmishes and negotiations which followed the raising of the question of Toulouse it would be fruitless to enter. Henry did not achieve his purpose, indeed he seems to have failed to use his strength to its best advantage, and allowed himself to be bought off by a futile marriage treaty by which his eldest son was to marry the French king's daughter (1160). This was to be but the first of many disappointments in this direction; there was apparently some fatal scruple, both in Henry's own mind and in that of his continental subjects, as to pressing their suzerain too hard. But it must also be remembered that a feudal army was an inefficient weapon for long wars, and that the mercenaries, by whom alone it could be replaced, were both expensive and untrustworthy. Henry developed as far as he was able the system of "scutage" (*q.v.*) which his grandfather had apparently invented; by this the vassal compounded for his forty days' personal service by paying money, with which the king could hire professional soldiers. But even with this help he could never keep a large enough army together.

Quarrel with the church.

Meanwhile England, though somewhat heavily taxed, was at least enjoying quiet and strong governance. There is every sign that Henry's early years were a time of returning prosperity. But there was also much friction between the crown and its subjects. The more turbulent part of the baronage, looking back to the boisterous times of Stephen with regret, was reserving itself for a favourable opportunity. The danger of feudal rebellion was not yet past, as was to be shown ten years later. The towns did not find Henry an easy master. He took away from London some of the exceptional privileges which his grandfather had granted, such as the free election of sheriffs of Middlesex, and the right of farming the shire at a fixed rent. He asserted his power to raise "tallages"—arbitrary taxation—from the citizens on occasion. Yet he left the foundations of municipal liberty untouched, and he was fairly liberal in granting charters which contained moderate privileges to smaller towns. His most difficult task, however, was to come to a settlement with the Church. The lavish grants of Stephen had made an end of the old authority which the Conqueror and Henry I. had exercised over the clergy. Their successor was well aware of the fact, and was resolved to put back the clock, so far as it was in his power. It was not, however, on the old problems of free election, of lay investiture, that his quarrel with the clerical body broke out, but on the comparatively new question of the conflicting claims of ecclesiastical and secular courts. The separate tribunals of the church, whose erection William I. had favoured, had been developing in power ever since, and had begun to encroach on the sphere of the courts of the state. This was more than ever the case since Stephen had formally granted them jurisdiction over all suits concerning clerics and clerical property. During the first few years of his reign Henry had already been in collision with the ecclesiastical authorities over several such cases; he had chafed at seeing two clerks accused of murder and blackmailing claimed by and acquitted in the church courts; and most of all at the frequency of unlicensed appeals to Rome—a flagrant breach of one of the three rules laid down by William the Conqueror. Being comparatively at leisure after the pacification with France, he resolved to turn his whole attention to the arrangement of a new *modus vivendi* with the church. As a preliminary move he appointed his able chancellor Thomas Becket to the archbishopric of Canterbury, which fell vacant in 1162. This was the greatest mistake of his reign. Becket was one of those men who, without being either hypocrites or consciously ambitious, live only to magnify their office. While chancellor he was the most zealous servant of the crown, and had seemed rather secular than clerical in his habits and his outlook on life. But no sooner had he been promoted to the archbishopric than he put away his former manners, became the most formal and austere of men, and set himself to be the champion of the church party in all its claims, reasonable or unreasonable, against the state. The king's astonishment was even greater than his indignation when he saw the late chancellor setting himself to oppose him in all things. Their first quarrel was about a proposed change in some details of taxation, which seems to have had no specially ecclesiastical bearing at all. But Becket vehemently opposed it, and got so much support when the great council met at Woodstock that Henry withdrew his schemes. This was only a preliminary skirmish; the main battle opened in the following year, when the king, quite aware that he must for the future look on Thomas as his enemy, brought forward the famous *Constitutions of Clarendon*, of which the main purport was to assert the jurisdiction of the state over clerical offenders by a rather complicated procedure, while other clauses provided that appeals to Rome must not be made without the king's leave, that suits about land or the presentation to benefices, in which clerics were concerned, should be tried before the royal courts, and that bishops should not quit the realm unless they had obtained permission to do so from the king (see CLARENDON, CONSTITUTIONS OF). Somewhat to the king's surprise, Becket yielded for a moment to his pressure, and declared his assent to the constitutions. But he had no sooner left the court than he proclaimed that he had grievously sinned in giving way, suspended himself from his archiepiscopal functions, and wrote to the pope to beg for pardon and absolution. He then made a clandestine attempt to escape from the realm, but was detected on the seashore and forced to return.

Becket.

Incensed with Becket for his repudiation of his original submission, Henry proceeded to open a campaign of lawsuits against him, in order to force him to plead in secular courts. He also took the very mean step of declaring that he should call him to account for all the moneys that had passed through his hands when he was chancellor, though Becket had been given a quittance for them when he resigned the office more than two years before. The business came up at the council of Northampton (October 1164), when the archbishop was tried for refusing to recognize the jurisdiction of the king's courts, and declared to have forfeited his movable goods. The sentence was passed by the lay members of the Curia Regis alone, the bishops having been forbidden to sit, and threatened with excommunication if they did so, by the accused primate. When Becket was visited by the justiciar who came to rehearse the judgment, he started to his feet, refused to listen to a word, declared his repudiation of all lay courts and left the hall. That same night he made a second attempt to escape from England and this time succeeded in getting off to Flanders. From thence he fled to the court of the pope, where he received less support than he had expected. Alexander III. privately approved of all that he had done, and regarded him as the champion of the Church, but he did not wish to quarrel with King Henry. He had lately been driven from Rome by the emperor Frederick I., who had installed an antipope in his place, and had been forced to retire to France. If he sided with Becket and thundered against his persecutor, there was small doubt that the king of England would adhere to the schism. Accordingly he endeavoured to temporize and to avoid a rupture, to the archbishop's great disgust. But since he also declared the Constitutions of Clarendon uncanonical and invalid, Henry was equally offended, and opened negotiations with the emperor and the antipope. This conduct forced Alexander's hand, and he gave Becket leave to excommunicate his enemies. The exile, who had taken refuge in a French abbey, placed the justiciar and six other of the king's chief councillors under the ban of the Church, and intimated that he should add Henry himself to the list unless he showed speedy signs of repentance (April 1166).

Thus the quarrel had come to a head. Church and State were at open war. Henry soon found that Becket's threats had more effect than he liked. Many of the English clergy were naturally on the side of the primate in a dispute which touched their loyalty to the Church and their class feeling. Several bishops declared to the king that, since his ministers had been duly excommunicated, they did not see how they could avoid regarding them as men placed outside the pale of Christendom. Fortunately the pope interfered for a moment to lighten the friction; being threatened with a new invasion by the emperor Frederick, he suspended the sentences and sent legates to patch up a peace. They failed, for neither the king nor the archbishop would give way. At this juncture Henry was desirous of getting his eldest son and namesake crowned as his colleague, the best mode that he could devise for avoiding the dangers of a disputed succession at his death. He induced the archbishop of York, assisted by the bishops of London and Salisbury, to perform the ceremony. This was a clear invasion of the ancient rights of the primate, and Becket took it more to heart than any other of his grievances.

Yet the next move in the struggle was a hollow reconciliation between the combatants—a most inexplicable act on both sides. The king offered to allow Becket to return from exile, and to restore him to his possessions, without exacting from him any promise of submission, or even a pledge that he would not reopen the dispute on his return. Apparently he had made a wrong interpretation of the primate's mental attitude, and thought him desirous of a truce, if not ready for a compromise. He had wholly misjudged the situation; Becket made neither promises nor threats, but three weeks after he reached Canterbury publicly excommunicated the bishops of London and Salisbury for the part that they had taken in the coronation of the young king, and suspended from their functions the other prelates who had been present at the ceremony. He then proceeded to excommunicate a number of his minor lay enemies.

Becket's murder.

The news was carried overseas to Henry, who was then in Normandy. It roused one of the fits of wild rage to which he was not unfrequently liable; he burst out into ejaculations of wrath, and cursed "the cowardly idle servants who suffered their master to be made the laughing-stock of a low-born priest." Among those who stood about him were four knights, some of whom had personal grudges against Becket, and all of whom were reckless ruffians, who were eager to win their master's favour by fair means or foul. They crossed the Channel with astonishing speed; two days after the king's outburst they stood before Becket at Canterbury and threatened him with death unless he should remove the excommunications and submit to his master. The archbishop answered with words as scornful as their own, and took his way to the minster to attend vespers. The knights went out to seek their weapons, and when armed followed him into the north transept, where they fell upon him and brutally slew him with many sword-strokes (December 29, 1170). Thomas had been given time to fly, and his followers had endeavoured to persuade him to do so. It seems that he deliberately courted martyrdom, anxious apparently that his death should deal the king the bitterest blow that it was in his power to inflict (see BECKET).

Its results.

Nothing could have put Henry in such an evil plight; the whole world held him responsible for the murder, and he was forced to buy pardon for it by surrendering many of the advantages over the Church which he had hoped to gain by enforcing the Constitutions of Clarendon. Especially the immunity of clerical offenders from the jurisdiction of lay courts had to be conceded; for the rest of the middle ages the clerk guilty of theft or assault, riot or murder, could plead his orders, and escape from the harsh justice of the king's officers to the milder penalties of the bishop's tribunal. "Benefit of clergy" became an intolerable anomaly, all the more so because the privilege was extended in practice not only to all persons actually in minor orders, but to all who claimed them; any criminal who could read had a fair chance of being reckoned a clerk. Another concession which Henry was forced to make was that the appeals to Rome of litigants in ecclesiastical suits should be freely permitted, provided that they made an oath that they were not contemplating any wrong to the English crown or the English church, a sufficiently easy condition. Such appeals became, and remained, innumerable and vexatious. Pope Alexander also extorted from the king a pledge that he would relinquish any customs prejudicial to the rights of the Church which had been introduced since his accession. To the pope this meant that the Constitutions of Clarendon were disavowed; to the king, who maintained that they were in the main a mere restatement of the customs of William I., it bore no such general interpretation. The points were fought out in detail, and not settled for many years. Practically it became the rule to regard suits regarding land, or presentations to benefices, as pertaining to the king's court, while those regarding probate, marriage and divorce fell to the ecclesiastical tribunal. The question of election to bishoprics and abbacies went back to the stage which it had reached in the time of Henry I.; the choice was made in canonical form, by the chapters or the monasteries, but the king's recommendation was a primary factor in that choice. When the electors disregarded it, as was sometimes the case, there was friction; a weak king was sometimes overruled; a strong one generally got his way in the end.

Becket's death, then, gave a qualified triumph to the church party, and he was rightly regarded as the successful champion of his caste. Hence they held his death in grateful remembrance; the pope canonized him in 1173, and more churches were dedicated to him during the next two centuries than to any other English saint. In the eyes of most men his martyrdom had put the king so much in the wrong that the obstinacy and provocative conduct which had brought it about passed out of memory. His life of ostentatious austerity, and the courage with which he met his death, had caused all his faults to be forgotten. Henry himself felt so much the invidious position in which he was placed that even after making his submission to the pope's legates at Avranches in 1172, he thought it necessary to do penance before Becket's tomb in 1174, on which occasion he allowed himself to be publicly scourged by the monks of Canterbury, who inflicted on him three cuts apiece.

Between the outbreak of the king's quarrel with Becket at the council of Woodstock and the compromise of Avranches no less than ten years had elapsed—the best years of Henry's manhood. During this period his struggle with the Church had been but one of his distractions. His policy of imperial aggrandisement had been in progress. In 1163 he had completed the conquest of South Wales; the marcher lords were now in possession of the greater part of the land; the surviving Welsh princes did homage for the rest. In 1166 Henry got practical possession of the duchy of Brittany, the only remaining large district of western France which was not already in his hands. Conan, the last prince of the old Breton house, recognized him as his lord, and gave the hand of his heiress Constance to Geoffrey, the king's third son. When the count died in 1171 Henry did not transfer the administration of the land to the young pair, who were still but children, but retained it for himself, and clung to it jealously long after his son came of age. Intermittent wars with France during these years were of small importance; Henry never pushed his suzerain to extremity. But the Angevin dominions were extended in a new direction, where no English king had yet made his power felt.

The distressful island of Ireland was at this moment enjoying the anarchy which had reigned therein since the dawn of history. Its state had grown even more unhappy than before since the Danish invasions of the 10th century, which had not welded the native kingdoms into unity by pressure from without—as had been the case in England—but had simply complicated affairs, by setting up two or three alien principalities on the coastline. As in England, the vikings had destroyed much of the old civilization; but they had neither succeeded in occupying the whole country nor had they been absorbed by the natives. The state of the island was much like that of England in the days of the Heptarchy: occasionally a "High King" succeeded in forcing his rivals into a precarious submission; more usually there was not even a pretence of a central authority in the island, and the annals of objectless tribal wars formed its sole history. King Henry's eyes had been fixed on the faction-ridden land since the first years of his reign. As early as 1155 he had asked and obtained the approval of Pope Adrian IV., the only Englishman who ever sat upon the papal throne, for a scheme for the conquest of Ireland. The Holy See had always regarded with distaste the existence in the West of a nation who repudiated the Roman obedience, and lived in schismatical independence, under local ecclesiastical customs which dated back to the 5th century, and had never been brought into line with those of the rest of Christendom. Hence it was natural to sanction an invasion which might bring the Irish within the fold. But Henry made no endeavour for many years to utilize the papal grant of Ireland, which seems to have been made under the preposterous "Donation of Constantine," the forged document which gave the bishop of Rome authority over all islands. It was conveniently forgotten that Ireland had never been in the Roman empire, and so had not even been Constantine's to give away.

Conquest of Ireland.

Not till 1168, thirteen years after the agreement with Pope Adrian, did the interference of the English king in Ireland actually begin. Even then he did not take the conquest in hand himself, but merely sanctioned a private adventure of some of his subjects. Dermot MacMorrough, king of Leinster, an unquiet Irish prince who for good reasons had been expelled by his neighbours, came to Henry's court in Normandy, proffering his allegiance in return for restoration to his lost dominions. The quarrel with Becket, and the French war, were both distracting the English king at the moment. He could not spare attention for the matter, but gave Dermot leave to enlist auxiliaries among the turbulent barons of the South Welsh Marches. The Irish exile enlisted first the services of Maurice Fitzgerald and Robert Fitzstephen, two half-brothers, both noted fighting men, and afterwards those of Richard de Clare, earl of Pembroke, an ambitious and impecunious magnate of broken fortunes. The two barons were promised lands, the earl a greater bribe the hand of Dermot's only daughter Eva and the inheritance of the kingdom of Leinster. Fitzgerald and Fitzstephen crossed to Ireland in 1169 with a mere handful of followers. But they achieved victories of an almost incredible completeness over Dermot's enemies. The undisciplined hordes of the king of Ossory and the Danes of Wexford could not stand before the Anglo-Norman tactics—the charge of the knights and the arrow-flight of the archers, skilfully combined by the adventurous invaders. Dermot was triumphant, and sent for more auxiliaries, aspiring to evict Roderic O'Connor of Connaught from the precarious throne of High King of Ireland. In 1170 the earl of Pembroke came over with a larger force, celebrated his marriage with Dermot's daughter, and commenced a series of conquests. He took Waterford and Dublin from the Danes, and scattered the hosts of the native princes. Early in the next spring Dermot died, and Earl Richard, in virtue of his marriage, claimed the kingship of Leinster. He held his own, despite the assaults of a great army gathered by Roderic the High King, and of a viking fleet which came to help the conquered jarls of Waterford and Dublin. At this moment King Henry thought it necessary to interfere; if he let more time slip away, Earl Richard would become a powerful king and forget his English allegiance. Accordingly, with a large army at his back, he landed at Waterford in 1171 and marched on Dublin. Richard did him homage for Leinster, engaging to hold it as a palatine earldom, and not to claim the name or rights of a king. The other adventurers followed his example, as did, after an interval, most of the native Irish princes. Only Roderic of Connaught held aloof in his western solitudes, asserting his independence. The clergy, almost without a murmur, submitted themselves to the Roman Church.

Such was the first conquest of Ireland, a conquest too facile to be secure. Four years later it appeared to be completed by the submission of the king of Connaught, who did homage like the rest of the island chiefs. But their oaths were as easily broken as made, and the real subjection of the island was not to be completed for 400 years. What happened was that the Anglo-Norman invaders pushed gradually west, occupying the best of the land and holding it down by castles, but leaving the profitless bogs and mountains to the local princes. The king's writ only ran in and about Dublin and a few other harbour fortresses. Inland, the intruding barons and the Irish chiefs fought perpetually, with varying fortunes. The conquest hardly touched central and western Ulster, and left half Connaught unsubdued: even in the immediate vicinity of Dublin the tribes of the Wicklow Hills were never properly tamed. The English conquest was incomplete; it failed to introduce either unity or strong governance. After a century and a half it began to recede rather than to advance. Many of the districts which had been overrun in the time of the Angevin kings were lost; many of the Anglo-Norman families intermarried with and became absorbed by the Irish; they grew as careless of their allegiance to the crown as any of the native chiefs. The "Lordship of Ireland" was never a reality till the times of the Tudors. But as long as Henry II. lived this could not have been foreseen. The first generation of the conquerors pushed their advance with such vigour that it seemed likely that they would complete the adventure. (See IRELAND: *History*.)

Rebellion of Henry's sons.

It was in 1173, the year after his return from Ireland and his submission to the papal legates at Avranches, that King Henry became involved in the first of a series of troubles which were to pursue him for the rest of his life—the rebellions of his graceless sons. His wife Eleanor of Aquitaine had borne him many children. Henry, the eldest surviving son, had already been crowned in 1170 as his father's colleague and successor; not only he, but Richard the second, and Geoffrey the third son, were now old enough to chafe against the restraints imposed upon them by an imperious and strong-willed father. The old king very naturally preferred to keep his dominions united under his own immediate government, but he had designated his eldest son as his successor in England and Normandy, while Richard was to have his mother's heritage of Aquitaine, and Geoffrey's wife's dowry, the duchy of Brittany, was due to him, now that he had reached the verge of manhood. The princes were shamelessly eager to enter on their inheritance, the king was loath to understand that by conferring a titular sovereignty on his sons he had given them a sort of right to expect some share of real power. Their grudge against their father was sedulously fostered by their mother Eleanor, a clever and revengeful woman, who could never forgive her husband for keeping her in the background in political matters and insulting her by his frequent amours. Her old subjects in Aquitaine were secretly encouraged by her to follow her son Richard against his father, whom the barons of the south always regarded as an alien and an intruder. The Bretons were equally willing to rise in the name of Geoffrey and Constance against the guardian who was keeping their prince too long waiting for his inheritance. In England the younger Henry had built himself up a party among the more turbulent section of the baronage, who remembered with regret and longing the carnival of licence which their fathers had enjoyed under King Stephen. Secret agreements had also been made with the kings of France and Scotland, who were eager to take advantage of the troubles which were about to break out.

In 1173 the plot was complete, and Henry's three elder sons all took arms against him, collecting Norman, Breton and Gascon rebels in great numbers, and being backed by a French army. At the same moment the king of Scots invaded Northumberland, and the earls of Norfolk, Chester and Leicester rose in the name of the younger Henry. This was in all essentials a feudal rebellion of the old type. The English barons were simply desirous of getting rid of the strong and effective governance of the king, and the alleged wrongs of his sons were an empty excuse. For precisely the same reason all classes in England, save the more turbulent section of the baronage, remained faithful to the elder king. The bureaucracy, the minor landholders, the towns, and the clergy refused to join in the rising, and lent their aid for its suppression, because they were unwilling to see anarchy recommence. Hence, though the rebellious princes made head for a time against their father abroad, the insurrection of their partisans in England was suppressed without much difficulty. The justiciar, Richard de Lucy, routed the army of the earl of Leicester at Fornham in Suffolk, the castles of the rebel earls were subdued one after another, and William of Scotland was surprised and captured by a force of northern loyalists while he was besieging Alnwick (1173–1174). The war lingered on for a space on the continent; but Henry raised the siege of Rouen, which was being attacked by his eldest son and the king of France, captured most of Richard's castles in Poitou, and then received the submission of his undutiful children. Showing considerable magnanimity, he promised to grant to each of them half the revenues of the lands in which they were his destined heirs, and a certain number of castles to hold as their own. Their allies fared less well; the rebel earls were subjected to heavy fines, and their strongholds were demolished. The king of Scots was forced to buy his liberty by doing homage to Henry for the whole of his kingdom. Queen Eleanor, whom her husband regarded as responsible for the whole rebellion, was placed in a sort of honourable captivity, or retirement, and denied her royal state.

Henry appeared completely triumphant; but the fourteen years which he had yet to live were for the most part to be times of trouble and frustrated hopes. He was growing old; the indomitable energy of his early career was beginning to slacken; his dreams of extended empire were vanishing. In the last period of his life he was more set on defending what he already enjoyed, and perfecting the details of administration in his realms, than on taking new adventures in hand. Probably the consciousness that his dominions would be broken up among his sons after his death had a disheartening effect upon him. At any rate his later years bear a considerable resemblance to the corresponding period of his grandfather's reign. The machinery of government which the one had sketched out the other completed. Under Henry II. the circuits of the itinerant justices became regular instead of intermittent; the judicial functions of the Curia Regis were delegated to a permanent committee of that body which took form as the court of king's bench (*Curia Regis in Banco*). The sheriffs were kept very tightly in hand, and under incessant supervision; once in 1170 nearly the whole body of them were dismissed for misuse of their office. The shire levies which had served the king so well against the feudal rebels of 1173 were reorganized, with uniformity of weapons and armour, by the *Assize of Arms* of 1181. There was also a considerable amount of new legislation with the object of protecting the minor subjects of the crown, and the system of trial by jurors was advanced to the detriment of the absurd old practices of trial by ordeal and trial by wager of battle. The 13th-century jury was a rough and primitive institution, which acted at once as accuser, witness and judge—but it was at any rate preferable to the chances of the red-hot iron, or the club of the duellist.

The best proof that King Henry's orderly if autocratic régime was appreciated at its true value by his English subjects, is that when the second series of rebellions raised by his undutiful sons began in 1182, there was no stir whatever in England, though in Normandy, Brittany and Aquitaine the barons rose in full force to support the young princes, whose success would mean the triumph of particularism and the destruction of the Angevin empire. Among the many troubles which broke down King Henry's strong will and great bodily vigour in those unhappy years, rebellion in England was not one. For this reason he was almost constantly abroad, leaving the administration of the one loyal section of his realm to his great justiciar. Hence the story of the unnatural war between father and sons has no part in English history. It is but necessary to note that the younger Henry died in 1183, that Geoffrey perished by accident at a tournament in 1186, and that in 1189, when the old king's strength finally gave out, it was Richard who was leading the rebellion, to which John, the youngest and least worthy of the four undutiful sons, was giving secret countenance. It was the discovery of the treachery of this one child whom he had deemed faithful, and loved over well, that broke Henry's heart. "Let things go as they will; I have nothing to care for in the world now," he murmured on his death-bed, and turned his face to the wall to breathe his last.

Richard I.

The death of the younger Henry had made Richard heir to all his father's lands from the Tweed to the Bidassoa save Brittany, which had fallen to Arthur, the infant son of the unlucky Geoffrey. John, the new king's only surviving brother, had been declared "Lord of Ireland" by his father in 1185, but Henry had been forced to remove him for persistent misconduct, and had left him nothing more than a titular sovereignty in the newly conquered island. In this Richard confirmed him at his accession, and gave him a more tangible endowment by allowing him to marry Isabella, the heiress of the earldom of Gloucester, and by bestowing on him the honour of Lancaster and the shires of Derby, Devon, Cornwall and Somerset. The gift was over-liberal and the recipient was thankless; but John was distinctly treated as a vassal, not granted the position of an independent sovereign.

Of all the medieval kings of England, Richard I. (known as Cœur de Lion) cared least for his realm on the English side of the Channel, and spent least time within it. Though he chanced to have been born in Oxford, he was far more of a foreigner than his father; his soul was that of a south French baron, not that of an English king. Indeed he looked upon England more as a rich area for taxation than as the centre of a possible empire. His ambitions were continental: so far as he had a policy at all it was Angevin—he would gladly have increased his dominions on the side of the upper Loire and Garonne, and was set on keeping in check the young king of France, Philip Augustus, though the latter had been his ally during his long struggle with his father. Naturally the policy of Richard as a newly crowned king was bound to differ from that which he had pursued as a rebellious prince. As regards his personal character he has been described, not without truth, as a typical man of his time and nothing more. He was at heart a chivalrous adventurer delighting in war for war's sake; he was not destitute of a conscience—his undutiful conduct to his father sat heavily on his soul when that father was once dead; he had a strong sense of knightly honour and a certain magnanimity of soul in times of crisis; but he was harsh, thriftless, often cruel, generally lacking in firmness and continuity of purpose, always careless of his subjects' welfare when it interfered with his pleasure or his ambitions of the moment. If he had stayed long in England he would have made himself hated; but he was nearly always absent; it was only as a reckless and spasmodic extorter of taxation, not as a personal tyrant, that he was known on the English side of the Channel.

The Crusade.

At the opening of his reign Richard had one all-engrossing desire; he was set on going forth to the Crusade for the recovery of Jerusalem which had been proclaimed in 1187, partly from chivalrous instincts, partly as a penance for his misconduct to his father. He visited England in 1189 only in order to be crowned, and to raise as much money for the expedition as he could procure. He obtained enormous sums, by the most unwise and iniquitous expedients, mainly by selling to any buyer that he could find valuable pieces of crown property, high offices and dangerous rights and privileges. The king of Scotland bought for 15,000 marks a release from the homage to the English crown which had been imposed upon him by Henry II. The chancellorship, one of the two chief offices in the realm, was sold to William Longchamp, bishop of Ely, for £3000, though he was well known as a tactless, arrogant and incapable person. The earldom of Northumberland, with palatine rights, was bought by Hugh Puiset, bishop of Durham. Countless other instances of unwise bargains could be quoted. Having raised every penny that he could procure by legal or illegal means, Richard crossed the Channel, and embarked at Marseilles with a great army on the 7th of August 1190. The only security which he had for the safety of his dominions in his absence was that his most dangerous neighbour, the king of France, was also setting out on the Crusade, and that his brother John, whose shifty and treacherous character gave sure promise of trouble, enjoyed a well-merited unpopularity both in England and in the continental dominions of the crown.

Richard's crusading exploits have no connexion with the history of England. He showed himself a good knight and a capable general—the capture of Acre and the victory of Arsuf were highly to his credit as a soldier. But he quarrelled with all the other princes of the Crusade, and showed himself as lacking in tact and diplomatic ability as he was full of military capacity. The king of France departed in wrath, to raise trouble at home; the army gradually melted away, the prospect of recovering Jerusalem disappeared, and finally Richard must be reckoned fortunate in that he obtained from Sultan Saladin a peace, by which the coastland of Palestine was preserved for the Christians, while the Holy City and the inland was sacrificed (Sept. 2, 1192). While returning to his dominions by the way of the Adriatic, the king was shipwrecked, and found himself obliged to enter the dominions of Leopold, duke of Austria, a prince whom he had offended at Acre during the Crusade. Though he disguised himelf, he was detected by his old enemy and imprisoned. The duke then sold him to the emperor Henry VI., who found pretexts for forcing him to buy his freedom by the promise of a ransom of 150,000 marks. It was not till February 1194 that he got loose, after paying a considerable instalment of this vast sum. The main bulk of it, as was to be expected, was never made over; indeed it could not have been raised, as Richard was well aware. But, once free, he had no scruple in cheating the imperial brigand of his blackmail.

John's treachery.

For five years Richard was away from his dominions as a crusader or a captive. There was plenty of trouble during his absence, but less than might have been expected. The strong governance set up by Henry II. proved competent to maintain itself, even when Richard's ministers were tactless and his brother treacherous. A generation before it is certain that England would have been convulsed by a great feudal rising when such an opportunity was granted to the barons. Nothing of the kind happened between 1190 and 1194. The chancellor William Longchamp made himself odious by his vanity and autocratic behaviour, and was overthrown in 1191 by a general rising, which was headed by Prince John, and approved by Walter, archbishop of Rouen, whom Richard had sent to England with a commission to assume the justiciarship if William should prove impossible as an administrator. Longchamp fled to the continent, and John then hoped to seize on supreme power, even perhaps to grasp the crown. But he was bitterly disappointed to find that he could gather few supporters; the justiciar and the bureaucrats of the Curia Regis would give him no assistance; they worked on honestly in the name of the absent king. Among the baronage hardly a man would commit himself to treason. In vain John hired foreign mercenaries, garrisoned his castles, and leagued himself with the king of France when the latter returned from the Crusade. It was only the news of his brother's captivity in Austria which gave the intriguing prince a transient hope of success. Boldly asserting that Richard would never be seen alive again he went to France, and did homage to King Philip for Normandy and Aquitaine, as if they were already his own. Then he crossed to England with a band of mercenaries, and seized Windsor and Wallingford castles. But no one rose to aid him, and his garrisons were soon being besieged by loyal levies, headed by the justiciar and by Hubert Walter, the newly elected archbishop of Canterbury.

At the same time King Philip's invasion of Normandy was repulsed by the barons of the duchy. Richard's faithful ministers, despite of all their distractions, succeeded in raising the first instalment of his ransom by grinding taxation—a fourth part of the revenue of all lay persons, a tithe from ecclesiastical land, was raised, and in addition much church plate was seized, though the officials who exacted it were themselves prelates. John and Philip wrote to the emperor to beg him to detain his captive at all costs, but Henry VI. pocketed the ransom money and set Richard free. He reached England in March 1194, just in time to receive the surrender of the last two castles which were holding out in his treacherous brother's name. With astonishing, and indeed misplaced, magnanimity, Richard pardoned his brother, when he made a grovelling submission, and restored him to his lordship of Ireland and to a great part of his English lands.

The king abode for no more than three months in England; he got himself recrowned at Winchester, apparently to wipe out the stain of his German captivity and of an enforced homage which the emperor had extorted from him. Then he raised a heavy tax from his already impoverished subjects, sold a number of official posts and departed to France—never to return, though he had still five years to live. He left behind Archbishop Hubert Walter as justiciar, a faithful if a somewhat high-handed minister.

Richard's one ruling passion was now to punish Philip of France for his unfriendly conduct during his absence. He plunged into a war with this clever and shifty prince, which lasted—with certain short breaks of truces and treaties—till his death. He wasted his considerable military talents in a series of skirmishes and sieges which had no great results, and after spending countless treasures and harrying many regions, perished obscurely by a wound from a cross-bow-bolt, received while beleaguering Châlus, a castle of a rebellious lord of Aquitaine, the viscount of Limoges (April 6, 1199).

English constitutional development.

During these years of petty strife England was only reminded at intervals of her king's existence by his intermittent demands for money, which his ministers did their best to satisfy. The machine of government continued to work without his supervision. It has been observed that, from one point of view, England's worst kings have been her best; that is to say, a sovereign like Richard, who persistently neglected his duties, was unconsciously the foster father of constitutional liberty. For his ministers, bureaucrats of an orderly frame of mind, devised for their own convenience rules and customs which became permanent, and could be cited against those later kings who interfered more actively in the details of domestic governance. We may trace back some small beginnings of a constitution to the time of Henry II.—himself an absentee though not on the scale of his son. But the ten years of Richard's reign were much more fruitful in the growth of institutions which were destined to curb the power of the crown. His justiciars, and especially Hubert Walter, were responsible for several innovations which were to have far-spreading results. The most important was an extension of the use of juries into the province of taxation. When the government employs committees chosen by the taxpayers to estimate and assess the details of taxation, it will find it hard to go back to arbitrary exactions. Such a practice had been first seen when Henry II., in his last year, allowed the celebrated "Saladin Tithe" for the service of the crusade to be assessed by local jurors. In Richard's reign the practice became regular. In especial when England was measured out anew for the great carucage of 1197—a tax on every ploughland which replaced the rough calculation of Domesday Book—knights elected by the shires shared in all the calculations then made for the new impost. Another constitutional advance was that which substituted "coroners," knights chosen by the county court, for the king's old factotum the sheriff in the duty of holding the "pleas of the crown," *i.e.* in making the preliminary investigations into such offences as riot, murder or injury to the king's rights or property. The sheriff's natural impulse was to indict every man from whom money could be got; the new coroners were influenced by other motives than financial rapacity, and so were much more likely to deal equitably with accusations. The towns also profited in no small degree from Richard's absence and impecuniosity. One of the most important charters to London, that which granted the city the right of constituting itself a "commune" and choosing itself a mayor, goes back to October 1191, the troubled month of Longchamp's expulsion from England. It was given by Prince John and the ministers, who were then supporting him against the arrogant chancellor, to secure the adherence of London. Richard on his return seems to have allowed it to stand. Lincoln was also given the right of electing its own magistrates in 1194, and many smaller places owe grants of more or less of municipal privilege to Hubert Walter acting in the name of the absent king. The English nation began to have some conception of a régime of fixed custom, in which its rights depended on some other source than the sovereign's personal caprice. The times, it may be remembered, were not unprosperous. There had been no serious civil war since the baronial rising of 1173. Prince John's turbulence had only affected the neighbourhood of a few royal castles. Despite of the frequent and heavy demands for money for the king's service, wealth seems to have been increasing, and prosperity to have been widespread. Strong and regular governance had on the whole prevailed ever since Henry II. triumphed over baronial anarchy.

III. THE STRUGGLE FOR CONSTITUTIONAL LIBERTY (1199–1337)

Accession of John.

Richard's queen, Berengaria of Navarre, had borne him no children. At the moment of his premature death his nearest kinsmen were his worthless brother John, and the boy Arthur of Brittany, the heir of Geoffrey, the third son of Henry II. On his death-bed the king had designated John as his successor, holding apparently that a bad ruler who was at least a grown man was preferable to a child. John's claim prevailed both in Normandy and in England, though in each, as we are told, there were those who considered it a doubtful point whether an elder brother's son had not a better right than a younger brother. But the ministers recognized John, and the baronage and nation acquiesced, though with little enthusiasm. In the lands farther south, however, matters went otherwise. The dowager duchess Constance of Brittany raised her son's claim, and sent an army into Anjou, and all down the Loire many of the nobles adhered to his cause. The king of France announced that he should support them, and allowed Arthur to do him homage for Anjou, Maine and Touraine. There would have been trouble in Aquitaine also, if the aged Queen Eleanor had not asserted her own primary and indefeasible right to her ancestral duchy, and then declared that she transferred it to her best loved son John. Most of her subjects accepted her decision, and Arthur's faction made no head in this quarter.

It seemed for a space as if the new king would succeed in retaining the whole of his brother's inheritance, for King Philip very meanly allowed himself to be bought off by the cession of the county of Evreux, and, when his troops were withdrawn, the Angevin rebels were beaten down, and the duchess of Brittany had to ask for peace for her son. But it had not long been granted, when John proceeded to throw away his advantage by acts of reckless impolicy. Though cunning, he was destitute alike of foresight and of self-control; he could never discern the way in which his conduct would be judged by other men, because he lacked even the rudiments of a conscience. Ere he had been many months on the throne he divorced his wife, Isabella of Gloucester, alleging that their marriage had been illegal because they were within the prohibited degrees. This act offended the English barons, but in choosing a new queen John gave much greater offence abroad; he carried off Isabella of Angoulême from her affianced husband, Hugh of Lusignan, the son of the count of la Marche, his greatest vassal in northern Aquitaine, and married her despite the precontract. This seems to have been an amorous freak, not the result of any deep-laid policy. Roused by the insult the Lusignans took arms, and a great part of the barons of Poitou joined them. They appealed for aid to Philip of France, who judged it opportune to intervene once

War with Philip Augustus.

Loss of Normandy.

more. He summoned John to appear before him as suzerain, to answer the complaints of his Poitevin subjects, and when he failed to plead declared war on him and declared his dominions escheated to the French crown for non-fulfilment of his feudal allegiance. He enlisted Arthur of Brittany in his cause by recognizing him once more as the rightful owner of all John's continental fiefs save Normandy, which he intended to take for himself. Philip then entered Normandy, while Arthur led a Breton force into Anjou and Poitou to aid the Lusignans. The fortune of war at first turned in favour of the English king. He surprised his nephew while he was besieging the castle of Mirebeau in Poitou, where the old Queen Eleanor was residing. The young duke and most of his chief supporters were taken prisoners (August 1, 1202). Instead of using his advantage aright, John put Arthur in secret confinement, and after some months caused him to be murdered. He is said also to have starved to death twenty-two knights of Poitou who had been among his captives. The assassination of his nearest kinsman, a mere boy of sixteen, was as unwise as it was cruel. It estranged from the king the hearts of all his French subjects, who were already sufficiently disgusted by many minor acts of brutality, as well as by incessant arbitrary taxation and by the reckless ravages in which John's mercenary troops had been indulging. The French armies met with little or no resistance when they invaded Normandy, Anjou and Poitou. John sat inert at Rouen, pretending to take his misfortunes lightly, and boasting that "what was easily lost could be as easily won back." Meanwhile Philip Augustus conquered all western Normandy, without having to fight a battle. The great castle of Château Gaillard, which guards the Lower Seine, was the only place which made a strenuous resistance. It was finally taken by assault, despite of the efforts of the gallant castellan, Roger de Lacy, constable of Chester, who had made head against the besiegers for six months (September 1203–March 1204) without receiving any assistance from his master. John finally absconded to England in December 1203; he failed to return with an army of relief, as he had promised, and before the summer of 1204 was over, Caen, Bayeux and Rouen, the last places that held out for him, had been forced to open their gates. The Norman barons had refused to strike a blow for John, and the cities had shown but a very passive and precarious loyalty to him. He had made himself so well hated by his cruelty and vices that the Normans, forgetting their old hatred of France, had acquiesced in the conquest. Two ties alone had for the last century held the duchy to the English connexion: the one was that many Norman baronial families held lands on this side of the Channel; the second was the national pride which looked upon England as a conquered appendage of Normandy. But the first had grown weaker as the custom arose of dividing family estates between brothers, on the principle that one should take the Norman, the other the English parts of a paternal heritage. By John's time there were comparatively few landholders whose interests were fairly divided between the duchy and the kingdom. Such as survived had now to choose between losing the one or the other section of their lands; those whose holding was mainly Norman adhered to Philip; those who had more land in England sacrificed their transmarine estates. For each of the two kings declared the property of the barons who did not support him confiscated to the crown. As to the old Norman theory that England was a conquered land, it had gradually ceased to exist as an operative force, under kings who, like Henry II. or Richard I., were neither Norman nor English in feeling, but Angevin. John did not, and could not, appeal as a Norman prince to Norman patriotism.

Loss of Anjou, Touraine and Poitou.

The successes of Philip Augustus did not cease with the conquest of Normandy. His armies pushed forward in the south also; Anjou, Touraine and nearly all Poitou submitted to him. Only Guienne and southern Aquitaine held out for King John, partly because they preferred a weak and distant master to such a strenuous and grasping prince as King Philip, partly because they were far more alien in blood and language to their French neighbours than were Normans or Angevins. The Gascons were practically a separate nationality, and the house of Capet had no ancient connexion with them. The kings of England were yet to reign at Bordeaux and Bayonne for two hundred and fifty years. But the connexion with Gascony meant little compared with the now vanished connexion with Normandy. Henry I. or Henry II. could run over to his continental dominions in a day or two days; Dieppe and Harfleur were close to Portsmouth and Hastings. It was a different thing for John and his successors to undertake the long voyage to Bordeaux, around the stormy headlands of Brittany and across the Bay of Biscay. Visits to their continental dominions had to be few and far between; they were long, costly and dangerous when a French fleet—a thing never seen before Philip Augustus conquered Normandy—might be roaming in the Channel. The kings of England became perforce much more home-keeping sovereigns after 1204.

It was certainly not a boon for England that her present sovereign was destined to remain within her borders for the greater part of his remaining years. To know John well was to loathe him, as every contemporary chronicle bears witness. The two years that followed the loss of Normandy were a time of growing discontent and incessant disputes about taxation. The king kept collecting scutages and tallages, yet barons and towns complained that nothing seemed to be done with the money he collected. At last, however, in 1206, the king did make an expedition to Poitou, and recovered some of its southern borders. Yet, with his usual inconsequence, he did not follow up his success, but made a two years' truce with Philip of France on the basis of *uti possidetis*—which left Normandy and all the territories on and about the Loire in the hands of the conqueror.

Quarrel with the Papacy.

It is probable that this pacification was the result of a new quarrel which John had just taken up with a new enemy—the Papacy. The dispute on the question of free election, which was to range over all the central years of his reign, had just begun. In the end of 1205 Hubert Walter, archbishop of Canterbury, had died. The king announced his intention of procuring the election of John de Gray, bishop of Norwich, as his successor; but, though his purpose was well known, the chapter (*i.e.* the monks of Christ Church, Canterbury) met secretly and elected their sub-prior Reginald as archbishop. They sent him to Rome at once, to receive confirmation from Pope Innocent III., whom they knew to be a zealous champion of the rights of the Church. But John descended upon them in great wrath, and by threats compelled them to hold a second meeting, and to elect his nominee Gray, in whose name application for confirmation was also made to the pope. Innocent, however, seeing a splendid chance of asserting his authority, declared both the elections that had taken place invalid, the first because it had been clandestine, the second because it had been held under *force majeure*, and proceeded to nominate a friend of his own—Cardinal Stephen Langton, an Englishman of proved capacity and blameless life, then resident in Rome. He was far the worthiest of the three candidates, but it was an intolerable invasion of the rights of the English crown and the English Church that an archbishop should be foisted on them in this fashion. The representatives of the chapter who had been sent to Rome were persuaded or compelled to elect him in the pope's presence (Dec. 1206).

King John was furious, and not without good reason; he refused to accept Langton, whom he declared (quite unjustly) to be a secret friend of Philip of France, and sequestrated the lands of the monks of Canterbury. On this the pope threatened to lay an interdict on himself and his realm. The king replied by issuing a proclamation to the effect that he would outlaw any clerk who should accept the validity of such an interdict and would confiscate his lands. Despising such threats Innocent carried out his threat, and put England under the ban of the Church on the 23rd of March 1208.

In obedience to the pope's orders the large majority of the English clergy closed their churches, and suspended the ordinary course of the services and celebration of the sacraments. Baptism and extreme unction only were continued, lest souls should be lost; and marriages were permitted but not inside the walls of churches. Foreseeing the wrath of the king against all who obeyed the mandate from Rome, the larger number of the bishops and many others of the higher clergy fled overseas to escape the storm. Those who were bold enough to remain behind had much to endure. John, openly rejoicing at the plunder that lay before him, declared the temporalities of all who had accepted the interdict, whether they had exiled themselves or no, to be confiscated. His treasury was soon so well filled that he could dispense with ordinary taxation. He also outlawed the whole body of the clergy, save the timid remnant who promised to disregard the papal commands.

Character of John's rule.

Nothing proves more conclusively the strength of the Angevin monarchy, and the decreasing power of feudalism, than that an unpopular king like John could maintain his strife with the pope, and suppress the discontents of his subjects, for nearly five years before the inevitable explosion came. Probably his long immunity was due in the main to the capacity of his strong-handed justiciar Geoffrey Fitz-Peter; the king hated him bitterly, but generally took his advice. The crash only came when Geoffrey died in 1213; his ungrateful master only expressed joy. "Now by God's feet am I for the first time king of England," he exclaimed, when the news reached him. He proceeded to fill the vacancy with a mere Poitevin adventurer, Peter des Roches, whom he had made bishop of Winchester some time before. Indeed John's few trusted confidants were nearly all foreigners, such men as the mercenary captains Gerard of Athies and Engelhart of Cigogné, whom he made sheriffs and castellans to the discontent of all Englishmen. He spent all his money in maintaining bands of hired *Brabançons* and *routiers*, by whose aid he for some time succeeded in terrorizing the countryside. There were a few preliminary outbreaks of rebellion, which were suppressed with vigour and punished with horrible cruelty. John starved to death the wife and son of William de Braose, the first baron who took arms against him, and hanged in a row twenty-eight young boys, hostages for the fidelity of their fathers, Welsh princes who had dabbled in treason. Such acts provoked rage as well as fear, yet the measure of John's iniquities was not full till 1212. Indeed for some time his persistent prosperity provoked the indignant surprise of those who believed him to be under a curse. If his renewed war with Philip of France was generally unsuccessful, yet at home he held his own. The most astounding instance of his success is that in 1210 he found leisure for a hasty expedition to Ireland, where he compelled rebellious barons to do homage, and received the submission of more than twenty of the local kinglets. It is strange that he came back to find England undisturbed behind him.

John does homage to the pope.

His long-deserved humiliation only began in the winter of 1212–1213, when Innocent III., finding him so utterly callous as to the interdict, took the further step of declaring him deposed from the throne for contumacy, and handing over the execution of the penalty to the king of France. This act provoked a certain amount of indignation in England, and in the spring of 1213 the king was able to collect a large army on Barham Down to resist the threatened French invasion. Yet so many of his subjects were discontented that he dared not trust himself to the chances of war, and, when the fleet of King Philip was ready to sail, he surprised the world by making a sudden and grovelling submission to the pope. Not only did he agree to receive Stephen Langton as archbishop, to restore all the exiled clergy to their benefices, and to pay them handsome compensation for all their losses during the last five years, but he took the strange and ignominious step of declaring that he ceded his whole kingdom to the pope, to hold as his vassal. He formally resigned his crown into the hands of the legate Cardinal Pandulf, and took it back as the pope's vassal, engaging at the same time to pay a tribute of 1000 marks a year for England and Ireland. This was felt to be a humiliating transaction by many of John's subjects, though to others the joy at reconciliation with the Church caused all else to be forgotten. The political effect of the device was all that John had desired. His new suzerain took him under his protection, and forbade Philip of France to proceed with his projected invasion, though ships and men were all ready (May 1213). John's safety, however, was secured in a more practical way when his bastard brother, William Longsword, earl of Salisbury, made a descent on the port of Damme and burnt or sunk a whole squadron of the French transports. After this John's spirits rose, and he talked of crossing the seas himself to recover Normandy and Anjou. But he soon found that his subjects were not inclined to follow him; they were resigned to the loss of the Angevin heritage, whose union with England brought no profit to them, however much it might interest their king. The barons expressed their wish for a peace with France, and when summoned to produce their feudal contingents pleaded poverty, and raised a rather shallow theory to the effect that their services could not be asked for wars beyond seas—against which there were conclusive precedents in the reigns of Henry I. and Henry II. But any plea can be raised against an unpopular king. John found himself obliged to turn back, since hardly a man save his mercenaries had rallied to his standard at Portsmouth. In great anger and indignation he marched off towards the north, with his hired soldiery, swearing to punish the barons who had taken the lead in the "strike" which had defeated his purpose. But the outbreak of war was to be deferred for a space. Archbishop Langton, who on assuming possession of his see had shown at once that he was a patriotic English statesman, and not the mere delegate of the pope, besought his master to hold back, and, when he refused, threatened to renew the excommunication which had so lately been removed. The old justiciar Geoffrey Fitz-Peter, now on his death-bed, had also refused to pronounce sentence on the defaulters. John hesitated, and meanwhile his enemies began to organize their resistance.

Opposition of the barons.

A great landmark in the constitutional history of England was reached when Langton assembled the leading barons, rehearsed to them the charter issued by Henry I. on his accession, and pointed out to them the rights and liberties therein promised by the crown to the nation. For the future they agreed to take this document as their programme of demands. It was the first of the many occasions in English history when the demand for reform took the shape of a reference back to old precedents, and now (as on all subsequent occasions) the party which opposed the crown read back into the ancient grants which they quoted a good deal more than had been actually conceded in them. To Langton and the barons the charter of Henry I. seemed to cover all the customs and practices which had grown up under the rule of the bureaucracy which had served Henry II. and Richard I. A correct historical perspective could hardly be expected from men whose constitutional knowledge only ran back as far as the memory of themselves and their fathers. The Great Charter of 1215 was a commentary on, rather than a reproduction of, the old accession pledges of Henry I.

Alliance against France.

Meanwhile John, leaving his barons to discuss and formulate their grievances, pushed on with a great scheme of foreign alliances, by which he hoped to crush Philip of France, even though the aid of the feudal levies of England was denied him. He leagued himself with his nephew the emperor Otto IV. (his sister's son), and the counts of Flanders and Boulogne, with many other princes of the Netherlands. Their plan was that John should land in Poitou and distract the attention of the French by a raid up the Loire, while the emperor and his vassals should secretly mobilize a great army in Brabant and make a sudden dash at Paris. The scheme was not destitute of practical ability, and if it had been duly carried out would have placed France in such a crisis of danger as she has seldom known. It was not John's fault that the campaign failed. He sent the earl of Salisbury with some of his mercenaries to join the confederates in Flanders, while he sailed with the main body of them to La Rochelle, whence he marched northward, devastating the land before him. Philip came out to meet him with the whole levy of France (April 1214), and Paris would have been left exposed if Otto and his Netherland vassals had struck promptly in. But the emperor was late, and by the time that he was approaching the French frontier Philip Augustus had discovered that John's invasion was but a feint, executed by an army too weak to do much harm. Leaving a small containing force on the Loire in face of the English king, Philip hurried to the north with his main army, and on the 27th of July 1214 inflicted a crushing defeat on the emperor and his allies at Bouvines near Lille. This was the greatest victory of the French medieval monarchy. It broke up the Anglo-German alliance, and gave the conqueror undisturbed possession of all that he had won from the Angevin house and his other enemies.

Battle of Bouvines.

Magna Carta.

Indirectly Bouvines was almost as important in the history of England as in that of France. John returned to England foiled, and in great anger; he resolved to give up the French war, secured a truce with King Philip by abandoning his attempt to reconquer his lost lands on the Loire, and turned to attack the recalcitrant subjects who had refused to join him in his late campaign beyond the Channel. Matters soon came to a head: on hearing that the king was mobilizing his mercenary bands, the barons met at Bury St Edmunds, and leagued themselves by an oath to obtain from the king a confirmation of the charter of Henry I. (November 1214). At the New Year they sent him a formal ultimatum, to which he would not assent, though he opened up futile negotiation with them through the channel of the archbishop, who did not take an open part in the rising. At Easter, nothing having been yet obtained from the king, an army headed by five earls, forty barons, and Giles Braose, bishop of Hereford, mustered at Stamford and marched on London. Their captain was Robert FitzWalter, whom they had named "marshal of the army of God and Holy Church." When they reached the capital its gates were thrown open to them, and the mayor and citizens adhered to their cause (May 17). The king, who had tried to turn them back by taking the cross and declaring himself a crusader, and by making loud appeals for the arbitration of the pope, was forced to retire to Windsor. He found that he had no supporters save a handful of courtiers and officials and the leaders of his mercenary bands; wherefore in despair he accepted the terms forced upon him by the insurgents. On the 15th of June 1215 he sealed at Runnymede, close to Windsor, the famous *Magna Carta*, in face of a vast assembly among which he had hardly a single friend. It is a long document of 63 clauses, in which Archbishop Langton and a committee of the barons had endeavoured to recapitulate all their grievances, and to obtain redress for them. Some of the clauses are unimportant concessions to individuals, or deal with matters of trifling importance—such as the celebrated weirs or "kiddles" on Thames and Medway, or the expulsion of the condottieri chiefs Gerard d'Athies and Engelhart de Cigogné. But many of them are matters of primary importance in the constitutional history of England. The Great Charter must not, however, be overrated as an expression of general constitutional rights; to a large extent it is a mere recapitulation of the claims of the baronage, and gives redress for their feudal grievances in the matters of aids, reliefs, wardships, &c., its object being the repression of arbitrary exactions by the king on his tenants-in-chief. One section, that which provides against the further encroachments of the king's courts on the private manorial courts of the landowners, might even be regarded as retrograde in character from the point of view of administrative efficacy. But it is most noteworthy that the barons, while providing for the abolition of abuses which affect themselves, show an unselfish and patriotic spirit in laying down the rule that all the concessions which the king makes to them shall also be extended by themselves to their own sub-tenants. The clauses dealing with the general governance of the realm are also as enlightened as could be expected from the character of the committee which drafted the charter. There is to be no taxation without the consent of the Great Council of the Realm—which is to consist of all barons, who are to be summoned by individual units, and of all smaller tenants-in-chief, who are to be called not by separate letters, but by a general notice published by the sheriff. It has been pointed out that this provides no representation for sub-tenants or the rest of the nation, so that we are still far from the ideal of a representative parliament. John himself had gone a step farther on the road towards that ideal when in 1213 he had summoned four "discreet men" from every shire to a council at Oxford, which (as it appears) was never held. But this would seem to have been a vain bid for popularity with the middle classes, which had no result at the time, and the barons preferred to keep things in their own hands, and to abide by ancient precedents. It was to be some forty years later that the first appearance of elected shire representatives at the Great Council took place. In 1215 the control of the subjects over the crown in the matter of taxation is reserved entirely for the tenants-in-chief, great and small.

There is less qualified praise to be bestowed on the clauses of Magna Carta which deal with justice. The royal courts are no longer to attend the king's person—a vexatious practice when sovereigns were always on the move, and litigants and witnesses had to follow them from manor to manor—but are to be fixed at Westminster. General rules of indisputable equity are fixed for the conduct of the courts—no man is to be tried or punished more than once for the same offence; no one is to be arrested and kept in prison without trial; all arrested persons are to be sent before the courts within a reasonable time, and to be tried by a jury of their peers. Fines imposed on unsuccessful litigants are to be calculated according to the measure of their offence, and are not to be arbitrary penalties raised or lowered at the king's good pleasure according to the sum that he imagined that the offender could be induced to pay. No foreigners or other persons ignorant of the laws of England are to be entrusted with judicial or administrative offices.

There is only a single clause dealing with the grievances of the English Church, although Archbishop Langton had been the principal adviser in the drafting of the whole document. This clause, "that the English church shall be free," was, however, sufficiently broad to cover all demands. The reason that Langton did not descend to details was that the king had already conceded the right of free canonical election and the other claims of the clerical order in a separate charter, so that there was no need to discuss them at length.

The special clauses for the benefit of the city of London were undoubtedly inserted as a tribute of gratitude on the part of the barons for the readiness which the citizens had shown in adhering to their cause. There are other sections for the benefit of the commons in general, such as that which gives merchants full right of leaving or entering the realm with their goods on payment of the fixed ancient custom dues. But these clauses are less numerous than might have been expected—the framers of the document were, after all, barons and not burghers.

The most surprising part of the Great Charter to modern eyes is its sixty-first paragraph, that which openly states doubts as to the king's intention to abide by his promise, and appoints a committee of twenty-five guardians of the charter (twenty-four barons and the mayor of London), who are to coerce their master, by force of arms if necessary, to observe every one of its clauses. The twenty-five were to hear and decide upon any claims and complaints preferred against the king, and to keep up their numbers by co-optation, so that it would seem that the barons intended to keep a permanent watch upon the crown. The clause seems unnecessarily harsh and violent in its wording; but it must be remembered that John's character was well known, and that it was useless to stand on forms of politeness when dealing with him. It seems certain that the drafters of the charter were honest in their intentions, and did not purpose to set up a feudal oligarchy in the place of a royal autocracy. They were only insisting on the maintenance of what they believed to be the ancient and laudable customs of the realm.

That the barons were right to suspect John is sufficiently shown by his subsequent conduct. His pretence of keeping his promise lasted less than two months; by August 1215 he was already secretly collecting money and hiring more mercenaries. He wrote to Rome to beg the pope to annul the charter, stating that all his troubles had come upon him in consequence of his dutiful conduct to the Holy See. He also stated that he had taken the cross as a crusader, but could not sail to Palestine as long as his subjects were putting him in restraint. Innocent III. at once took the hint; in September Archbishop Langton was suspended for disobedience to papal commands, and the charter was declared uncanonical, null and void. The "troublers of the king and kingdom" were declared excommunicate.

Civil War.

Langton departed at once to Rome, to endeavour to turn the heart of his former patron, a task in which he utterly failed. Many of the clergy who had hitherto supported the baronial cause drew back in dismay at the pope's attitude. But the laymen were resolute, and prepared for open war, which broke out in October 1215. The king, who had already gathered in many mercenaries, gained the first advantage by capturing Rochester Castle before the army of the barons was assembled. So formidable did he appear to them for the moment that they took the deplorable step of inviting the foreign foe to join in the struggle. Declaring John deposed because he had broken his oath to observe the charter, they offered the crown to Louis of France, the son of King Philip, because he had married John's niece Blanche of Castile and could assert in her right a claim to the throne. This was a most unhappy inspiration, and drove into neutrality or even into the king's camp many who had previously inclined to the party of reform. But John did his best to disgust his followers by adopting the policy of carrying out fierce and purposeless raids of devastation all through the countryside, while refusing to face his enemies in a pitched battle. He bore himself like a captain of banditti rather than a king in his own country. Presently, when the French prince came over with a considerable army to join the insurgent barons, he retired northward, leaving London and the home counties to his rival. In all the south country only Dover and Windsor castles held out for him. His sole success was that he raised the siege of Lincoln by driving off a detachment of the baronial army which was besieging it.

Death of John.

Soon after, while marching from Lynn towards Wisbeach, he was surprised by the tide in the fords of the Wash and lost part of his army and all his baggage and treasure. Next day he fell ill of rage and vexation of spirit, contracted a dysenteric ailment, and died a week later at Newark (Oct. 19, 1216). It was the best service that he could do his kingdom. Owing to the unwise and unpatriotic conduct of the barons in summoning over Louis of France to their aid, John had become in some sort the representative of national independence. Yet he was so frankly impossible as a ruler that, save the earls of Pembroke and Chester, all his English followers had left him, and he had no one to back him but the papal legate Gualo and a band of foreign mercenaries. When once he was dead, and his heritage fell to his nine-year-old son Henry III., whom none could make responsible for his father's doings, the whole aspect of affairs was changed.

Henry III.

The aged William Marshal, earl of Pembroke, by far the most important and respectable personage who had adhered to John's cause, assumed the position of regent. He at once offered in the name of the young king pardon and oblivion of offences to all the insurgent barons. At the same time he reissued the Great Charter, containing all the important concessions which John had made at Runnymede, save that which gave the control of taxation to the tenants-in-chief. Despite this and certain other smaller omissions, it was a document which would satisfy most subjects of the crown, if only it were faithfully observed. The youth of the king and the good reputation of the earl marshal were a sufficient guarantee that, for some years at any rate, an honest attempt would be made to redeem the pledge. Very soon the barons began to return to their allegiance, or at least to slacken in their support of Louis, who had given much offence by his openly displayed distrust of his partisans and his undisguised preference for his French followers. The papal influence was at the same time employed in the cause of King Henry, and Philip of France was forced to abandon open support of his son, though he naturally continued to give him secret help and to send him succours of men and money.

Battle of Lincoln.

The fortune of war, however, did not turn without a battle. At Lincoln, on the 20th of May 1217, the marshal completely defeated an Anglo-French army commanded by the count of Perche and the earls of Winchester and Hereford. The former was slain, the other two taken prisoners, with more than 300 knights and barons. This was the death-blow to the cause of Louis of France; when it was followed up by the defeat in the Dover Straits of a fleet which was bringing him reinforcements (Aug. 17), he despaired of success and asked for terms. By the treaty of Lambeth (Sept. 11, 1217) he secured an amnesty for all his followers and an indemnity of 10,000 marks for himself. Less than a month later he quitted England; the victorious royalists celebrated his departure by a second reissue of the Great Charter, which contained some new clauses favourable to the baronial interest.

After the departure of Prince Louis and his foreigners the earl marshal had to take up much the same task that had fallen to Henry II. in 1154. Now, as at the death of Stephen, the realm was full of "adulterine castles," of bands of robbers who had cloaked their plundering under the pretence of loyal service to the king or the French prince, and of local magnates who had usurped the prerogatives of royalty, each in his own district. It was some years before peace and order were restored in the realm, and the aged Pembroke died in 1219 before his work was completed. After his decease the conduct of the government passed into the hands of the justiciar Hubert de Burgh, and the papal legate Pandulf, to whom the marshal had specially recommended the young king. Their worst enemies were those who during the civil war had been their best friends, the mercenary captains and upstart knights whom John had made sheriffs and castellans. From 1219 to 1224 de Burgh was constantly occupied in evicting the old loyalists from castles which they had seized or offices which they had disgraced. In several cases it was necessary to mobilize an army against a recalcitrant magnate. The most troublesome of them was Falkes de Breauté, the most famous of King John's foreign *condottieri*, whose minions held Bedford castle against the justiciar and the whole shire levy of eastern England for nearly two months in 1224. The castle was taken and eighty men-at-arms hanged on its surrender, but Falkes escaped with his life and fled to France. It was not till this severe lesson had been inflicted on the faction of disorder that the pacification of England could be considered complete.

The fifty-six years' reign of Henry III. forms one of the periods during which the mere chronicle of events may seem tedious and trivial, yet the movement of national life and constitutional progress was very important. Except during the stirring epoch 1258–1265 there was little that was dramatic or striking in the events of the reign. Yet the England of 1272 was widely different from the England of 1216. The futile and thriftless yet busy and self-important king was one of those sovereigns who irritate their subjects into opposition by injudicious activity. He was not a ruffian or a tyrant like his father, and had indeed not a few of the domestic virtues. But he was constitutionally incapable of keeping a promise or paying a debt. Not being strong-handed or capable, he could never face criticism nor suppress discontent by force, as a king of the type of Henry I. or Henry II. would have done. He generally gave way when pressed, without attempting an appeal to arms; he would then swear an oath to observe the Great Charter, and be detected in violating it again within a few months. His greatest fault in the eyes of his subjects was his love of foreigners; since John had lost Normandy the English baronage had become as national in spirit as the commons. The old Anglo-Norman houses had forgotten the tradition of their origin, and now formed but a small section of the aristocracy; the newer families, sprung from the officials of the first two Henries, had always been English in spirit.

Unfortunately for himself the third Henry inherited the continental cosmopolitanism of his Angevin ancestors, and found himself confronted with a nation which was growing ever more and more insular in its ideals. He had all the ambitions of his grandfather Henry II.; his dreams were of shattering the newly-formed kingdom of France, the creation of Philip Augustus, and of recovering all the lost lands of his forefathers on the Seine and Loire. Occasionally his views grew yet wider—he would knit up alliances all over Christendom and dominate the West. Nothing could have been wilder and more unpractical than the scheme on which he set his heart in 1255-1257, a plan for conquering Naples and Sicily for his second son. Moreover it was a great hindrance to him that he was a consistent friend and supporter of the papacy. He had never forgotten the services of the legates Pandulf and Gualo to himself and his father, and was always ready to lend his aid to the political schemes of the popes, even when it was difficult to see that any English interests were involved in them. His designs, which were always shifting from point to point of the continent, did not appeal in the least to his subjects, who took little interest in Poitou or Touraine, and none whatever in Italy. After the troubled times which had lasted from 1214 to 1224 they desired nothing more than peace, quietness and good governance. They had no wish to furnish their master with taxation for French wars, or to follow his banner to distant Aquitaine. But most of all did they dislike his practice of flooding England with strangers from beyond seas, for whom offices and endowments had to be found. The moment that he had got rid of the honest and capable old Justiciar Hubert de Burgh, who had pacified the country during his minority, and set the machinery of government once more in regular order, Henry gave himself over to fostering horde after horde of foreign favourites. There was first his Poitevin chancellor, Peter des Roches, bishop of Winchester, with a numerous band of his relations and dependents. As a sample of the king's methods it may be mentioned that he once made over nineteen of the thirty-five sheriffdoms, within a fortnight, to Peter of Rivaux, a nephew of the chancellor. Des Roches was driven from office after two years (1234), and his friends and relatives fell with him. But they were only the earliest of the king's alien favourites; quite as greedy were the second family of his mother, Isabella of Angoulême, who after King John's death had married her old betrothed, Hugh of Lusignan. Henry secured great English marriages for three of them, and made the fourth, Aymer, bishop of Winchester. Their kinsmen and dependents were equally welcomed. Even more numerous and no less expensive to the realm were the Provençal and Savoyard relatives of Henry's queen, Eleanor of Provence. The king made one of her uncles, Boniface of Savoy, archbishop of Canterbury—it was three years before he deigned to come over to take up the post, and then he was discovered to be illiterate and unclerical in his habits, an unworthy successor for Langton and Edmund of Abingdon, the great primates who went before him. Peter of Savoy, another uncle, was perhaps the most shameless of all the beggars for the king's bounty; not only was he made earl of Richmond, but his debts were repeatedly paid and great sums were given him to help his continental adventures.

Simon de Montfort.

King Henry's personal rule lasted from 1232, the year in which he deprived Hubert de Burgh of his justiciarship and confiscated most of his lands, down to 1258. It was thriftless, arbitrary, and lacking in continuity of policy, yet not tyrannical or cruel. If he had been a worse man he would have been put under control long before by his irritated subjects. All through these twenty-six years he was being opposed and criticised by a party which embraced the wisest and most patriotic section of the baronage and the hierarchy. It numbered among its leaders the good archbishop, Edmund of Abingdon, and Robert Grossetete, the active and learned bishop of Lincoln; it was not infrequently aided by the king's brother Richard, earl of Cornwall, who did not share Henry's blind admiration for his foreign relatives. But it only found its permanent guiding spirit somewhat late in the reign, when Simon de Montfort, earl of Leicester, became the habitual mouthpiece of the grievances of the nation. The great earl had, oddly enough, commenced his career as one of the king's foreign favourites. He was the grandson of Amicia, countess of Leicester, but his father, Simon the Elder, a magnate whose French interests were greater than his English, had adhered to the cause of Philip Augustus in the days of King John and the Leicester estates had been confiscated. Simon, reared as a Frenchman, came over in 1230 to petition for their restoration. He not only obtained it, but to the great indignation of the English baronage married the king's sister Eleanor in 1238. For some time he was in high favour with his brother-in-law, and was looked upon by the English as no better than Aymer de Valence or Peter of Savoy. But he quarrelled with the fickle king, and adhered ere long to the party of opposition. A long experience of his character and actions convinced barons and commons alike that he was a just and sincere man, a friend of good governance, and an honest opponent of arbitrary and unconstitutional rule. He had become such a thorough Englishman in his views and prejudices, that by 1250 he was esteemed the natural exponent of all the wrongs of the realm. He was austere and religious; many of his closest friends were among the more saintly of the national clergy. By the end of his life the man who had started as the king's unpopular minion was known as "Earl Simon the Righteous," and had become the respected leader of the national opposition to his royal brother-in-law.

Condition of England under Henry III.

Though Henry's taxes were vexatious and never-ending, though his subservience to the pope and his flighty interference in foreign politics were ever irritating the magnates and the people, and though outbreaks of turbulence were not unknown during his long period of personal rule, it would yet be a mistake to regard the central years of the 13th century as an unprosperous period for England. Indeed it would be more correct to regard the period as one of steady national development in wealth, culture and unity. The towns were growing fast, and extending their municipal liberties; the necessities of John and the facile carelessness of Henry led to the grant of innumerable charters and privileges. As was to be seen again during the first period of the reign of Charles I., political irritation is not incompatible either with increasing material prosperity or with great intellectual development. The king's futile activity led to ever more frequent gatherings of the Great Council, in which the theory of the constitution was gradually hammered out by countless debates between the sovereign and his subjects. Every time that Henry confirmed the Great Charter, the fact that England was already a limited monarchy became more evident. It is curious to find that—like his father John—he himself contributed unconsciously to advances towards representative government. John's writ of 1213, bidding "discreet men" from each shire to present themselves at Oxford, found its parallel in another writ of 1253 which bids four knightly delegates from each county to appear along with the tenants-in-chief, for the purpose of discussing the king's needs. When county members begin to present themselves along with the barons at the national assembly, the conception of parliament is already reached. And indeed we may note that the precise word "parliament" first appears in the chroniclers and in official documents about the middle of Henry's reign. By its end the term is universally acknowledged and employed.

Beginnings of parliament.

Intellectual life.

We may discern during these same years a great intellectual activity. This was the time of rapid development in the universities, where not only were the scholastic philosophy and systematic theology eagerly studied, but figures appear like that of the great Roger Bacon, a scientific researcher of the first rank, whose discoveries in optics and chemistry caused his contemporaries to suspect him of magical arts. His teaching at Oxford in 1250-1257 fell precisely into the years of the worst misgovernance of Henry III. It was the same with law, an essentially 13th-century study; it was just in this age that the conception of law as something not depending on the pleasure of the king, nor compiled from mere collected ancestral customs, but existing as a logical entity, became generally prevalent. The feeling is thoroughly well expressed by the partisan of Montfort who wrote in his jingling Latin verse:—

> "Dicitur vulgariter 'ut rex vult lex vadit':
> Veritas vult aliter: nam lex stat, rex cadit."

Law has become something greater than, and independent of, royal caprice. The great lawyers of the day, of whom Bracton is the most celebrated name, were spinning theories of its origin and development, studying Roman precedents, and turning the medley of half-understood Saxon and Norman customs into a system.

Religious life: the friars.

Intellectual growth was accompanied by great religious activity; it is no longer merely on the old questions of dispute between church and state that men were straining their minds. The reign of Henry III. saw the invasion of England by the friars, originally the moral reformers of their day, who preached the superiority of the missionary life over the merely contemplative life of the old religious orders, and came, preaching holy poverty, to minister to souls neglected by worldly incumbents and political prelates (see Mendicant Movement). The mendicants, Dominican and Franciscan, took rapid root in England; the number of friaries erected in the reign of Henry III. is astounding. For two generations they seem to have absorbed into their ranks all the most active and energetic of those who felt a clerical vocation. It is most noteworthy that they were joined by thinkers such as Grosseteste, Adam Marsh, Roger Bacon, Duns Scotus and William of Ockham. Still more striking is the fact that the friars threw themselves energetically into the cause of political reform, and that several of their leading brothers were the close friends and counsellors of Simon de Montfort.

Literature and art.

Architecture and art generally were making rapid strides during this stirring time. The lofty Early English style had now completely superseded the more heavy and sombre Norman, and it was precisely during the years of the maladministration of Henry III. that some of the most splendid of the English cathedrals, Salisbury (1220–1258) and Wells (1230–1239), were built. The king himself, when rearing the new Westminster Abbey over the grave of Edward the Confessor, spent for once some of his money on a worthy object. It may be noted that he showed a special reverence for the old English royal saint, and christened his eldest son after him; while his second bore the name of Edmund, the East Anglian martyr. These were the first occasions on which princes of the Angevin house received names that were not drawn from the common continental stock, but recalled the days before the Conquest. The reappearance of these old English names bears witness to the fact that the vernacular was reasserting itself. Though French was still the language of the court and of law, a new literature was already growing up in the native tongue, with such works as Layamon's *Brut* and the *Ormulum* as its first fruits. Henry III. himself on rare occasions used English for a state document.

All these facts make it sufficiently clear that England was irritated rather than crushed by Henry's irregular taxation and thriftless expenditure. The nation was growing and prospering, despite of its master's maladministration of its resources. On several occasions when he endeavoured to commit parliaments to back his bills and endorse his policy, they refused to help him, and left him to face his debts as best he might. This was especially the case with the insane contract which he made with Pope Innocent IV. in 1254, when he bound the realm of England to find 140,000 marks to equip an army for the conquest of Naples and Sicily. Henry lacked the energy to attempt to take by force what he could not obtain by persuasion, and preferred to break his bargain with the pope rather than to risk the chance of civil war at home.

Public discontent. The Provisions of Oxford.

It was over this Sicilian scheme, the crowning folly of the king, that public opinion at last grew so hot that the intermittent criticism and grumbling of the baronage and the nation passed into vigorous and masterful action. At the "Mad Parliament," which met at Oxford, 1258, the barons informed their master that his misgovernment had grown so hopeless that they were resolved to put him under constitutional restraints. They appointed a committee of twenty-four, in which Simon de Montfort was the leading spirit, and entrusted it with the duty, not only of formulating lists of grievances, but of seeing that they were redressed. Henry found that he had practically no supporters save his unpopular foreign relatives and favourites, and yielded perforce. To keep him in bounds the celebrated "Provisions of Oxford" were framed. They provided that he was to do nothing without the consent of a permanent council of fifteen barons and bishops, and that all his finances were to be controlled by another committee of twenty-four persons. All aliens were to be expelled from the realm, and even the king's household was to be "reformed" by his self-constituted guardians. The inevitable oath to observe honestly all the conditions of the Great Charter of 1215 was, as usual, extorted from him with special formalities. Though Montfort and the barons voiced the public discontent, the constitution which they thus imposed on the king had nothing popular about it. The royal functions of which Henry was stripped were to be exercised by a series of baronial committees. The arrangement was too cumbersome, for there was nothing which would be called a central executive; the three bodies (two of twenty-four members each, the third of fifteen) were interdependent, and none of them possessed efficient control over the others. It was small wonder that the constitution established by the Provisions of Oxford was found unworkable. They were not even popular—the small landholders and subtenants discovered that their interests had not been sufficiently regarded, and lent themselves to an agitation against the provisional government, which was got up by Edward, the king's eldest son, who now appeared prominently in history for the first time. To conciliate them the barons allowed the "Provisions of Westminster" to be enacted in 1259, in which the power of feudal courts was considerably restricted, and many classes of suit were transferred to the royal tribunals, a sufficient proof that the king's judges did not share in the odium which appertained to their master, and were regarded as honest and impartial.

The limited monarchy established by the Provisions of Oxford lasted only three years. Seeing the barons quarrelling among themselves, and Montfort accused of ambition and overweening masterfulness by many of his colleagues, the king took heart. Copying the example of his father in 1215, he obtained from the pope a bull, which declared the new constitution irregular and illegal, and absolved him from his oath to abide by it. He then began to recall his foreign friends and relatives, and to assemble mercenaries. De Montfort answered by raising an army, arresting prominent aliens, and seizing the lands which the king had given them. Henry thereupon, finding his forces too weak to face the earl, took refuge in the Tower of London and proposed an arbitration. He offered to submit his case to Louis IX., the saintly king of France, whose virtues were known and respected all over Europe, if the baronial party would do the same. An appeal to the pope they would have laughed to scorn; but the confidence felt in the probity of the French king was so great that Montfort advised his friends to accede to the proposal. This was an unwise step. Louis was a saint, but he was also an autocratic king, and had no knowledge of the constitutional customs of England. Having heard the claims of the king and the barons, he issued the mise of Amiens (Jan. 23, 1264), so called from the city at which he dated it, a document which stated that King Henry ought to abide by the terms of Magna Carta, to which he had so often given his assent, but that the Provisions of Oxford were wholly invalid and derogatory to the royal dignity. "We ordain," he wrote, "that the king shall have full power and free jurisdiction over his realm, as in the days before the said Provisions." The pope shortly afterwards confirmed the French king's award.

Simon de Montfort and his friends were put in an awkward position by this decision, to which they had so unwisely committed themselves. But they did not hesitate to declare that they must repudiate the mise. Simon declared that it would be a worse perjury to abandon his oath to keep the Provisions of Oxford than his oath to abide by the French king's award. He took arms again at the head of the Londoners and his personal adherents and allies. But many of the barons stood neutral, not seeing how they could refuse to accept the arbitration they had courted, while a number not inconsiderable joined the king, deciding that Leicester had passed the limits of reasonable loyalty, and that their first duty was to the crown.

The barons' war: battle of Lewes.

Hence it came to pass that in the campaign of 1264 Simon was supported by a minority only of the baronial class, and the king's army was the larger. The fortune of war inclined at first in favour of the royalists, who captured Northampton and Nottingham. But when it came to open battle, the military skill of the earl sufficed to compensate for the inferiority of his numbers. At Lewes, on the 14th of May, he inflicted a crushing defeat on the king's army. Henry himself, his brother Richard of Cornwall, and many hundreds of his chief supporters were taken prisoners. His son Prince Edward, who had been victorious on his own flank of the battle, and had not been caught in the rout, gave himself up next morning, wishing to share his father's fate, and not to prolong a civil war which seemed to have become hopeless.

Montfort's parliament.

On the day that followed his victory Leicester extorted from the captive king the document called the "mise of Lewes," in which Henry promised to abide by all the terms of the Provisions of Oxford, as well as to uphold the Great Charter and the old customs of the realm. Montfort was determined to put his master under political tutelage for the rest of his life. He summoned a parliament, in which four knights elected by each shire were present, to establish the new constitution. It appointed Simon, with his closest allies, the young earl of Gloucester and the bishop of Chichester, as electors who were to choose a privy council for the king and to fill up all offices of state. The king was to exercise no act of sovereignty save by the consent of the councillors, of whom three were to follow his person wherever he went. This was a far simpler constitution than that framed at Oxford in 1258, but it was even more liable to criticism. For if the "Provisions" had established a government by baronial committees, the parliament of 1264 created one which was a mere party administration. For the victorious faction, naturally but unwisely, took all power for themselves, and filled every sheriffdom, castellany and judicial office with their own firm friends. Simon's care to commit the commons to his cause by summoning them to his parliament did not suffice to disguise the fact that the government which he had set up was not representative of the whole nation. He himself was too much like a dictator; even his own followers complained that he was over-masterful, and the most important of them, the young earl of Gloucester, was gradually estranged from him by finding his requests often refused and his aims crossed by the old earl's action. The new government lasted less than two years, and was slowly losing prestige all the time. Its first failure was in the repression of the surviving royalists. Isolated castles in several districts held out in the king's name, and the whole March of Wales was never properly subdued. When Simon turned the native Welsh prince Llewelyn against the marcher barons, he gave great offence; he was accused of sacrificing Englishmen to a foreign enemy. The new regime did not give England the peace which it had promised; its enemies maintained that it did not even give the good governance of which Simon had made so many promises. It certainly appears that some of his followers, and notably his three reckless sons, had given good cause for offence by high-handed and selfish acts. Much indignation was provoked by the sight of the king kept continually in ward by his privy councillors and treated with systematic neglect; but the treatment of his son was even more resented. Edward, though he had given little cause of offence, and had behaved admirably in refusing to continue the civil war, was deprived of his earldom of Chester, and put under the same restraint as his father. There was no good reason for treating him so harshly, and his state was much pitied.

Montfort attempted to strengthen his position, and to show his confidence in the commons, by summoning to his second and last parliament, that of 1265, a new element—two citizens from each city and two burgesses from each borough in the realm. It must be confessed that his object was probably not to introduce a great constitutional improvement, and to make parliament more representative, but rather to compensate for the great gaps upon the baronial benches by showing a multitude of lesser adherents, for the towns were his firm supporters. The actual proceedings of this particular assembly had no great importance.

Battle of Evesham.

Two months later Prince Edward escaped from his confinement, and fled to the earl of Gloucester, who now declared himself a royalist. They raised an army, which seized the fords of the Severn, in order to prevent de Montfort—who was then at Hereford with the captive king—from getting back to London or the Midlands. The earl, who could only raise a trifling force in the Marches, where the barons were all his enemies, failed in several attempts to force a passage eastward. But his friends raised a considerable host, which marched under his son Simon the Younger and the earl of Oxford, to fall on the rear of the royalists. Prince Edward now displayed skilful generalship—hastily turning backward he surprised and scattered the army of relief at Kenilworth (Aug. 1); he was then free to deal with the earl, who had at last succeeded in passing the Severn during his absence. On the 4th of August he beset Montfort's little force with five-fold numbers, and absolutely exterminated it at Evesham. Simon fought most gallantly, and was left dead on the field along with his eldest son Henry, his justiciar Hugh Despenser, and the flower of his party. The king fell into the hands of his son's followers, and was once more free.

It might have been expected that the victorious party would now introduce a policy of reaction and autocratic government. But the king was old and broken by his late misfortunes: his son the prince was wise beyond his years, and Gloucester and many other of the present supporters of the crown had originally been friends of reform, and had not abandoned their old views. They had deserted Montfort because he was autocratic and masterful, not because they had altogether disapproved of his policy. Hence we find Gloucester insisting that the remnant of the vanquished party should not be subjected to over heavy punishment, and even making an armed demonstration, in the spring of 1267, to demand the re-enactment of the Provisions of Oxford. Ultimately the troubles of the realm were ended by the Dictum of Kenilworth (Oct. 31, 1266) and the Statute of Marlborough (Nov. 1267). The former allowed nearly all of Montfort's faction to obtain amnesty and regain their estates on the payment of heavy fines; only Simon's own Leicester estates and those of Ferrers, earl of Derby, were confiscated. The latter established a form of constitution in which many, if not all, of the innovations of the Provisions of Oxford were embodied. The only unsatisfactory part of the pacification was that Llewelyn of Wales, who had ravaged the whole March while he was Montfort's ally, was allowed to keep a broad region (the greater part of the modern shire of Denbigh) which he had won back from its English holders. His power in a more indirect fashion extended itself over much of Mid-Wales. The line of the March was distinctly moved backward by the treaty of 1267.

Death of Henry III.

King Henry survived his restoration to nominal, if not to actual, authority for seven years. He was now too feeble to indulge in any of his former freaks of foreign policy, and allowed the realm to be governed under his son's eye by veteran bureaucrats, who kept to the old customs of the land. Everything settled down so peacefully that when the prince took the cross, and went off to the Crusades in 1270, no trouble followed. Edward was still absent in Palestine when his father died, on the 16th of November 1272. For the first time in English history there was no form of election of the new king, whose accession was quietly acknowledged by the officials and the nation. It was nearly two years after his father's death that he reached England, yet absolutely no trouble had occurred during his absence. He had taken advantage of his leisurely journey home to pacify the turbulent Gascony, and to visit Paris and make a treaty with King Philip III. by which the frontiers of his duchy of Aquitaine were rectified, to some slight extent, in his favour. He, of course, did homage for the holding, as his father had done before him.

Edward I.

The reign which began with this unwonted quietness was perhaps the most important epoch of all English medieval history in the way of the definition and settlement of the constitution. Edward I. was a remarkable figure, by far the ablest of all the kings of the house of Plantagenet. He understood the problem that was before him, the construction of a working constitution from the old ancestral customs of the English monarchy plus the newer ideas that had been embodied in the Great Charter, the Provisions of Oxford, and the scanty legislation of Simon de Montfort. Edward loved royal power, but he was wise in his generation, and saw that he could best secure the loyalty of his subjects by assenting to so many of the new constitutional restraints as were compatible with his own practical control of the policy of the realm. He was prepared to refer all important matters to his parliament, and (as we shall see) he improved the shape of that body by reintroducing into it the borough members who had appeared for the first time in Montfort's assembly of 1265. He would have liked to make parliament, no doubt, a mere meeting for the voting of taxation with the smallest possible friction. But he fully realized that this dream was impossible, and was wise enough to give way, whenever opposition grew too strong and bitter. He had not fought through the civil wars of 1263–66 without learning his lesson. There was a point beyond which it was unwise to provoke the baronage or the commons, and, unlike his flighty and thriftless father, he knew where that point came. The constitutional quarrels of his reign were conducted with decency and order, because the king knew his own limitations, and because his subjects trusted to his wisdom and moderation in times of crisis. Edward indeed was a man worthy of respect, if not of affection. His private life was grave and seemly, his court did not sin by luxury or extravagance. His chosen ministers were wise and experienced officials, whom no man could call favourites or accuse of maladministration. He was sincerely religious, self-restrained and courteous, though occasionally, under provocation, he could burst out into a royal rage. He was a good master and a firm friend. Moreover, he had a genuine regard for the sanctity of a promise, the one thing in which his father had been most wanting. It is true that sometimes he kept his oaths or carried out his pledges with the literal punctuality of a lawyer, rather than with the chivalrous generosity of a knight. But at any rate he always endeavoured to discharge an obligation, even if he sometimes interpreted it by the strict letter of the law and not with liberality. A conscientious man according to his lights, he took as his device the motto *Pactum serva*, "keep troth," which was afterwards inscribed on his tomb, and did his best to live up to it. Naturally he expected the same accuracy from other men, and when he did not meet it he could be harsh and unrelenting in the punishment that he inflicted. To sum up his character it must be added that he was a very great soldier. The headlong courage which he showed at Lewes, his first battle, was soon tempered by caution, and already in 1265 he had shown that he could plan a campaign with skill. In his later military career he was the first general who showed on a large scale how the national English weapon, the bow, could win fights when properly combined with the charge of the mailed cavalry. He inaugurated the tactics by which his grandson and great-grandson were to win epoch-making victories abroad.

Edward's reign lasted for thirty-five years, and was equally important in constitutional development and in imperial policy. The first period of it, 1272–1290, may be defined as mainly notable for his great series of legislative enactments and his conquest of Wales. The second, 1290–1307, contains his long and ultimately unsuccessful attempt to incorporate Scotland into his realm, and his quarrels with his parliament.

Constitutional changes. Statutes of Westminster and Gloucester.

The changes made by Edward in constitutional law by his great series of statutes commenced very soon after his return to his kingdom in 1274. We may trace in all of them the same purpose of strengthening the power of the crown by judicious and orderly definition of its privileges. The great enactments start with the First Statute of Westminster (1275), a measure directed to the improvement of administrative details, which was accompanied by a grant to the king of a permanent customs-revenue on imports and exports, which soon became more valuable to the royal exchequer than the old feudal taxes on land. In 1278 followed the Statute of Gloucester, an act empowering the king to make inquiry as to the right by which old royal estates, or exceptional franchises which infringed on the royal prerogative of justice or taxation, had passed into the hands of their present owners. This inquest was made by the writ *Quo Warranto*, by which each landholder was invited to show the charter or warrant in which his claims rested. The baronage were angry and suspicious, for many of their customary rights rested on immemorial and unchartered antiquity, while others were usurpations from the weakness of John or Henry III. They showed signs of an intention to make open resistance; but to their surprise the king contented himself with making complete lists of all franchises then existing, and did no more; this being his method of preventing the growth of any further trespasses on his prerogative.

Statute of Mortmain.

Edward's next move was against clerical encroachments. In 1279 he compelled Archbishop Peckham to withdraw some legislation made in a synod called without the royal permission—a breach of one of the three great canons of William the Conqueror. Then he took the offensive himself, by persuading his parliament to pass the Statute of Mortmain (de religiosis). This was an act to prevent the further accumulation of landed property in the "dead hand" of religious persons and communities. The more land the church acquired, the less feudal taxation came into the royal exchequer. For undying corporations paid the king neither "reliefs" (death duties) nor fees on wardship and marriage, and their property would never escheat to the crown for want of an heir. The Statute of Mortmain forbade any man to alienate land to the church without royal licence. It was very acceptable to the baronage, who had suffered, on a smaller scale, the same grievance as the king, for when their subtenants transferred estates to the church, they (like their masters) suffered a permanent loss of feudal revenue. A distinct check in the hitherto steady growth of clerical endowments began from this time, though licences in mortmain were by no means impossible to obtain.

Second Statute of Westminster.

The great group of statutes that date from Edward's earlier years ends with the legislative enactments of 1285, the Second Statute of Westminster and the Statute of Winchester. The former contains the clause *De Donis Conditionalibus*, a notable landmark in the history of English law, since it favoured the system of entailing estates. Hitherto life-owners of land, holding as subtenants, had possessed large powers of alienating it, to the detriment of their superior lords, who would otherwise have recovered it, when their vassals died heirless, as an "escheat." This custom was primarily harmful to the king—the greatest territorial magnate and the one most prone to distribute rewards in land to his servants. But it was also prejudicial to all tenants-in-chief. By *De Donis* the tenant for life was prevented from selling his estate, which could only pass to his lawful heir; if he had none, it fell back to his feudal superior. Five years later this legislation was supplemented by the statute *Quia Emptores*, equally beneficial to king and barons, which provided that subtenants should not be allowed to make over land to other persons, retaining the nominal possession and feudal rights over it, but should be compelled to sell it out and out, so that their successor in title stood to the overlord exactly as the seller had done. Hitherto they had been wont to dispose of the whole or parts of their estates while maintaining their feudal rights over it, so that the ultimate landlord could not deal directly with the new occupant, whose reliefs, wardship, &c., fell to the intermediate holder who had sold away the land. The main result of this was that, when a baron parted with any one of his estates, the acquirer became a tenant-in-chief directly dependent on the king, instead of being left a vassal of the person who had passed over the land to him. Subinfeudation came to a complete stop, and whenever great family estates broke up the king obtained new tenants-in-chief. The number of persons holding immediately of the crown began at once to multiply by leaps and bounds. As the process of the partition of lands continued, the fractions grew smaller and smaller, and many of the tenants-in-chief were ere long very small and unimportant persons. These, of course, would not form part of the baronial interest, and could not be distinguished from any other subjects of the crown.

Statute of Winchester.

The Statute of Winchester, the other great legislative act of 1285, was mainly concerned with the keeping of the peace of the realm. It revised the arming and organization of the national militia, the lineal descendent of the old *fyrd*, and provided a useful police force for the repression of disorder and robbery by the reorganization of *watch and ward*. This was, of course, one more device for strengthening the power of the crown.

Welsh wars.

In the intervals of the legislation which formed the main feature of the first half of his reign, Edward was often distracted by external matters. He was, on the whole, on very good terms with his first cousin, Philip III. of France; the trouble did not come from this direction, though there was the usual crop of feudal rebellions in Gascony. Nor did Edward's relations with the more remote states of the continent lead to any important results, though he had many treaties and alliances in hand. It was with Wales that his most troublesome relations occurred. Llewelyn-ap-Gruffydd, the old ally of de Montfort, had come with profit out of the civil wars of 1263–66, and having won much land and more influence during the evil days of Henry III., was reluctant to see that his time of prosperity had come to an end, now that a king of a very different character sat on the English throne.

Friction had begun the moment that Edward returned to his kingdom from the crusade. Llewelyn would not deign to appear before him to render the customary homage due from Wales to the English crown, but sent a series of futile excuses lasting over three years. In 1277, however, the king grew tired of waiting, invaded the principality and drove his recalcitrant vassal up into the fastnesses of Snowdon, where famine compelled him to surrender as winter was beginning. Llewelyn was pardoned, but deprived of all the lands he had gained during the days of the civil war, and restricted to his old North Welsh dominions. He remained quiescent for five years, but busied himself in knitting up secret alliances with the Welsh of the South, who were resenting the introduction of English laws and customs by the strong-handed king. In 1282 there was a sudden and well-planned rising, which extended from the gates of Chester to those of Carmarthen; several castles were captured by the insurgents, and Edward had to come to the rescue of the lords-marchers at the head of a very large army. After much checkered fighting Llewelyn was slain at the skirmish of Orewyn Bridge near Builth on the 11th of December 1282. On his death the southern rebels submitted, but David his brother continued the struggle for three months longer in the Snowdon district, till his last bands were scattered and he himself taken prisoner. Edward beheaded him at Shrewsbury as a traitor, having the excuse that David had submitted once before, had been endowed with lands in the Marches, and had nevertheless joined his brother in rebellion. After this the king abode for more than a year in Wales, organizing the newly conquered principality into a group of counties, and founding many castles, with dependent towns, within its limits. The "statute of Wales," issued at Rhuddlan in 1284, provided for the introduction of English law into the country, though a certain amount of Celtic customs was allowed to survive. For the next two centuries and a half the lands west of Dee and Wye were divided between the new counties, forming the "principality" of Wales, and the "marches" where the old feudal franchises continued, till the marcher-lordships gradually fell by forfeiture or marriage to the crown. Edward's grip on the land was strong, and it had need to be so, for in 1287 and 1294–1295 there were desperate and widespread revolts, which were only checked by the existence of the new castles, and subdued by the concentration of large royal armies. In 1301 the king's eldest surviving son Edward, who had been born at Carnarvon in 1284, was created "prince of Wales," and invested with the principality, which henceforth became the regular appanage of the heirs of the English crown. This device was apparently intended to soothe Welsh national pride, by reviving in form, if not in reality, the separate existence of the old Cymric state. For four generations the land was comparatively quiet, but the great rebellion of Owen Glendower in the reign of Henry IV. was to show how far the spirit of particularism was from extinction.

Conquest of Wales.

Some two years after his long sojourn in Wales Edward made an even longer stay in a more remote corner of his dominions. Gascony being, as usual, out of hand, he crossed to Bordeaux in 1286, and abode in Guienne for no less than three years, reducing the duchy to such order as it had never known before, settling all disputed border questions with the new king of France, Philip IV., founding many new towns, and issuing many useful statutes and ordinances. He returned suddenly in 1289, called home by complaints that reached him as to the administration of justice by his officials, who were slighting the authority of his cousin Edmund of Cornwall, whom he had left behind as regent. He dismissed almost the whole bench of judges, and made other changes among his ministers. At the same time he fell fiercely upon the great lords of the Welsh Marches, who had been indulging in private wars; when they returned to their evil practice he imprisoned the chief offenders, the earls of Hereford and Gloucester, forfeited their estates, and only gave them back when they had paid vast fines (1291). Another act of this period was Edward's celebrated expulsion of the Jews from England (1290). This was the continuation of a policy which he had already carried out in Guienne. It would seem that his reasons were partly religious, but partly economic. No earlier king could have afforded to drive forth a race who had been so useful to the crown as bankers and money-lenders; but by the end of the 13th century the financial monopoly of the Jews had been broken by the great Italian banking firms, whom Edward had been already employing during his Welsh wars. Finding them no less accommodating than their rivals, he gratified the prejudices of his subjects and himself by forcing the Hebrews to quit England. The Italians in a few years became as unpopular as their predecessors in the trade of usury, their practices being the same, if their creed was not.

Expulsion of the Jews.

Edward I. and Scotland.

Meanwhile in the same year that saw the expulsion of the Jews, King Edward's good fortune began to wane, with the rise of the Scottish question, which was to overshadow the latter half of his reign. Alexander III., the last male in direct descent of the old Scottish royal house, had died in 1286. His heiress was his only living descendant, a little girl, the child of his deceased daughter Margaret and Eric, king of Norway. After much discussion, for both the Scottish nobles and the Norse king were somewhat suspicious, Edward had succeeded in obtaining from them a promise that the young queen should marry his heir, Edward of Carnarvon. This wedlock would have led to a permanent union of the English and Scottish crowns, but not to an absorption of the lesser in the greater state, for the rights of Scotland were carefully guarded in the marriage-treaty. But the scheme was wrecked by the premature death of the bride, who expired by the way, while being brought over from Norway to her own kingdom, owing to privations and fatigue suffered on a tempestuous voyage.

She had no near relatives, and more than a dozen Scottish or Anglo-Scottish nobles, distantly related to the royal line, put in a claim to the crown, or at least to a part of the royal heritage. The board of six regents, who had been ruling Scotland for the young queen, seeing their own power at an end and civil war likely to break out, begged Edward of England to arbitrate between the claimants. The history of the next twenty years turned on the legal point whether the arbitrator acted—as he himself contended—in the capacity of suzerain, or—as the Scots maintained—in that of a neighbour of acknowledged wisdom and repute, invited to settle a domestic problem. This question of the relations between the English and the Scottish crowns had been raised a dozen times between the days of Edward the Elder and those of Henry III. There was no denying the fact that the northern kings had repeatedly done homage to their greater neighbours. But, save during the years when William the Lion, after his captivity, had owned himself the vassal of Henry II. for all his dominions, there was considerable uncertainty as to the exact scope of the allegiance which had been demanded and given. And William's complete submission had apparently been cancelled, when Richard I. sold him in 1190 a release from the terms of the treaty of Falaise. Since that date Alexander II. and Alexander III. had repeatedly owned themselves vassals to the English crown, and had even sat in English parliaments. But it was possible for patriotic Scots to contend that they had done so only in their capacity as English barons—for they held much land south of Tweed—and to point to the similarity of their position to that of the English king when he did homage for his duchy of Guienne at Paris, without thereby admitting any suzerainty of the French crown over England or Ireland. On the last occasion when Alexander III. had owned himself the vassal of Edward I., there had been considerable fencing on both sides as to the form of the oath, and, as neither sovereign at the moment had wished to push matters to a rupture, the words used had been intentionally vague, and both parties had kept their private interpretations to themselves. But now, when Edward met the Scottish magnates, who had asked for his services as arbitrator, he demanded that they should acknowledge that he was acting as suzerain and overlord of the whole kingdom of Scotland. After some delay, and with manifest reluctance, the Scots complied; their hand was forced by the fact that most of the claimants to the crown had hastened to make the acknowledgment, each hoping thereby to prejudice the English king in his own favour.

This submission having been made, Edward acted with honesty and fairness, handing over the adjudication to a body of eighty Scottish and twenty-four English barons, knights and bishops. These commissioners, after ample discussion and taking of evidence, adjudged the crown to John Baliol, the grandson of the eldest daughter of Earl David, younger brother of William the Lion. They ruled out the claim of Robert Bruce, the son of David's second daughter, who had raised the plea that his descent was superior because he was a generation nearer than Baliol to their common ancestor. This theory of affinity had been well known in the 12th century, and had been urged in favour of King John when he was contending with his nephew Arthur. But by 1291 it had gone out of favour, and the Scottish barons had no hesitation in declaring Baliol their rightful king. Edward at once gave him seizin of Scotland, and handed over to him the royal castles, which had been placed in his hands as a pledge during the arbitration. In return Baliol did him homage as overlord of the whole kingdom of Scotland.

This, unfortunately, turned out to be the beginning, not the end, of troubles. Edward was determined to exact all the ordinary feudal rights of an overlord—whatever might have been the former relations of the English and Scottish crowns. The Scots, on the other hand, were resolved not to allow of the introduction of usages which had not prevailed in earlier times, and to keep the tie as vague and loose as possible. Before Baliol had been many months on the throne there was grave friction on the question of legal appeals. Scottish litigants defeated in the local courts began to appeal to the courts of Westminster, just as Gascon litigants were wont to appeal from Bordeaux to Paris. King John and his baronage, relying on the fact that such evocation of cases to a superior court had never before been known, refused to allow that it was valid. King Edward insisted that by common feudal usage it was perfectly regular, and announced his intention of permitting it. Grave friction had already begun when external events precipitated an open rupture between the king of England and his new vassal.

Edward I. and Philip IV.

The "model parliament" of 1295.

Philip III. of France, who had always pursued a friendly policy with his cousin of England, had died in 1285, and had been succeeded by his son Philip IV., a prince of a very different type, the most able and unscrupulous of all the dynasty of Capet. In 1294 he played a most dishonourable trick upon King Edward. There had been some irregular and piratical fighting at sea between English and Norman sailors, in which the latter had been worsted. When called to account for the doings of his subjects, as well as for certain disputes in Gascony, the English king promised redress, and, on the suggestion of Philip, surrendered, as a formal act of apology, the six chief fortresses of Guienne, which were to be restored when reparation had been made. Having garrisoned the places, Philip suddenly changed his line, refused to continue the negotiations, and declared the whole duchy forfeited. Edward was forced into war, after having been tricked out of his strongholds. Just after his first succours had sailed for the Gironde, the great Welsh rebellion of 1294 broke out, and the king was compelled to turn aside to repress it. This he accomplished in the next spring, but meanwhile hardly a foothold remained to him in Gascony. He was then preparing to cross the Channel in person, when Scottish affairs began to become threatening. King John declared himself unable to restrain the indignation of his subjects at the attempt to enforce English suzerainty over Scotland, and in July 1295 leagued himself with Philip of France, and expelled from his realm the chief supporters of the English alliance. Finding himself involved in two wars at once, Edward made an earnest appeal to his subjects to rise to the occasion and "because that which touches all should be approved of all" summoned the celebrated "model parliament" of November 1295, which exactly copied in its constitution Montfort's parliament of 1265, members from all cities and boroughs being summoned along with the knights of the shires, and the inferior clergy being also represented by their proctors. This system henceforth became the normal one, and the English parliament assumed its regular form, though the differentiation of the two houses was not fully completed till the next century. Edward was voted liberal grants by the laity, though the clergy gave less than he had hoped; but enough money was obtained to fit out two armies, one destined for the invasion of Scotland, the other for that of Gascony.

Invasion of Scotland.

The French expedition, which was led by the king's brother Edmund, earl of Lancaster, failed to recover Gascony, and came to an ignominious end. But Edward's own army achieved complete success in Scotland. Berwick was stormed, the Scottish army was routed at Dunbar (April 27), Edinburgh and Stirling were easily captured, and at last John Baliol, deserted by most of his adherents, surrendered at Brechin. Edward pursued his triumphant march as far as Aberdeen and Elgin, without meeting further resistance. He then summoned a parliament at Berwick, and announced to the assembled Scots that he had determined to depose King John, and to assume the crown himself. The ease with which he had subdued the realm misled him; he fancied that the slack resistance, which was mainly due to the incapacity and unpopularity of Baliol, implied the indifference of the Scots to the idea of annexation. The alacrity with which the greater part of the baronage flocked in to do him homage confirmed him in the mistaken notion. He appointed John, earl Warenne, lieutenant of the realm, with Hugh Cressingham, an English clerk, as treasurer, but left nearly all the minor offices in Scottish hands, and announced that Scottish law should be administered.

He then returned to England, and began to make preparations for a great expedition to France in 1297.

Disputes with the clergy and baronage.

His plan was something more ambitious than a mere attempt to recover Bordeaux; succours were to go to Gascony, but he himself and the main army were to invade France from the north with the aid of the count of Flanders. Much money was, of course, needed for the double expedition, and in raising it Edward became involved in two desperate constitutional disputes. Though the barons and the commons voted a liberal grant at the parliament of Bury (Nov. 1296) the clergy would give nothing. This was owing to a bull—the celebrated *Clericis Laicos*, recently issued by the arrogant and contentious pope Boniface VIII., which forbade the clergy to submit to any taxation by secular princes. Robert Winchelsea, the archbishop of Canterbury, an enthusiastic exponent of clerical rights and grievances, declared himself in conscience bound to obey the pontiff, and persuaded the representatives of the Church in the parliament to refuse supplies. The king, indignant that an attempt should be made to exempt the vast ecclesiastical lands from taxation at a time of national crisis, sequestrated the estates of the see of Canterbury, and copied John's conduct in 1208 by outlawing the whole body of the clergy. Winchelsea in return excommunicated all those who refused to recognize the authority of the pope's bull.

Scarcely was this quarrel developed when Edward found himself involved in an equally hot dispute with the commons and the baronage. In his eagerness to collect the sinews of war he had issued orders for the levy of a heavy customs duty on wool, the main export of the land, and in some cases laid hands on the wool itself, which lay ready for shipping, though this had not been granted him by the late parliament. The "maltolt"—or illegal tax—as his subjects called it, provoked the anger of the whole body of merchants in England. At the same time the barons, headed by the earls of Norfolk and Hereford, raised the old grievance about feudal service beyond seas, which had been so prominent in the time of King John. Norfolk, who had been designated to lead the expedition to Guienne, declared that though he was ready to follow his master to Flanders in his capacity of marshal, he would not be drafted off to Gascony against his own will. Hereford and a number of other barons gave him hearty support.

Harassed by these domestic troubles, the king could not carry out his intention of sailing for Flanders in the spring, and spent the greater part of the campaigning season in wrangles with his subjects. He was obliged to come to a compromise. If the clergy would give him a voluntary gift, which was in no way to be considered a tax, he agreed to inlaw them. They did so, and even Winchelsea, after a time, was reconciled to his master. As to the barons, the king took the important constitutional step of conceding that he would not ask them to serve abroad as a feudal obligation, but would pay them for their services, if they would oblige him by joining his banner. Even then Norfolk and Hereford refused to sail; but the greater part of the minor magnates consented to serve as stipendiaries. The commons were conciliated by a promise that the wool which the royal officers had seized should be paid for, when a balance was forthcoming in the exchequer.

Insurrection in Scotland. Wallace.

By these means Edward succeeded at last in collecting a considerable army, and sailed for Flanders at the end of August. But he was hardly gone when dreadful news reached him from Scotland. An insurrection, to which no great importance was attached at first, had broken out in the summer. Its first leader was none of the great barons, but a Renfrewshire knight, Sir William Wallace; but ere long more important persons, including Robert Bruce, earl of Carrick (grandson of Robert Bruce of Annandale, one of the competitors for the crown of Scotland), and the bishop of Glasgow, were found to be in communication with the rebels. Earl Warenne, the king's lieutenant in Scotland, mustered his forces to put down the rising. On the 11th of September 1297 he attempted to force the passage of the Forth at Stirling Bridge, and was completely beaten by Wallace, who allowed half the English army to pass the river and then descended upon it and annihilated it, while Warenne looked on helplessly from the other bank. Almost the whole of Scotland rose in arms on hearing of this victory, but the barons showed less zeal than the commons, owing to their jealousy of Wallace. Warenne retired to Berwick and besought his master for aid.

Edward, who was just commencing an autumn campaign in Flanders which was to lead to no results, sent home orders to summon a parliament, which should raise men and money for the Scottish war. It was called, and made a liberal grant for that purpose, but Archbishop Winchelsea and the earls of Norfolk and Hereford took advantage of their master's needs, and of his absence, to assert themselves. Taking up the position of defenders of the constitution, they induced the parliament to couple its grants of money with the condition that the king should not only confirm Magna Carta—as had been so often done before—but give a specific promise that no "maltolts," or other taxes not legally granted him, should be raised for the future. Edward received the petition at Ghent, and made the required oath. The document to which he gave his assent, the *Confirmatio Cartarum* (less accurately called the statute *De Tallagio non concedendo*) marked a distinct advance beyond the theories of Magna Carta; for the latter had been drawn up before England possessed a parliament, and had placed the control of taxation in the hands of the old feudal council of tenants-in-chief, while the *Confirmatio* gave it to the assembly, far more national and representative, which had now superseded the Great Council as the mouthpiece of the whole people of the realm.

The "Confirmatio Cartarum."

The Scottish revolt had become so formidable that Edward was compelled to abandon his unfruitful Flemish campaign; he patched up an unsatisfactory truce with the king of France, which left four-fifths of his lost Gascon lands in the power of the enemy, and returned to England in the spring of 1298. In July he invaded Scotland at the head of a formidable army of 15,000 men, and on the 22nd of that month brought Wallace to action on the moors above Falkirk. The steady Scottish infantry held their own for some time against the charge of the English men-at-arms. But when Edward brought forward his archers to aid his cavalry, as William I. had done at Hastings, Wallace's columns broke up, and a dreadful slaughter followed. The impression made on the Scots was so great that for some years they refused to engage in another pitched battle. But the immediate consequences were not all that might have been expected. Edward was able to occupy many towns and castles, but the broken bands of the insurgents lurked in the hills and forests, and the countryside as a whole remained unsubdued. Wallace went to France to seek aid from King Philip, and his place was taken by John Comyn, lord of Badenoch, a nephew of Baliol, who was a more acceptable leader to the Scottish nobles than the vanquished knight of Falkirk. Edward was detained in the south for a year, partly by negotiations with France, partly by a renewed quarrel with his parliament, and during his absence Comyn recovered Stirling and most of the other places which had received English garrisons. It was not till 1300 that the king was able to resume the invasion of Scotland, with an army raised by grants of money that he had only bought by humiliating concessions to the will of his parliament, formulated in the *Articuli super cartas* which were drawn up in the March of that year. Even then he only succeeded in recovering some border holds, and the succeeding campaign of 1301 only took him as far as Linlithgow. But in the following year his position was suddenly changed by unexpected events abroad; the king of France became involved in a desperate quarrel with the pope, and at the same moment his army received a crushing defeat before Courtrai at the hands of the Flemings. To free himself for these new struggles Philip made up his mind to conclude peace with England, even at the cost of sacrificing his conquests in Gascony. Bordeaux had already revolted from him, and he gave up the rest of his ill-gotten gains of 1294 by the treaty of Paris (May 20, 1303).

Now that he had only a single war upon his hands Edward's position was entirely changed. There was no more need to conciliate the magnates nor the parliament. His displeasure fell mainly on the archbishop and the earl of Norfolk, who had so long led the opposition. Winchelsea was put in disgrace, and ultimately exiled. Norfolk, who was childless, was forced to sign a grant by which his lands went to the king after his death—a harsh and illegal proceeding, for he had collateral heirs. But the Scots, as was natural, bore the brunt of the king's wrath. In June 1303, a month after the peace of Paris, he advanced from Roxburgh, determined to make a systematic conquest of the realm, and not to return till it was ended. He kept up his campaign throughout the winter, reduced every fortress that held out, and carried his arms as far as Aberdeen and Elgin. In February 1304 the regent Comyn and most of the Scottish baronage submitted, on the promise that they should retain their lands on doing homage. Wallace, who had returned from France, kept up a guerilla warfare in the hills for a year more, but was captured in July 1305, and sent to London to be executed as a traitor. Even before his capture it seemed that Scotland was thoroughly tamed, and was destined to share the fate of Wales.

Edward again invades Scotland, 1303.

Edward's arrangements for the administration of the conquered kingdom were wise and liberal, if only the national spirit of the Scots could have tolerated them. The Scottish parliament was to continue, though representatives from beyond Tweed were also to be sent to the English parliament. The sheriffdoms and most of the ministerial posts were left in the hands of Scots, though the supreme executive authority was put in the hands of John of Brittany, earl of Richmond, the king's nephew. The land seemed for a time to be settling down, and indeed the baronage were to such a large extent English in both blood and feeling, that there was no insuperable difficulty in conciliating them. A considerable fraction of them adhered consistently to the English cause from this time forth, and ultimately lost their lands for refusing to follow the rest of the nation in the next insurrection.

But the delusion that Scotland had been finally subdued was to last only for a year, although in 1305 Edward seemed to have accomplished his task, and stood triumphant, with the northern realm at his feet, his domestic foes humbled, and France and the papacy defeated. His last short interval of peaceful rule was distinguished by the passing of the Statute of Trailbaston in the parliament of 1305. This was a measure for the repression of local riots, empowering justices in every shire to suppress clubmen (*trailbastons*), gangs of marauders who had been rendering the roads unsafe.

In the first month of 1306, however, the weary Scottish war broke out again, with the appearance of a new insurgent chief. Robert Bruce, earl of Carrick, grandson of the claimant to the throne of 1292, had hitherto pursued a shifty policy, wavering between submission and opposition to the English invader. He had been in arms more than once, but had finally adhered to the pacification of 1304, and was now entirely trusted by the king. But he was secretly plotting rebellion, disgusted (as it would seem) that Edward had not transferred the crown of Scotland to the line of Bruce when the house of Baliol was found wanting. Though he found himself certain of a considerable amount of support, he yet could see that there would be no general rising in his favour, for many of the magnates refused to help in making king a baron whom they regarded as no more important than one of themselves. But the insurrection was precipitated by an unpremeditated outrage. Bruce was conferring at Dumfries with John Comyn, the late regent, whom he was endeavouring to tempt into his plots, on the 10th of January 1306. An angry altercation followed, for Comyn would have nothing to do with the scheme, and Bruce and his followers finally slew him before the altar of a church into which he had fled. After this crime, which combined the disgrace of sacrilege with that of murder under tryst, Bruce was forced to take arms at once, though his preparations were incomplete. He raised his banner, and was hastily crowned at Scone on the 25th of March; by that time the rising had burst out in many shires of Scotland, but it was neither unanimous nor complete. Edward by no means despaired of crushing it, and had raised a large army, when he was smitten with an illness which prevented him from crossing the border. But his troops, under Aymer de Valence, earl of Pembroke, pressed north, and surprised and routed Bruce at Methven near Perth. The pretender's brother Nigel and many of his chief supporters were taken prisoners, and he himself escaped with a handful of followers and took refuge in the Western islands. Edward ordered young Nigel Bruce and many other captives to be executed; for he was provoked to great wrath by the rebellion of a magnate who had given him every assurance of loyalty. He intended to follow de Valence to Scotland, and to complete the suppression of the rising in person. But this proved beyond his strength; he struggled as far as the border in July, but could not shake off his disease, and was forced to linger, a broken invalid, in the neighbourhood of Carlisle for many months. Meanwhile his lieutenants failed to follow up with energy the victory gained at Methven, and in the next spring Bruce reappeared in the Lowlands, gathered new levies, and inflicted a defeat on de Valence at Loudoun Hill. Roused to anger King Edward rose from his bed, mounted his horse, and started for Scotland. But after struggling on for a few miles he fell by the way, and died at Burgh-on-Sands, just inside the English border, on the 7th of July 1307.

Robert Bruce.

Despite the chequered fortunes of his later years the reign of Edward had been a time of progress and prosperity for England. He had given his realm good and strong governance; according to his lights he had striven to keep faith and to observe his coronation oath. He had on more than one occasion quarrelled with his subjects, but matters had never been pushed to an open rupture. The king knew how to yield, and even opponents like Winchelsea and the earls of Norfolk and Hereford respected him too much to drive him to an extremity. The nation, however much it might murmur, would never have been willing to rebel against a sovereign whose only fault was that he occasionally pressed his prerogative too far. Edward's rule was seldom or never oppressive, the seizure of the merchants' wool in 1297 was the only one of his acts which caused really fierce and widespread indignation. For his other arbitrary proceedings he had some show of legal justification in every case. It would have been absurd to declare that his rule was tyrannical or his policy disastrous. The realm was on the whole contented and even flourishing. Population was steadily increasing, and with it commerce; the intellectual activity which had marked the reign of Henry III. was still alive; architecture, religious and military, was in its prime. He was himself a great builder, and many of the perfected castles of that concentric style, which later ages have called the "Edwardian type," were of his own planning. In ecclesiastical architecture his reign represents the early flower of the "Decorated" order, perhaps the most beautiful of all the developments of English art. In many respects the reign may be regarded as the culmination and crowning point of the middle ages. It certainly gave a promise of greatness and steady progress which the 14th century was far from justifying.

Character of Edward I.'s rule.

With the great king's death a sudden change for the worse was at once visible. The individual character of the reigning king was still the main factor in political history, and Edward II. was in every respect a contrast to his father. He was incorrigibly frivolous, idle and apathetic; his father had given him much stern schooling, but this seems only to have inspired him with a deeply rooted dislike for official work of any kind. He has been well described as "the first king since the Conquest who was not a man of business." Even Stephen and Henry III. had been active and bustling princes, though their actions were misguided and inconsequent. But Edward II. hated all kingly duties; he detested war, but he detested even more the routine work of administration. He was most at his ease in low company, his favourite diversion was gambling, his best trait a love for farming and the mechanical arts of the smith and the gardener.

Edward II.

Piers Gaveston.

His first acts on coming to the throne caused patriotic Englishmen to despair. His father, on his deathbed, had made him swear to conduct the Scottish expedition to its end. But he marched no further than Dumfries, and then turned back, on the vain pretext that he must conduct his parent's funeral in person. Leaving Bruce to gather fresh strength and to commence the tedious process of reducing the numerous English garrisons in Scotland, he betook himself to London, and was not seen on the border again for more than three years. He then dismissed all his father's old ministers, and replaced them by creatures of his own, for the most part persons of complete incompetence. But his most offensive act was to promote to the position of chief councillor of the crown, and disperser of the royal favours, a clever but vain and ostentatious Gascon knight, one Piers Gaveston, who had been the companion of his boyhood, and had been banished by Edward I. for encouraging him in his follies and frivolity. Piers was given the royal title of earl of Cornwall, and married to the king's niece; when Edward went over to France to do homage for Gascony, he even made his friend regent during his absence, in preference to any of his kinsmen. It was his regular habit to refer those who came to him on matters of state to "his good brother Piers," and to refuse to discuss them in person.

Baronial opposition.

It was of course impossible that the nation or the baronage should accept such a preposterous régime, and Edward was soon involved in a lively struggle with his subjects. Of the leaders of opposition in his father's reign both Hereford and Norfolk were now dead. But Archbishop Winchelsea had returned from exile in a belligerent mood, and the place of Norfolk and Hereford was taken by an ambitious prince of the royal house, Thomas, earl of Lancaster, the son of the younger brother of Edward I. Thomas was selfish and incompetent, but violent and self-assertive, and for some years was able to pose successfully as a patriot simply because he set himself to oppose every act of the unpopular king. He had several powerful baronial allies—the earls of Warwick, Pembroke and Warenne, with Humphrey Bohun of Hereford, who had succeeded to his father's politics, though he had married the king's own sister.

Progress of Bruce in Scotland.

The annals of the early years of Edward II. are mainly filled by contemporary chroniclers with details of the miserable strife between the king and his barons on the question of Gaveston's unconstitutional position. But the really important feature of the time was the gradual reconquest of Scotland by Robert Bruce, during the continuance of the domestic strife in England. Edward I. had laid such a firm grip on the northern realm that it required many years to undo his work. A very large proportion of the Scottish nobility regarded Bruce as a usurper who had opened his career with murder and sacrilege, and either openly opposed him or denied him help. His resources were small, and it was only by constant effort, often chequered by failures, that he gradually fought down his local adversaries, and reduced the English garrisons one by one. Dumbarton and Linlithgow were only mastered in 1312. Perth did not finally fall into his hands till 1313; Edinburgh, Roxburgh and Stirling were still holding out in 1314. During all this time the English king only once went north of the Border—in 1311—and then with a very small army, for Lancaster and his friends had refused to join his banner. Yet even under such conditions Bruce had to retire to the mountains, and to allow the invaders to range unopposed through Lothian and Fife, and even beyond the Tay. With ordinary capacity and perseverance Edward II. might have mastered his enemy; indeed the Comyns and Umfravilles and other loyalist barons of Scotland would have carried out the business for him, if only he had given them adequate support. But he spent what small energy he possessed in a wretched strife of chicanery and broken promises with Thomas of Lancaster and his party, dismissing and recalling Gaveston according to the exigencies of the moment, while he let the Scottish war shift for itself. It must be confessed that the conduct of his adversaries was almost as contemptible and unpatriotic. They refused to aid in the war, as if it was the king's private affair and not that of the nation. And repeatedly, when they had Edward at their mercy and might have dictated what terms they pleased to him, they failed to rise to the situation. This was especially the case in 1311, when the king had completely submitted in face of their armed demonstrations. Instead of introducing any general scheme of reform they contented themselves with putting him under the tutelage of twenty-one "lords ordainers," a baronial committee like that which had been appointed by the Provisions of Oxford, fifty years back. Edward was not to levy an army, appoint an official, raise a tax, or quit the realm without their leave. He had also to swear an obedience to a long string of constitutional limitations of his power, and to promise to remove many practical grievances of administration. But there were two great faults in the proceedings of Thomas of Lancaster and his friends. The first was that they ignored the rights of the commons—save indeed that they got their ordinances confirmed by parliament—and put all power into the hands of a council which represented nothing but the baronial interest. The second, and more fatal, was that this council of "ordainers," when installed in office, showed energy in nothing save in persecuting the friends of Edward and Gaveston; it neglected the general welfare of the realm, and in particular made no effort whatever to end the Scottish war. It was clearly their duty either to make peace with Robert Bruce, or to exert themselves to crush him; but they would do neither.

The "Lords Ordainers."

Battle of Bannockburn.

Gaveston's unhappy career came to an end in 1312. After he had been twice exiled, and had been twice recalled by the king, he was besieged in Scarborough and captured by the earl of Pembroke. He was being conducted to London to be tried in parliament, when his two greatest enemies, Thomas of Lancaster and Guy, earl of Warwick, took him out of the hands of his escort, and beheaded him by the wayside without any legal authority or justification. The unhappy king was compelled to promise to forget and forgive this offence, and was then restored to a certain amount of freedom and power; the barons believed that when freed from the influence of Gaveston he would prove a less unsatisfactory sovereign. The experiment did not turn out happily. Bruce having at last made an almost complete end of the English garrisons within his realm, laid siege to Stirling, the last and strongest of them all, in the spring of 1313. Compelled by the pressure of public opinion to attempt its relief, Edward crossed the border in June 1314, with an army of 20,000 foot and 4000 men-at-arms. He found Bruce prepared to dispute his advance on the hillside of Bannockburn, 2 m. in front of Stirling, in a strong position with a stream in front and his flanks covered by rows of pitfalls, dug to discomfit the English cavalry. The Scots, as at Falkirk, were ranged in solid clumps of pikemen above the burn, with only a small reserve of horse. The English king, forgetting his father's experiences, endeavoured to ride down the enemy by headlong frontal charges of his men-at-arms, and made practically no attempt to use his archery to advantage. After several attacks had been beaten off with heavy loss, the English host recoiled in disorder and broke up—the king, who had kept in the rear all day, was one of the first to move off The flower of his knights had fallen, including his nephew, the earl of Gloucester, who was the only one of the great magnates of the realm who had shown loyalty to him during the last six years. The Scots also made many prisoners; the disaster was complete, and the wrecks of the beaten army dispersed before reaching the border. Bruce followed them up, and spent the autumn in ravaging Northumberland and Cumberland.

Thomas, earl of Lancaster.

Thomas of Lancaster, who had refused to join in the late campaign, took advantage of its results to place the king once more in complete tutelage. His household was dismissed, he was bidden to live as best he could on an allowance of £10 a day, and all his ministers and officials were changed. For more than three years Lancaster practically reigned in his cousin's name; it was soon found that the realm got no profit thereby, for Earl Thomas, though neither so apathetic nor so frivolous as Edward, was not a whit more competent to conduct either war or domestic administration. The Scots swept everything before them, ravaging the north at their will, and capturing Berwick. They even made a great expedition to Ireland, where Bruce's brother Edward was proclaimed king by the rebellious Celtic septs, and rode across the whole island, exterminating the Anglo-Irish population in many districts (1315–1317). But the colonists rallied, and cut to pieces a great Irish army at Athenry (1316), while in the next year Roger Mortimer, a hard-handed baron of the Welsh march, crossed with reinforcements and drove back Edward Bruce into the north. Resuming his advance after a space, the rebel king was routed and slain at Dundalk (Oct. 14, 1318) and the insurrection died out. But it had had the permanent result of weakening the king's grip on the north and west of Ireland, where the Englishry had been almost exterminated. From this time forth until the reign of Henry VIII. the limit of the country in full subjection to the crown was always shrinking, and the Irish chiefs of the inland continued to pay less and less attention to orders issued from Dublin or London.

Though the Scottish expedition to Ireland had been beaten off, this was not in the least to be ascribed to the credit of Lancaster, who was showing the grossest incompetence as an administrator. He could neither protect the Border, nor even prevent private civil wars from breaking out, not only on the Welsh marches (where they had always been common), but even in the heart of England. The most extraordinary symptom of the time was a civic revolt at Bristol (1316), where the townsfolk expelled the royal judges, and actually stood a siege before they would submit. Such revolts of great towns were normal in Germany or Italy, but almost unknown on this side of the Channel. All this unrest might well be ascribed to Lancaster's want of ability, but he had also to bear—with less justice—the discontent caused by two years of famine and pestilence. In August 1318 he was removed from power by a league formed by Pembroke, Warenne, Arundel and others of the lords ordainers, who put a new council in power, and showed themselves somewhat less hostile to the king than Earl Thomas had been. Edward was allowed to raise an army for the siege of Berwick, and was lying before its walls, when the Scots, turning his flank, made a fierce foray into Yorkshire, and routed the shire-levy under Archbishop Melton at the battle of Myton. This so disheartened the king and the council that controlled him that they concluded a two years truce with Robert of Scotland, thus for the first time acknowledging him as a regular enemy and no mere rebel (1319).

The Despensers.

The time of comparative quiet that followed was utilized by the king in an attempt to win back some of his lost authority. For a short space Edward showed more capacity and energy than he had ever been supposed to possess. Probably this was due entirely to the fact that he had come under the influence of two able men who had won his confidence and had promised him revenge for the murdered Gaveston. These were the two Hugh Despensers, father and son; the elder was an ambitious baron who hated Lancaster, the younger had been made Edward's chamberlain in 1318 and had become his secret councillor and constant companion. Finding that the king was ready to back them in all their enterprises, the Despensers resolved to take the fearful risk of snatching at supreme power by using their master's name to oust the barons who were now directing affairs from their position. The task was the more easy because Lancaster was at open discord with the men who had supplanted him, so that the baronial party was divided; while the mishaps of the last six years had convinced the nation that other rulers could be as incompetent and as unlucky as the king. Indeed, there was a decided reaction in Edward's favour, since Lancaster and his friends had been tried and found wanting. Moreover, the Despensers felt that they had a great advantage over Gaveston in that they were native-born barons of ancient ancestry and good estate: the younger Hugh, indeed, through his marriage with the sister of the earl of Gloucester who fell at Bannockburn, was one of the greatest landowners on the Welsh border: they could not be styled upstarts or adventurers. Edward's growing confidence in the Despensers at last provoked the notice and jealousy of the dominant party. The barons brought up many armed retainers to the parliament of 1321, and forced the king to dismiss and to condemn them to exile. But their discomfiture was only to last a few months; in the following October a wanton outrage and assault on the person and retinue of Edward's queen, Isabella of France, by the retainers of Lord Badlesmere, one of Pembroke's associates, provoked universal reprobation. The king made it an excuse for gathering an army to besiege Badlesmere's castle at Leeds; he took it and hanged the garrison. He then declared the Despensers pardoned, and invited them to return to England. On this Thomas of Lancaster and the more resolute of his associates took arms, but the majority both of the baronage and of the commons remained quiescent, public opinion being rather with than against the king. The rebels displayed great indecision, and Lancaster proved such a bad general that he was finally driven into the north and beaten at the battle of Boroughbridge (March 16, 1322), where his chief associate, the earl of Hereford, was slain. Next day he surrendered, with the wreck of his host. But the king, who showed himself unexpectedly vindictive, beheaded him at once; three other peers, Badlesmere, Clifford and Mowbray, were subsequently executed, with a score of knights.

Execution of Lancaster.

Such severity was most impolitic, and Lancaster was ere long hailed as a saint and a martyr. But for the moment the king seemed triumphant; he called a parliament which revoked the "ordinances" of 1311, and replaced the Despensers in power. For the remaining four years of his reign they were omnipotent; but able and unscrupulous as they were, they could not solve the problem of successful governance. To their misfortune the Scottish war once more recommenced, King Robert having refused to continue the truce. The fortune of Edward II. now hung on the chance that he might be able to maintain the struggle with success; he raised a large army and invaded Lothian, but Bruce refused a pitched battle, and drove him off with loss by devastating the countryside around him. Thereupon Edward, to the deep humiliation of the people, sued for another cessation of hostilities, and obtained it by conceding all that Robert asked, save the formal acknowledgment of his kingly title. But peace did not suffice to end Edward's troubles; he dropped back into his usual apathy, and the Despensers showed themselves so harsh and greedy that the general indignation only required a new leader in order to take once more the form of open insurrection. The end came in an unexpected fashion. Edward had quarrelled with his wife Isabella, who complained that he made her the "handmaid of the Despensers," and excluded her from her proper place and honour. Yet in 1325 he was unwise enough to send her over to France on an embassy to her brother Charles IV., and to allow his eldest son Edward, prince of Wales, to follow her to Paris. Having the boy in her power, and being surrounded by the exiles of Lancaster's faction, she set herself to plot against her husband, and opened up communications with the discontented in England. It was in vain that Edward besought her to return and to restore him his son; she came back at last, but at the head of an army commanded by Roger, Lord Mortimer, the most prominent survivor of the party of Earl Thomas, with whom she had formed an adulterous connexion which they for some time succeeded in keeping secret.

Rebellion of Queen Isabella and Mortimer.

Deposition and murder of Edward II.

When she landed with her son in Essex in September 1326, she was at once joined by Henry of Lancaster, the heir of Earl Thomas, and most of the baronage of the eastern counties. Even the king's half-brother, the earl of Norfolk, rallied to her banner. Edward and the Despensers, after trying in vain to raise an army, fled into the west. They were all caught by their pursuers; the two Despensers were executed—the one at Bristol, the other at Hereford. Several more of Edward's scanty band of friends—the earl of Arundel and the bishop of Exeter and others—were also slain. Their unhappy master was forced to abdicate on the 20th of January 1327, his fourteen-year old son being proclaimed king in his stead. He was allowed to survive in close prison some eight months longer, but when his robust constitution defied all attempts to kill him by privations, he was murdered by the orders of the queen and Mortimer at Berkeley Castle on the 21st of September.

Regency of Isabella and Mortimer.

The three years regency of Isabella, during the minority of Edward III., formed a disgraceful episode in the history of England. She was as much the tool of Mortimer as her husband had been the tool of the Despensers, and their relations became gradually evident to the whole nation. All posts of dignity and emolument were kept for their personal adherents, and a new and formidable dignity was conferred on Mortimer himself, when he was made both justiciar of the principality of Wales, and also earl of March, in which lay both his own broad lands and the estates of Despenser and Arundel, which he had shamelessly appropriated. It is surprising that the adulterous pair succeeded in maintaining themselves in power for so long, since the ignominy of the situation was evident. They were even able to quell the first attempt at a reaction, by seizing and beheading Edmund, earl of Kent, the late king's half-brother, who was betrayed while organizing a plot for their destruction. The one politic act of Mortimer's administration, the conclusion of a permanent peace with Scotland by acknowledging Bruce as king (1328), was not one which made him more popular. The people called it "the shameful peace of Northampton," and firmly believed that he had been bribed by the Scots.

Edward III.

Yet Isabella and her paramour held on to power for two years after the peace, and were only overthrown by a blow from an unexpected quarter. When the young king had reached the age of eighteen he began to understand the disgraceful nature of his own situation. Having secured promise of aid from Henry of Lancaster, his cousin, and other barons, he executed a *coup de main*, and seized Mortimer in his chamber at midnight. The queen was also put under guard till a parliament could be called. It met, and at the king's demand passed sentence on the earl for the murder of Edward II. and other crimes He was hanged at Tyburn (Nov. 1330); the queen suffered nothing worse than complete exclusion from power, and lived for more than twenty years in retirement on the manors of her dowry.

Edward III., who thus commenced his reign ere he was out of his boyhood, was, as might have been foretold from his prompt action against Mortimer, a prince of great vigour and enterprise. He showed none of his father's weakness and much of his grandfather's capacity. He fell short of Edward I. in steadiness of character and organizing power, but possessed all his military capacity and his love of work. Unfortunately for England his ambition was to be the mirror of chivalry rather than a model administrator. He took up and abandoned great enterprises with equal levity; he was reckless in the spending of money; and in times of trouble he was careless of constitutional precedent, and apt to push his prerogative to extremes. Yet like Edward I. he was popular with his subjects, who pardoned him much in consideration of his knightly virtues, his courage, his ready courtesy and his love of adventure. In most respects he was a perfect exponent of the ideals and foibles of his age, and when he broke a promise or repudiated a debt he was but displaying the less satisfactory side of the habitual morality of the 14th century the chivalry of which was often deficient in the less showy virtues. With all his faults Edward during his prime was a capable and vigorous ruler; and it was not without reason that not England only but all western Europe looked up to him as the greatest king of his generation.

Edward III. invades Scotland.

His early years were specially fortunate, as his rule contrasted in the most favourable way with that of his infamous mother and his contemptible father. The ministers whom he substituted for the creatures of Mortimer were capable, if not talented administrators. He did much to restore the internal peace of the realm, and put down the local disorders which had been endemic for the last twenty years. Moreover, when the war with Scotland recommenced he gave the English a taste of victory such as they had not enjoyed since Falkirk. Robert Bruce was now dead and his throne was occupied by the young David II., whose factious nobles were occupied in civil strife when, in 1332, a pretender made a snatch at the Scottish throne. This was Edward, the son of John Baliol, an adventurous baron who collected all the "disinherited" Scots lords, the members of the old English faction who had been expelled by Bruce, and invaded the realm at their head. He beat the regent Mar at the battle of Dupplin, seized Perth and Edinburgh, and crowned himself at Scone. But knowing that his seat was precarious he did homage to the English king, and made him all the promises that his father had given to Edward I. The temptation was too great for the young king to refuse; he accepted the homage, and offered the aid of his arms. It was soon required, for Baliol was ere long expelled from Scotland. Edward won the battle of Halidon Hill (July 19, 1333)—where he displayed considerable tactical skill—captured Berwick, and reconquered a considerable portion of Scotland for his vassal. Unfortunately for himself he made the mistake of requiring too much from Baliol—forcing him to cede Lothian, Tweeddale and the larger part of Galloway, and to promise a tribute. These terms so irritated the Scots, who had shown signs of submission up to this moment, that they refused to accept the pretender, and kept up a long guerilla warfare which ended in his final expulsion. But the fighting was all on Scottish ground, and Edward repeatedly made incursions, showy if not effective, into the very heart of the northern realm; on one occasion he reached Inverness unopposed. He held Perth till 1339, Edinburgh till 1341, and was actually in possession of much Scottish territory when his attention was called off from this minor war to the greater question of the struggle with France. Meanwhile he had acquired no small military reputation, had collected a large body of professional soldiers whose experience was to be invaluable to him in the continental war, and had taught his army the new tactics which were to win Creçy and Poitiers. For the devices employed against the Scottish "schiltrons" of pikemen at Dupplin and Halidon, were the same as those which won all the great battles of the Hundred Years' War—the combination of archery, not with cavalry (the old system of Hastings and Falkirk), but with dismounted men-at-arms. The nation, meanwhile prosperous, not vexed by overmuch taxation, and proud of its young king, was ready and willing to follow him into any adventure that he might indicate.

IV. The Hundred Years' War (1337–1453)

Causes of the Hundred Years' War.

Wars between England and France had been many, since William the Conqueror first linked their fortunes together by adding his English kingdom to his Norman duchy. They were bound to recur as long as the kings who ruled on this side of the Channel were possessed of continental dominions, which lay as near, or nearer, to their hearts than their insular realm. While the kingdom of France was weak, monarchs like Henry II. and Richard I. might dream of extending their transmarine possessions to the detriment of their suzerain at Paris. When France had grown strong, under Philip Augustus, the house of Plantagenet still retained a broad territory in Gascony and Guienne, and the house of Capet could not but covet the possession of the largest surviving feudal appanage which marred the solidarity of their kingdom. There had been a long interval of peace in the 13th century, because Henry III. of England was weak, and Louis IX. of France an idealist, much more set on forwarding the welfare of Christendom than the expansion of France. But the inevitable struggle had recommenced with the accession of the unscrupulous Philip IV. Its cause was simple; France was incomplete as long as the English king ruled at Bordeaux and Bayonne, and far up the valleys of the Garonne and the Adour. From 1293 onward Philip and his sons had been striving to make an end of the power of the Plantagenets in Aquitaine, sometimes by the simple argument of war, more frequently by the insidious process of encroaching on ducal rights, summoning litigants to Paris, and encouraging local magnates and cities alike to play off their allegiance to their suzerain against that to their immediate lord. Both in the time of Edward II. and in that of his son active violence had several times been called in to aid legal chicanery. Fortunately for the duke of Guienne the majority of his subjects had no desire to become Frenchmen; the Gascons felt no national sympathy with their neighbours of the north, and the towns in especial were linked to England by close ties of commerce, and had no wish whatever to break off their allegiance to the house of Plantagenet. The English rule, if often weak, had never proved tyrannical, and they had a great dread of French taxes and French officialism. But there were always individuals, more numerous among the noblesse than among the citizens, whose private interests impelled them to seek the aid of France.

The root of the Hundred Years' War, now just about to commence, must be sought in the affairs of Guienne, and not in any of the other causes which complicated and obscured the outbreak of hostilities. These, however, were sufficiently important in themselves. The most obvious was the aid which Philip VI. had given to the exiled David Bruce, when he was driven out of Scotland by Edward and his ally Balliol. The English king replied by welcoming and harbouring Robert of Artois, a cousin whom Philip VI. had expelled from France. He also made alliances with several of the dukes and counts of the Netherlands, and with the emperor Louis the Bavarian, obviously with the intention of raising trouble for France on her northern and eastern frontiers.

Beginning of the war.

It was Philip, however, who actually began the war, by declaring Guienne and the other continental dominions of Edward III. forfeited to the French crown, and sending out a fleet which ravaged the south coast of England in 1337. In return Edward raised a claim to the throne of France, not that he had any serious intention of pressing it—for throughout his reign he always showed himself ready to barter it away in return for sufficient territorial gains—but because such a claim was in several ways a useful asset to him both in war and in diplomacy. It was first turned to account when the Flemings, who had scruples about opposing their liege lord the king of France, found it convenient to discover that, since Edward was the real king and not Philip, their allegiance was due in the same direction whither their commercial interests drew them. Led by the great demagogue dictator, Jacob van Artevelde, they became the mainstay of the English party in the Netherlands.

Edward III. and the French crown.

Edward's claim—such as it was—rested on the assertion that his mother, Isabella, was nearer of kin to her brother Charles IV., the last king of the main line of the house of Capet, than was Charles's cousin Philip of Valois. The French lawyers ruled that heiresses could not succeed to the crown themselves, but Edward pleaded that they could nevertheless transmit their right to their sons. He found it convenient to forget that the elder brother of Charles IV., King Louis X., had left a daughter, whose son, the king of Navarre, had on this theory a title preferable to his own. This prince, he said, had not been born at the time of his grandfather's death, and so lost any rights that might have passed to him had he been alive at that time. A far more fatal bar to Edward's claim than the existence of Charles of Navarre was the fact that the peers of France, when summoned to decide the succession question nine years before, had decided that Philip of Valois had the sole valid claim to the crown, and that Edward had then done homage to him for Guienne. If he pleaded that in 1328 he had been the mere tool of his mother and Mortimer, he could be reminded of the unfortunate fact that in 1331, after he had crushed Mortimer, and taken the power into his own hands, he had deliberately renewed his oath to King Philip.

Edward's claim to the French crown embittered the strife in a most unnecessary fashion. It was an appeal to every discontented French vassal to become a traitor under a plausible show of loyalty, and from first to last many such persons utilized it. It also gave Edward an excuse for treating every loyal Frenchman as guilty of treason, and, to his shame, he did not always refrain from employing such a discreditable device. Yet, as has been already said, he showed his consciousness of the fallacy of his claim by offering to barter it again and again during the course of the war for land or money. But he finally passed on the wretched fiction as a heritage of his descendants, to cause untold woes in the 15th century. It is seldom in the world's history that a hollow legal device such as this has had such long enduring and deplorable results.

Battle of Sluys.

In the commencement of his continental war Edward took little profit either from his assumption of the French royal title, or from the lengthy list of princes of the Low Countries whom he enrolled beneath his banner. His two land-campaigns of 1339 and 1340 led to no victories or conquests, but cost enormous sums of money. The Netherland allies brought large contingents and took high pay from the king, but they showed neither energy nor enthusiasm in his cause. When Philip of Valois refused battle in the open, and confined his operations to defending fortified towns, or stockading himself in entranched camps, the allies drifted off, leaving the king with his English troops in force too small to accomplish anything. The sole achievement of the early years of the war which was of any profit to Edward or his realm was the great naval triumph of Sluys (June 24, 1340), which gave the English the command of the sea for the next twenty years. The French king had built or hired an enormous fleet, and with it threatened to invade England. Seeing that he could do nothing on land while his communications with the Low Countries were endangered by the existence of this armada, Edward levied every ship that was to be found, and brought the enemy to action in the Flemish harbour of Sluys. After a day of desperate hand to hand fighting—for the vessels grappled and the whole matter was settled by boarding—the French fleet was annihilated. Henceforth England was safe from coast raids, could conduct her commerce with Flanders without danger, and could strike without difficulty at any point of the French littoral. But it was not for some years that Edward utilized the advantage that Sluys had given him. As long as he persevered in the attempt to conduct the invasion of the northern frontier of France he achieved nothing.

Financial crisis. Trial of Archbishop Stratford.

Such schemes were finally abandoned simply because the king discovered that his allies were worthless and that his money was all spent. On his return from Flanders in 1340 he became involved in an angry controversy with his ministers, whom he accused, quite unjustly, of wasting his revenue and wrecking his campaign thereby. He imprisoned some of them, and wished to try his late chancellor, Archbishop Stratford, for embezzlement, in the court of the exchequer. But the primate contended very vigorously for the right to be tried before his peers, and since the king could get no subsidies from his parliament till he acknowledged the justice of this claim, he was forced to concede it. Stratford was acquitted—the king's thriftlessness and not the chancellor's maladministration had emptied the treasury. Edward drifted on along the path to financial ruin till he actually went bankrupt in 1345, when he repudiated his debts, and ruined several great Italian banking houses, who had been unwise enough to continue lending him money to the last. The Flemings were also hard hit by this collapse of the king's credit, and very naturally lost their enthusiasm for the English alliance. Van Artevelde, its chief advocate, was murdered by his own townsmen in this same year.

War in Brittany.

The second act of the Hundred Years' War, after King Edward had abandoned in despair his idea of invading France from the side of the Netherlands, was fought out in another quarter—the duchy of Brittany. Here a war of succession had broken out in which (oddly enough) Edward took up the cause of the pretender who had male descent, while Philip supported the one who represented a female line—each thus backing the theory of heritage by which his rival claimed the throne of France. By espousing the cause of John of Montfort Edward obtained a good foothold on the flank of France, for many of the Breton fortresses were put into his hands. But he failed to win any decisive advantage thereby over King Philip. It was not till 1346, when he adopted the new policy of trusting nothing to allies, and striking at the heart of France with a purely English army, that Edward found the fortune of war turning in his favour.

Edward invades France.

Battle of Creçy.

Capture of Calais.

In this year he landed in Normandy, where the English banner had not been seen since the days of King John, and executed a destructive raid through the duchy, and up the Seine, till he almost reached the gates of Paris. This brought out the king of France against him, with a mighty host, before which Edward retreated northward, apparently intending to retire to Flanders. But after crossing the Somme he halted at Creçy, near Abbeville, and offered battle to the pursuing enemy. He fought relying on the tactics which had been tried against the Scots at Dupplin and Halidon Hill, drawing up his army with masses of dismounted men-at-arms flanked on either side by archery. This array proved as effective against the disorderly charges of the French noblesse as it had been against the heavy columns of the Scottish pikemen. Fourteen times the squadrons of King Philip came back to the charge; but mowed down by the arrow-shower, they seldom could get to handstrokes with the English knights, and at last rode off the field in disorder. This astonishing victory over fourfold numbers was no mere chivalrous feat of arms, it had the solid result of giving the victors a foothold in northern France. For Edward took his army to beleaguer Calais, and after blockading it for nearly a year forced it to surrender. King Philip, after his experience at Creçy, refused to fight again in order to raise the siege. From henceforth the English possessed a secure landing-place in northern France, at the most convenient point possible, immediately opposite Dover. They held it for over two hundred years, to their own inestimable advantage in every recurring war.

Battle of Neville's Cross.

The years 1345–1347 saw the zenith of King Edward's prosperity; in them fell not only his own triumphs at Creçy and Calais, but a victory at Auberoche in Périgord won by his cousin Henry of Lancaster, which restored many long-lost regions of Guienne to the English suzerainty (Oct. 21, 1345), and another and more famous battle in the far north. At Neville's Cross, near Durham, the lords of the Border defeated and captured David Bruce, king of Scotland (Oct. 17, 1346). The loss of their king and the destruction of a fine army took the heart out of the resistance of the Scots, who for many years to come could give their French allies little assistance.

Truce with France. The Black Death.

In 1347 Edward made a short truce with King Philip: even after his late victories he felt his strength much strained, his treasury being empty, and his army exhausted by the year-long siege of Calais. But he would have returned to the struggle without delay had it not been for the dreadful calamity of the "Black Death," which fell upon France and England, as upon all Europe, in the years 1348–1349. The disease, on which the 14th century bestowed this name, was the bubonic plague, still familiar in the East. After devastating western Asia, it reached the Mediterranean ports of Europe in 1347, and spread across the continent in a few months. It was said that in France, Italy and England a third of the population perished, and though this estimate may be somewhat exaggerated, local records of unimpeachable accuracy show that it cannot be very far from the truth. The bishop's registers of the diocese of Norwich show that many parishes had three and some four successive vicars admitted in eighteen months. In the manor rolls it is not uncommon to find whole families swept away, so that no heir can be detected to their holdings. Among the monastic orders, whose crowded common life seems to have been particularly favourable to the spread of the plague, there were cases where a whole community, from the abbot down to the novices, perished. The upper classes are said to have suffered less than the poor; but the king's daughter Joan and two archbishops of Canterbury were among the victims. The long continuance of the visitation, which as a rule took six or nine months to work out its virulence in any particular spot, seems to have cowed and demoralized society. Though it first spread from the ports of Bristol and Weymouth in the summer of 1348, it had not finished its destruction in northern England till 1350, and only spread into Scotland in the summer of that year.

Economic and social effects of the Black Death.

When the worst of the plague was over, and panic had died down, it was found that the social conditions of England had been considerably affected by the visitation. The condition of the realm had been stable and prosperous during the earlier years of Edward III., the drain on its resources caused by heavy war-taxation having been more than compensated by the increased wealth that arose from growing commerce and developing industries. The victory of Sluys, which gave England the command of the seas, had been a great landmark in the economic no less than in the naval history of this island. But the basis of society was shaken by the Black Death; the kingdom was still essentially an agricultural community, worked on the manorial system; and the sudden disappearance of a third of the labouring hands by which that system had been maintained threw everything into disorder. The landowners found thousands of the crofts on which their villeins had been wont to dwell vacant, and could not fill them with new tenants. Even if they exacted the full rigour of service from the survivors, they could not get their broad demesne lands properly tilled. The landless labourers, who might have been hired to supply the deficiency, were so reduced in numbers that they could command, if free competition prevailed, double and triple rates of payment, compared with their earnings in the days before the plague. Hence there arose, almost at once, a bitter strife between the lords of manors and the labouring class, both landholding and landless. The lords wished to exact all possible services from the former, and to pay only the old two or three pence a day to the latter. The villeins, as hard hit as their masters, resented the tightening of old duties, which in some cases had already been commuted for small money rents during the prosperous years preceding the plague. The landless men formed combinations, disputed with the landlords, and asked and often got twice as much as the old rates, despite of the murmurings of the employer.

The Statute of Labourers.

After a short experience of these difficulties the king and council, whose sympathies were naturally with the landholders, issued an ordinance forbidding workmen of any kind to demand more than they had been wont to receive before 1348. This was followed up by the famous Statute of Labourers of 1351, which fixed rates for all wages practically identical with those of the times before the Black Death. Those workmen who refused to accept them were to be imprisoned, while employers who went behind the backs of their fellows and secretly paid higher sums were to be punished by heavy fines. Later additions to the statute were devised to terrorize the labourer, by adding stripes and branding to his punishment, if he still remained recalcitrant or absconded. And landowners were empowered to seize all vagrant able-bodied men, and to compel them to work at the statutory wages. As some compensation for the low pay of the workmen, parliament tried to bring down the price of commodities to their former level, for (like labour) all manufactured articles had gone up immensely in value.

Thirty years of friction followed, while the parliament and the ruling classes tried in a spasmodic way to enforce the statute, and the peasantry strove to evade it. It proved impossible to carry out the scheme; the labourers were too many and too cunning to be crushed. If driven over hard they absconded to the towns, where hands were needed as much as in the countryside, or migrated to districts where the statute was laxly administered. Gradually the landowners discovered that the only practical way out of their difficulties was to give up the old custom of working the manorial demesne by the forced labour of their villeins, and to cut it up into farms which were rented out to free tenants, and cultivated by them. In the course of two generations the "farmers" who paid rent for these holdings became more and more numerous, and demesne land tilled by villein-service grew more and more rare. But enough old-fashioned landlords remained to keep up the struggle with the peasants to the end of the 14th century and beyond, and the number of times that the Statute of Labourers was re-enacted and recast was enormous. Nevertheless the struggle turned gradually to the advantage of the labourer, and ended in the creation of the sturdy and prosperous farming yeomanry who were the strength of the realm for several centuries to come.

One immediate consequence of the "Black Death" was the renewal of the truce between England and France by repeated agreements which lasted from 1347 to 1355. During this interval Philip of France died, in 1350, and was succeeded by his son John. The war did not entirely cease, but became local and spasmodic. In Brittany the factions which supported the two claimants to the ducal title were so embittered that they never laid down their arms. In 1351 the French noblesse of Picardy, apparently without their master's knowledge or consent, made an attempt to surprise Calais, which was beaten off with some difficulty by King Edward in person. There was also constant bickering on the borders of Guienne. But the main forces on both sides were not brought into action till the series of truces ran out in 1355. From that time onward the English took the offensive with great vigour. Edward, prince of Wales, ravaged Languedoc as far as the Mediterranean, while his younger brother John of Gaunt, duke of Lancaster, executed a less ambitious raid in Picardy and Artois. In the south this campaign marked real progress, not mere objectless plunder, for it was followed by the reconquest of great districts in Périgord and the Agenais, which had been lost to England since the 13th century. A similar double invasion of France led to even greater results in the following year, 1356. While Lancaster landed in Normandy, and with the aid of local rebels occupied the greater part of the peninsula of the Côtentin, the prince of Wales accomplished greater things on the borders of Aquitaine. After executing a great circular sweep through Périgord, Limousin and Berry, he was returning to Bordeaux laden with plunder, when he was intercepted by the king of France near Poitiers. The battle that followed was the most astonishing of all the English victories during the Hundred Years' War. The odds against the prince were far heavier than those of Creçy, but by taking up a strong position and using the national tactics which combined the use of archery and dismounted men-at-arms, the younger Edward not merely beat off his assailants in a long defensive fight, but finally charged out upon them, scattered them, and took King John prisoner (Sept. 19, 1356).

Renewal of the war with France.

Battle of Poitiers.

This fortunate capture put an enormous advantage in the hands of the English; for John, a facile and selfish prince, was ready to buy his freedom by almost any concessions. He signed two successive treaties which gave such advantageous terms to Edward III. that the dauphin Charles, who was acting as regent, and the French states-general refused to confirm them. This drove the English king to put still further pressure on the enemy; in 1359 he led out from Calais the largest English army that had been seen during the war, devastated all northern France as far as Reims and the borders of Burgundy, and then—continuing the campaign through the heart of the winter—presented himself before the gates of Paris and ravaged the Île de France. This brought the regent Charles and his counsellors to the verge of despair; they yielded, and on the 8th of May 1360, signed an agreement at Brétigny near Chartres, by which nearly all King Edward's demands were granted. These preliminaries were ratified by the definitive peace of Calais (Oct. 24, 1360), which brought the first stage of the Hundred Years' War to an end.

The English ravage France.

Peace of Brétigny.

By this treaty King Edward formally gave up his claim to the French throne, which he had always intended to use merely as an asset for barter, and was to receive in return not only a sum of 3,000,000 gold crowns for King John's personal ransom, but an immense cession of territory which—in southern France at least—almost restored the old boundaries of the time of Henry II. The duchy of Aquitaine was reconstructed, so as to include not only the lands that Edward had inherited, and his recent conquests, but all Poitou, Limousin, Angoumois, Quercy, Rouergue and Saintonge—a full half of France south of the Loire. This vast duchy the English king bestowed not long after on his son Edward, the victor of Poitiers, who reigned there as a vassal-sovereign, owing homage to England but administering his possessions in his own right. In northern France, Calais and the county of Guines, and also the isolated county of Ponthieu, the inheritance of the wife of Edward I., were ceded to the English crown. All these regions, it must be noted, were to be held for the future free of any homage or acknowledgment of allegiance to an overlord, "in perpetuity, and in the manner in which the kings of France had held them." There was to be an end to the power of the courts of Paris to harass the duke of Aquitaine, by using the rights of the suzerain to interfere with the vassal's subjects. It was hoped that for the future the insidious legal warfare which had been used with such effect by the French kings would be effectually prevented.

To complete the picture of the triumph of Edward III. at this, the culminating point of his reign, it must be mentioned that some time before the peace of Calais he had made terms with Scotland. David Bruce was to cede Roxburgh and Berwick, but to keep the rest of his dominions on condition of paying a ransom of 100,000 marks. This sum could never be raised, and Edward always had it in his power to bring pressure to bear on the king of Scots by demanding the instalments, which were always in arrear. David gave no further trouble; indeed he became so friendly to England that he offered to proclaim Lionel of Clarence, Edward's second son, as his heir, and would have done so but for the vigorous opposition of his parliament.

Submission of David of Scotland.

The English people had expected that a sort of Golden Age would follow the conclusion of the peace with Scotland and France. Freed from the war-taxes which had vexed them for the last twenty years, they would be able to repair the ravages of the Black Death, and to develop the commercial advantages which had been won at Sluys, and secured by the dominion of the seas which they had held ever since. In some respects this expectation was not deceived; the years that followed 1360 seem to have been prosperous at home, despite the continued friction arising from the Statute of Labourers. The towns would seem to have fared better than the countryside, partly indeed at its expense, for the discontented peasantry migrated in large numbers to the centres of population where newly-developed manufactures were calling for more hands. The weaving industry, introduced into the eastern counties by the king's invitation to Flemish settlers, was making England something more than a mere producer of raw material for export. The seaports soon recovered from their losses in the Black Death, and English shipping was beginning to appear in the distant seas of Portugal and the Baltic. Nothing illustrates the growth of English wealth better than the fact that the kingdom had, till the time of Edward III., contrived to conduct all its commerce with a currency of small silver, but that within thirty years of his introduction of a gold coinage in 1343, the English "noble" was being struck in enormous quantities. It invaded all the markets of western Europe, and became the prototype of the gold issues of the Netherlands, Scotland, and even parts of Germany. It is in the latter years of Edward III. that we find the first forerunners of that class of English merchant princes who were to be such a marked feature in the succeeding reigns. The Poles of Hull, whose descendants rose in three generations to ducal rank, were the earliest specimens of their class. The poet Chaucer may serve as a humbler example of the rise of the burgher class—the son of a vintner, he became the father of a knight, and the ancestor, through female descents, of many baronial families. The second half of the 14th century is the first period in English history in which we can detect a distinct rise in the importance

Economic progress in England.

of the commercial as opposed to the landed interest. The latter, hard hit by the manorial difficulties that followed the plague of 1348–1349, found their rents stationary or even diminishing, while the price of the commodities from which the former made their wealth had permanently risen. As to intellectual vigour, the age that produced two minds of such marked originality in different spheres as Wycliffe and Chaucer must not be despised, even if it failed to carry out all the promise of the 13th century.

English rule in France.

For a few years after the peace of 1360 the political influence of Edward III. in western Europe seemed to be supreme. France, prostrated by the results of the English raids, by peasant revolts, and municipal and baronial turbulence, did not begin to recover strength till the thriftless king John had died (1364) and had been succeeded by his capable if unchivalrous son Charles V. Yet the state of the English dominions on the continent was not satisfactory; in building up the vast duchy of Aquitaine Edward had made a radical mistake. Instead of contenting himself with creating a homogeneous Gascon state, which might have grown together into a solid unit, he had annexed broad regions which had been for a century and a half united to France, and had been entirely assimilated to her. From the first Poitou, Quercy, Rouergue and the Limousin chafed beneath the English yoke; the noblesse in especial found the comparatively orderly and constitutional governance to which they were subjected most intolerable. They waited for the first opportunity to revolt, and meanwhile murmured against every act of their duke, the prince of Wales, though he did his best to behave as a gracious sovereign.

The Black Prince in Spain.

The younger Edward ended by losing his health and his wealth in an unnecessary war beyond the Pyrenees. He was persuaded by the exiled Peter the Cruel, king of Castile, to restore him to the throne which he had forfeited by his misgovernment. In 1367 he gathered a great army, entered Castile, defeated the usurper Henry of Trastamara at the battle of Najera, and restored his ally. But Peter, when once re-established as king, forgot his obligations and left the prince burdened with the whole expense of the campaign. Edward left Spain with a discontented and unpaid army, and had himself contracted the seeds of a disease which was to leave him an invalid for the rest of his life. To pay his debts he was obliged to resort to heavy taxation in Aquitaine, which gave his discontented subjects in Poitou and the other outlying districts an excuse for the rebellion that they had been for some time meditating. In 1368 his greatest vassals, the counts of Armagnac, Périgord and Comminges, displayed their disloyalty by appealing to the king of France as their suzerain against the legality of Edward's imposts. The French overlordship had been formally abolished by the treaty of 1360, so this appeal amounted to open rebellion. And when Charles V. accepted it, and cited Edward to appear before his parlement to answer the complaints of the counts, he was challenging England to renewed war. He found a preposterous excuse for repudiating the treaty by which he was bound, by declaring that some details had been omitted in its formal ratification.

Renewal of the war with France.

The Hundred Years' War, therefore, broke out again in 1369, after an interval of nine years. Edward III. assumed once more the title of king of France, while Charles V., in the usual style, declared that the whole duchy of Aquitaine had been forfeited for treason and rebellion on the part of its present holder. The second period of war, which was to last till the death of the English king, and for some years after, was destined to prove wholly disastrous to England. All the conditions had changed since 1360. Edward, though only in his fifty-seventh year, was entering into a premature and decrepit old-age, in which he became the prey of unworthy favourites, male and female. The men of the 14th century, who commanded armies and executed *coups d'état* at eighteen, were often worn out by sixty. The guidance of the war should have fallen into the hands of his eldest son, the victor of Poitiers and Najera, but the younger Edward had never recovered from the fatigues of his Spanish campaign; his disease having developed into a form of dropsy, he had become a confirmed invalid and could no longer take the field. The charge of the military operations of the English armies had passed to John of Gaunt, duke of Lancaster, the king's younger son, a prince far inferior in capacity to his father and brother. Though not destitute of good impulses Lancaster was hasty, improvident and obstinate; he was unfortunate in his choice of friends, for he allied himself to all his father's unscrupulous dependents. He was destitute of military skill, and wrecked army after army by attempting hard tasks at inappropriate times and by mistaken methods. Despite of all checks and disasters he remained active, self-confident and ambitious, and, since he had acquired a complete control over his father, he had ample opportunity to mismanage the political and military affairs of England.

Character of the war.

Lancaster's strategy, in the early years of the renewed war, consisted mainly of attempts to wear down the force of France by devastating raids; he hoped to provoke the enemy to battle by striking at the heart of his realm, but never achieved his purpose. Warned by the disasters of Creçy and Poitiers, Charles V. and his great captain Bertrand du Guesclin would never commit themselves to an engagement in the open field. They let the English invaders pass by, garrisoning the towns but abandoning the countryside. Since Lancaster, in his great circular raids, had never the leisure to sit down to a siege—generally a matter of long months in the 14th century—he repeatedly crossed France leaving a train of ruined villages behind him, but having accomplished nothing else save the exhaustion of his own army. For the French always followed him at a cautious distance, cutting off his stragglers, and restricting the area of his ravages by keeping flying columns all around his path. But while the duke was executing useless marches across France, the outlying lands of Aquitaine were falling away, one after the other, to the enemy. The limit of the territory which still remained loyal was ever shrinking, and what was once lost was hardly ever regained. Almost the only reconquest made was that of the city of Limoges, which was stormed in September 1370 by the troops of the Black Prince, who rose from his sick-bed to strike his last blow at the rebels. His success did almost as much harm as good to his cause, for the deliberate sack of the city was carried out with such ruthless severity that it roused wild wrath rather than terror in the neighbouring regions. Next spring the prince returned to England, feeling himself physically unable to administer or defend his duchy any longer.

English reverses.

The greater part of Poitou, Quercy and Rouergue had been lost, and the English cause was everywhere losing ground, when a new danger was developed. Since Sluys the enemy had never disputed the command of the seas; but in 1372 a Spanish fleet joined the French, and destroyed off La Rochelle a squadron which was bringing reinforcements for Guienne. The disaster was the direct result of the campaign of Najera—for Henry of Trastamara, who had long since dethroned and slain his brother Peter the Cruel, remained a consistent foe of England. From this date onward Franco-Spanish fleets were perpetually to be met not only in the Bay of Biscay but in the Channel; they made the voyage to Bordeaux unsafe, and often executed descents on the shores of Kent, Sussex, Devon and Cornwall. It was to no effect that, in the year after the battle of La Rochelle, Lancaster carried out the last, the most expensive, and the most fruitless of his great raids across France. He marched from Calais to Bordeaux, inflicted great misery on Picardy, Champagne and Berry, and left half his army dead by the way.

This did not prevent Bertrand du Guesclin from expelling from his dominions John of Brittany, the one ally whom King Edward possessed in France, or from pursuing a consistent career of petty conquest in the heart of Aquitaine. By 1374 little was left of the great possessions which the English had held beyond the Channel save Calais, and the coast slip from Bordeaux to Bayonne, which formed the only loyal part of the duchy of Guienne. Next year King Edward sued for peace—he failed to obtain it, finding the French terms too hard for acceptance—

but a truce at least was signed at Bruges (Jan. 1375) which endured till a few weeks before his death.

Domestic strife.

Agitation against the Church.

Wycliffe.

These two last years of Edward's reign were filled with an episode of domestic strife, which had considerable constitutional importance. The nation ascribed the series of disasters which had filled the space from 1369 to 1375 entirely to the maladministration of Lancaster and the king's favourites, failing to see that it was largely due to the mere fact that England was not strong enough to hold down Aquitaine, when France was administered by a capable king and served by a great general. Hence there arose, both in and out of parliament, a violent agitation for the removal of Lancaster from power, and the punishment of the favourites, who were believed, with complete justification, to be misusing the royal name for their own private profit. Among the leaders of this agitation were the clerical ministers whom John of Gaunt had expelled from office in 1371, and chiefly William of Wykeham, bishop of Winchester, the late chancellor; they were helped by Edmund Mortimer, earl of March, a personal enemy of Lancaster, and could count on the assistance of the prince of Wales when he was well enough to take a part in politics. The greater part of the House of Commons was on their side, and on the whole they may be regarded as the party of constitutional protest against maladministration. But there was another movement on foot at the same time, which cut across this political agitation in the most bewildering fashion. Protests against the corruption of the Church and the interference of the papacy in national affairs had always been rife in England. At this moment they were more prevalent than ever, largely in consequence of the way in which the popes at Avignon had made themselves the allies and tools of the kings of France. The Statutes of Praemunire and Provisors had been passed a few years before (1351–1365) to check papal pretensions. There was a strong anti-clerical party, whose practical aim was to fill the coffers of the state by large measures of disendowment and confiscations of Church property. The intellectual head of this party at the time was John Wycliffe, a famous Oxford teacher, and for some time master of Balliol College. In his lectures and sermons he was always laying stress on the unsatisfactory state of the national church and the infamous corruption of the papacy. The doctrine which first made him famous, and commended him to all members of the anti-clerical faction, was that unworthy holders of spiritual endowments ought to be dispossessed of them, because "dominion" should depend on "grace." Churchmen, small and great, as he held, had been corrupted, because they had fallen away from the early Christian idea of apostolic poverty. Instead of discharging their proper functions, bishops and abbots had become statesmen or wealthy barons, and took no interest in anything save politics. The monasteries, with their vast possessions, had become corporations of landlords, instead of associations for prayer and good works. The papacy, with its secular ambitions, and its insatiable greed for money, was the worst abuse of all. A bad pope, and most popes were bad, was the true Antichrist, since he was always overruling the divine law of the scriptures by his human ordinances. Every man, as Wycliffe taught—using the feudal analogies of contemporary society—is God's tenant-in-chief, directly responsible for his acts to his overlord; the pope is always thrusting himself in between, like a mesne-tenant, and destroying the touch between God and man by his interference. Sometimes his commands are merely presumptuous; sometimes—as when, for example, he preaches crusades against Christians for purely secular reasons—they are the most horrible form of blasphemy. Wycliffe at a later period of his life developed views on doctrinal matters, not connected with his original thesis about the relations between Church and State, and foreshadowed most of the leading tenets of the reformers of the 16th century. But in 1376–1377 he was known merely as the outspoken critic of the "Caesarean clergy" and the papacy. He had a following of enthusiastic disciples at Oxford, and scattered adherents both among the burghers and the knighthood, the nucleus of the party that afterwards became famous as the Lollards. But they had not yet differentiated themselves from the body of those who were merely anti-clerical, without being committed to any theories of religious reform.

John of Gaunt and Wycliffe.

Since Wycliffe was, above all things, the enemy of the political clergy of high estate, and since those clergy were precisely the leaders of the attack upon John of Gaunt, it came to pass that hatred of a common foe drew the duke and the doctor together for a space. There was a strange alliance between the advocate of clerical reform, and the practical exponent of secular misgovernment. The only point on which they were agreed was that it would be highly desirable to strip the Church of most of her endowments, in order to fill the exchequer of the state. Lancaster hoped to use Wycliffe as his mouthpiece against his enemies; Wycliffe hoped to see Lancaster disendowing bishops and monasteries and defying the pope. Hence the attempt of the political bishops to get Wycliffe condemned as a heretic became inextricably mixed with the attempt of the constitutional party, to which the bishops belonged, to evict the duke from his position of first councillor to the king and director of the policy of the realm.

The "Good Parliament."

Overthrow of the king's favourites.

Constitutional reforms.

The struggle began in the parliament of 1376, called by the anti-Lancastrian party the "Good Parliament." Headed by the earl of March, William Courtenay, bishop of London, and Sir Peter de la Mare, the daring speaker of the House of Commons, the duke's enemies began their campaign by accusing the king's ministers and favourites of corruption. Here they were on safe ground, for the misdeeds of Lord Latimer—the king's chamberlain, Lord Neville—his steward, Richard Lyons—his financial agent, and Alice Perrers—his greedy and shameless mistress, had been so flagrant that it was hard for Lancaster to defend them. In face of the evidence brought forward the old king and his son had to abandon their friends to the angry parliament. Latimer and Lyons were condemned to imprisonment and forfeiture of their goods, Alice Perrers was banished from court. Encouraged by this victory, the parliament passed on to constitutional reforms, forced on the king a council of twelve peers nominated by themselves, who were to exercise over him much the same control that the lords ordainers had held over his father, and compelled him to assent to a long list of petitions which, if properly carried out, would have removed most of the practical grievances of the nation. Having so done they dispersed, not guessing that Lancester had yielded so easily because he was set on undoing their work the moment that they were gone.

John of Gaunt re-establishes the royal power.

Death of the Black Prince.

This, however, was the case; after the shortest of intervals the duke executed something like a *coup d'état*. In his father's name he released Latimer and Lyons, dismissed the council of twelve, imprisoned Peter de la Mare, sequestrated the temporalities of Bishop Wykeham, and sent the earl of March out of the realm. Alice Perrers took possession again of the king, and all his corrupt courtiers came back to him. A royal edict declared the statutes of the "Good Parliament" null and void. Lancaster would never have dared to defy public opinion and challenge the constitutional party to a life-and-death struggle in this fashion, had it not been that his brother the prince of Wales had died while the "Good Parliament" was sitting; thus the opposition had been deprived of their strongest support. The prince's heir was a mere child, Richard of Bordeaux, aged only nine. It was feared by some that Duke John might carry his ambitions so far as to aim at the throne—he could do what he pleased with his doting father, and flaws might have been picked in the marriage of the Black Prince and his wife Joan of Kent, who were cousins, and therefore within the "prohibited degrees." As a matter of fact Lancaster was a more honest man than his enemies suspected; he hastened to acknowledge his little nephew's rights, acknowledged him as prince of Wales, and introduced him as his grandfather's heir before the parliament of January 1377.

The character of this body was a proof of the great strength of the royal name and power even in days when parliamentary institutions had been long in existence, and were supposed to act as a check on the crown. To legalize his arbitrary acts Duke John dared to summon the estates together, after he had issued stringent orders to the sheriffs to exclude his enemies and return his friends when the members for the Commons were chosen. He obtained a house of the complexion that he desired, and having a strong following among the peers actually succeeded in undoing all the work of 1376. No sign of trouble or rebellion followed, the opposition being destitute of a fighting leader. March had left the realm; Bishop Wykeham showed an unworthy subservience by suing for pardon through the mediation of Alice Perrers. Only Bishop Courtenay refused to be terrorized; he chose this moment to open a campaign against the duke's ally, John Wycliffe, who was arraigned for heresy before the ecclesiastical courts. His trial, however, ended in a scandalous fiasco. Lancaster and his friend Lord Percy came to St Paul's, and so insulted and browbeat the bishop, that the proceedings degenerated into a riot, and reached no conclusion (Feb. 19). Courtenay dared not recommence them, and Lancaster ruled as he pleased till his father, five months later, died. Deserted by his worthless courtiers and plundered on his death-bed by his greedy mistress, the victor of Sluys and Creçy sank into an unhonoured grave. It was a relief to the nation that he was gone. Yet there was a general feeling that chaos might follow. If Lancaster should justify the malevolent rumours that were afloat by making a snatch at the crown, the last state of the realm might be worse than the first.

Death of Edward III.

Richard II.

Duke John, however, was a better man than his enemies supposed. He was loyal to the crown according to his lights, and showed a chivalrous self-denial that had hardly been expected from him. He saluted his little nephew as king without a moment's hesitation, though he was aware that with the commencement of a new reign his own dictatorship had come to an end. The princess of Wales, in whose hands the young Richard II. was placed, had never been his friend, and was surrounded by adherents of her deceased husband, who belonged to the constitutional party. Disarmed, however, by the duke's frank submission they wisely resolved not to push him to extremes, and the first council which was appointed to act for the new monarch was a sort of "coalition ministry" in which Lancaster's followers as well as his foes were represented. For that very reason it was lacking in strength and unity of purpose, and proved lamentably incapable of dealing with the problems of the moment.

The French war.

Of these the most pressing was the renewal of the French war; the truce had expired a few weeks before the death of Edward III., and the new reign began with a series of military disasters. The French fleet landed in great force in Sussex, burnt Rye and Hastings and routed the shire levies. Simultaneously the seneschal of Aquitaine was defeated in battle, and Bergerac, the last great town in the inland which remained in English hands, was captured by the duke of Anjou.

First parliament of Richard. Reforms.

The first parliament of Richard II. met in October under the most gloomy auspices. It showed its temper by taking up the work of the "Good Parliament." Lancaster's adherents were turned out of the council; the persons condemned in 1376 were declared incapable of serving in it; Alice Perrers was sentenced to banishment and forfeiture, and the little king was made to repudiate the declaration whereby his uncle had quashed the statutes of 1376 by declaring that "no act of parliament can be repealed save with parliament's consent." John of Gaunt bowed before the storm, retired to his estates, and for some time took little part in affairs of state.

Unfortunately the new government proved wholly unable either to conduct the struggle with France successfully or to pluck up courage to make a humiliating peace—the only wise course before them. The nation was too proud to accept defeat, and persevered in the unhappy attempt to reverse the fortunes of war. An almost unbroken series of petty disasters marked the first three years of King Richard. The worst was the failure of the last great devastating raid which the English launched against France. Thomas of Woodstock, the youngest son of Edward III., took a powerful army to Calais, and marched through Picardy and Champagne, past Orleans, and finally to Rennes in Brittany, but accomplished nothing save the ruin of his own troops and the wasting of a vast sum of money. Meanwhile taxation was heavy, the whole nation was seething with discontent, and—what was worst—no way was visible out of the miserable situation; ministers and councillors were repeatedly displaced, but their successors always proved equally incompetent to find a remedy.

The Great Revolt of 1381.

This period of murmuring and misery culminated in the Great Revolt of 1381, a phenomenon whose origins must be sought in the most complicated causes, but whose outbreak was due in the main to a general feeling that the realm was being misgoverned, and that some one must be made responsible for its maladministration. It was actually provoked by the unwise and unjust poll-tax of one shilling a head on all adult persons, voted by the parliament of Northampton in November 1380. The last poll-tax had been carefully graduated on a sliding scale so as to press lightly on the poorest classes; in this one a shilling for each person had to be exacted from every township, though it was provided that "the strong should help the weak" to a certain extent. But in hundreds of villages there were no "strong" residents, and the poorest cottager had to pay his three groats. The peasantry defended themselves by the simple device of understating the numbers of their families; the returns made it appear that the adult population of England had gone down from 1,355,000 to 896,000 since the poll-tax of 1379. Thereupon the government sent out commissioners to revise the returns and exact the missing shillings. Their appearance led to a series of widespread and preconcerted riots, which soon spread over all England from the Wash to the Channel, and in a few days developed into a formidable rebellion. The poll-tax was no more than the spark which fired the mine; it merely provided a good general grievance on which all malcontents could unite. In the districts which took arms two main causes of insurrection may be differentiated; the first and the most widespread was the discontent of the rural population with the landowners and the Statute of Labourers. Their aim was to abolish all villein-service, and to wring from their lords the commutation of all manorial customs and obligations for a small rent—fourpence an acre was generally the sum suggested. But there was a simultaneous outbreak in many urban districts. In Winchester, London, St Albans, Canterbury, Bury, Beverley, Scarborough and many other places the rioting was as violent as in the countryside. Here the object of the insurgents was in most cases to break down the local oligarchy, who engrossed all municipal office and oppressed the meaner citizens; but in less numerous instances their end was to win charters from lords (almost always ecclesiastical lords) who had hitherto refused to grant them. But it must not be forgotten that there was also a tinge of purely political discontent about the rising; the insurgents everywhere proclaimed their intention to destroy "traitors," of whom the most generally condemned were the chancellor, Archbishop Sudbury, and the treasurer, Sir Robert Hailes, the two persons most responsible for the levy of the poll-tax. Often the rebels added the name of John of Gaunt to the list, looking upon him as the person ultimately responsible for the mismanagement of the war and the misgovernment of the realm. It must be added that though the leaders of the revolt were for the most part local demagogues, the creatures of the moment, there were among them a few fanatics like the "mad priest of Kent," John Ball, who had long preached socialist doctrines from the old text:

"When Adam delved and Eve span
Who was then the gentleman?"

and clamoured for the abolition of all differences of rank, status and property. Though many clerics were found among the rebels, it does not seem that any of them were Wycliffites, or that the reformer's teaching had played any part in exciting the peasantry at this time. No contemporary authority ascribes the rising to the Lollards.

Wat Tyler.

The riots had begun, almost simultaneously in Kent and Essex: from thence they spread through East Anglia and the home counties. In the west and north there were only isolated and sporadic outbreaks, confined to a few turbulent towns. In the countryside the insurrection was accompanied by wholesale burnings of manor-rolls, the hunting down of unpopular bailiffs and landlords, and a special crusade against the commissioners of the poll-tax and the justices who had been enforcing the Statute of Labourers. There was more arson and blackmailing than murder, though some prominent persons perished, such as the judge, Sir John Cavendish, and the prior of Bury. In many regions the rising was purely disorderly and destitute of organization. This was not, however, the case in Kent and London. The mob which had gathered at Maidstone and Canterbury marched on the capital many thousands strong, headed by a local demagogue named Wat Tyler, whom they had chosen as their captain; his most prominent lieutenant was the preacher John Ball. They announced their intention of executing all "traitors," seizing the person of the king, and setting up a new government for the realm. The royal council and ministers showed grievous incapacity and cowardice—they made no attempt to raise an army, and opened negotiations with the rebels. While these were in progress the malcontent party in London, headed by three aldermen, opened the gates of the city to Tyler and his horde. They poured in, and, joined by the London mob, sacked John of Gaunt's palace of the Savoy, the Temple, and many other buildings, while the ministers took refuge with the young king in the Tower. It was well known that not only the capital and the neighbouring counties but all eastern England was ablaze, and the council in despair sent out the young king to parley with Tyler at Mile End. The rebels at first demanded no more than that Richard should declare villeinage abolished, and that all feudal dues and services should be commuted for a rent of fourpence an acre. This was readily conceded, and charters were drawn up to that effect and sealed by the king. But, while the meeting was still going on, Tyler went off to the Tower with a part of his horde, entered the fortress unopposed, and murdered the unhappy chancellor, Archbishop Sudbury, the treasurer, and several victims more. This was only the beginning of massacre. Instead of dispersing with their charters, as did many of the peasants, Tyler and his confederates ran riot through London, burning houses and slaying lawyers, officials, foreign merchants and other unpopular persons. This had the effect of frightening the propertied classes in the city, who had hitherto observed a timid neutrality, and turned public opinion against the insurgents. Next day the rebel leaders again invited the king to a conference, in the open space of Smithfield, and laid before him a programme very different from that propounded at Mile End. Tyler demanded that all differences of rank and status should cease, that all church lands should be confiscated and divided up among the laity, that the game laws should be abolished, and that "no lord should any longer hold lordship except civilly." Apparently he was set on provoking a refusal, and thus getting an excuse for seizing the person of the king. But matters went otherwise than he had expected; when he waxed unmannerly, and unsheathed his dagger to strike one of the royal retinue who had dared to answer him back, the mayor of London, William Walworth, drew his cutlass and cut him down. The mob strung their bows, and were about to shoot down the king and his suite. But Richard—who showed astounding nerve and presence of mind for a lad of fourteen—cantered up to them shouting that he would be their chief and captain and would give them their rights. The conference was continued, but, while it was in progress, the mayor brought up the whole civic militia of London, who had taken arms when they saw that the triumph of the rebels meant anarchy, and rescued the king out of the hands of the mob. Seeing such a formidable body of armed men opposed to them, the insurgents dispersed—without their reckless and ready-witted captain they were helpless (June 15, 1381).

Suppression of the rising.

This was the turning-point of the rebellion; within a few days the council had collected a considerable army, which marched through Essex scattering such rebel bands as still held together. Kent was pacified at the same time; and Henry Despenser, the warlike bishop of Norwich, made a separate campaign against the East Anglian insurgents, defeating them at the skirmish of North Walsham, and hanging the local leader Geoffrey Lister, who had declared himself "king of the commons" (June 25, 1381). After this there was nothing remaining save to punish the leaders of the revolt; a good many scores of them were hanged, though the vengeance exacted does not seem to have been greater than was justified by the numerous murders and burnings of which they had been guilty; the fanatic Ball was, of course, among the first to suffer. On the 30th of August the rough methods of martial law were suspended, and on the 14th of December the king issued an amnesty to all save certain leaders who had hitherto escaped capture. A parliament had been called in November; it voted that all the charters given by the king at Mile End were null and void, no manumissions or grants of privileges could have been valid without the consent of the estates of the realm, "and for their own parts they would never consent to such, of their own free will nor otherwise, even to save themselves from sudden death."

Decline of the manorial system.

The rebellion, therefore, had failed either to abolish villeinage in the countryside or to end municipal oligarchy in the towns, and many lords took the opportunity of the time of reaction in order to revindicate old claims over their bondsmen. Nevertheless serfdom continued to decline all through the latter years of the 14th century, and was growing obsolete in the 15th. This, however, was the result not of the great revolt of 1381, but of economic causes working out their inevitable progress. The manorial system was already doomed, and the rent-paying tenant farmers, who had begun to appear after the Black Death, gradually superseded the villeins as the normal type of peasantry during the two generations that followed the outbreak that is generally known as "Wat Tyler's rebellion."

Wycliffe and the Lollards.

King Richard, though he had shown such courage and ready resources at Smithfield, was still only a lad of fourteen. For three years more he was under the control of tutors and governors appointed by his council. Their rule was incompetent, but the chief danger to the realm had passed away when both Charles V. of France and his great captain Du Guesclin died in 1380. The new king at Paris was a young boy, whose councils were swayed by a knot of quarrelsome and selfish uncles; the vigour of the attack on England began to slacken. Nevertheless there was no change in the fortune of war, which continued to be disastrous, if on a smaller scale than before. The chief domestic event of the time was the attack of the clerical party on Wycliffe and his followers. The reformer had begun to develop dogmatic views, in addition to his old theories about the relations of Church and State. When he proceeded to deny the doctrine of transubstantiation, to assert the all-sufficiency of the Scriptures as a rule of life, to denounce saint-worship, pilgrimages, and indulgences, and to declare the pope to be Antichrist, he frightened his old supporter John of Gaunt and the politicians of the anti-clerical clique. They ceased to support him, and his followers became a sect rather than a political party. He and his disciples were expelled from Oxford, and ere long the bishops began to arrest and try them for heresy. Wycliffe himself, strange to say, was not molested. He survived to publish his translation of the Bible and to die in peace in December 1383. But his followers were being hunted, and imprisoned or forced to recant, all through the later years of Richard II. Yet they continued to multiply, and exercised at times considerable influence; though they had few supporters among the baronage, yet among the lesser gentry and still more among the burgher class and in the universities they were strong. It was not till the next reign, when the bishops succeeded in calling in the crown to their aid, and passed the statute *De heretico comburendo*, that Lollardy ceased to flourish.

Richard's personal rule.

Impeachment of the king's "favourites."

The "lords appellant."

Execution of the king's friends.

King Richard meanwhile had grown to man's estate, and had resolved to take the reins of power into his own hands. He was wayward, high-spirited and self-confident. He wished to restore the royal powers which had slipped into the hands of the council and parliament during his minority, and had small doubts of his capacity to restore it. His chosen instruments were two men whom his enemies called his "favourites," though it was absurd to apply the name either to an elderly statesman like Michael de la Pole, who was made chancellor in 1384, or to Robert de Vere, earl of Oxford, a young noble of the oldest lineage, who was the king's other confidant. Neither of them was an upstart, and both, the one from his experience and the other from his high station, were persons who might legitimately aspire to a place among the advisers of the king. But Richard was tactless; he openly flouted his two uncles, John of Gaunt and Thomas of Woodstock, and took no pains to conciliate either the baronage or the commons. His autocratic airs and his ostentatious preference for his confidants—of whom he made the one earl of Suffolk and the other marquess of Dublin—provoked both lords and commons. Pole was impeached on a groundless charge of corruption and condemned, but Richard at once pardoned him and restored him to favour. De Vere was banished to Ireland, but at his master's desire omitted to leave the realm. The contemptuous disregard for the will of parliament which the king displayed brought on him a worse fate than he deserved. His youngest uncle, Thomas of Woodstock, duke of Gloucester, was a designing and ambitious prince who saw his own advantage in embittering the strife between Richard and his parliament. John of Gaunt having departed to Spain, where he was stirring up civil strife in the name of his wife, the heiress of Peter the Cruel, Gloucester put himself at the head of the opposition. Playing the part of the demagogue, and exaggerating all his nephew's petulant acts and sayings, he declared the constitution in danger, and took arms at the head of a party of peers, the earls of Warwick, Arundel and Nottingham, and Henry, earl of Derby, the son of John of Gaunt, who called themselves the lords appellant, because they were ready to "appeal" Richard's councillors of treason. Public opinion was against the king, and the small army which his confidant De Vere raised under the royal banner was easily scattered by Gloucester's forces at the rout of Radcot Bridge (Dec. 20, 1387). Oxford and Suffolk succeeded in escaping to France, but the king and the rest of his adherents fell into the hands of the lords appellant. They threatened for a moment to depose him, but finally placed him under the control of a council and ministers chosen by themselves, and to put him in a proper state of terror, executed Lord Beauchamp, the judge, Sir Robert Tressilian, and six or seven more of his chief friends. This was a piece of gratuitous cruelty, for the king, though wayward and unwise, had done nothing to justify such treatment.

Richard rules constitutionally.

Peace with France.

To the surprise of the nation Richard took his humiliation quietly. But he was merely biding his time; he had sworn revenge in his heart, but he was ready to wait long for it. For the next nine years he appeared an unexceptionable sovereign, anxious only to conciliate the nation and parliament. He got rid of the ministers imposed upon him by the lords appellant, but replaced them by Bishop Wykeham and other old statesmen against whom no objection could be raised. He disarmed Gloucester by making a close alliance with his elder uncle John of Gaunt, who had been absent in Spain during the troubles of 1387–1388, and was displeased at the violent doings of his brother. His rule was mild and moderate, and he succeeded at last in freeing himself from the incubus of the French war—the source of most of the evils of the time, for it was the heavy taxation required to feed this struggle which embittered all the domestic politics of the realm. After two long truces, which filled the years 1390–1395, a definitive peace was at last concluded, by which the English king kept Calais and the coast-strip of Guienne, from Bordeaux to Bayonne, which had never been lost to the enemy. To confirm the peace, he married Isabella, the young daughter of Charles VI. (Nov. 1396); he had lost his first wife, the excellent Anne of Bohemia, two years before.

Richard reduces Ireland to obedience.

His revenge on Gloucester and the lords appellant.

Banishment of Bolingbroke and Norfolk.

The king seemed firmly seated on his throne—so much so that in 1395 he had found leisure for a long expedition to Ireland, which none of his ancestors had visited since King John. He compelled all the native princes to do him homage, and exercised the royal authority in such a firm manner as had never before been known in the island. But those who looked forward to quiet and prosperous times both for Ireland and for England were destined to be undeceived. In 1397 Richard carried out an extraordinary and unexpected *coup d'état*, which he had evidently premeditated for many years. Having lived down his unpopularity, and made himself many powerful friends, he resolved to take his long-deferred revenge on Gloucester and the other lords appellant. He trumped up a vain story that his uncle was once more conspiring against him, arrested him, and sent him over to Calais, where he was secretly murdered in prison. At the same time Gloucester's two chief confederates of 1387, the earls of Arundel and Warwick, were tried and sentenced to death: the former was actually executed, the latter imprisoned for life. The other two lords appellant, Mowbray, duke of Norfolk,[1] and Henry of Bolingbroke, the son of John of Gaunt, were dealt with a year later. Richard pretended to hold them among his best friends, but in 1398 induced Bolingbroke to accuse Norfolk of treasonable language. Mowbray denied it, and challenged his accuser to a judicial duel. When they were actually facing each other in the lists at Coventry, the king forbade them to fight, and announced that he banished them both—Henry for six years, Norfolk for life.

Arbitrary rule of Richard.

Having thus completed his vengeance on those who had slain his friends ten years before—their respective punishments were judiciously adapted to their several responsibilities in that matter—Richard began to behave in an arbitrary and unconstitutional fashion. He evidently thought that no one would dare to lift a hand against him after the examples that he had just made. This might have been so, if he had continued to rule as cautiously as during the time when he was nursing his scheme of revenge. But now his brain seemed to be turned by success—indeed his wild language at times seemed to argue that he was not wholly sane. He declared that all pardons issued since 1387 were invalid, and imposed heavy fines on persons, and even on whole shires, that had given the lords appellant aid. He made huge forced loans, and employed recklessly the abuse of purveyance. He browbeat the judges on the bench, and kept many persons under arrest for indefinite periods without a trial. But the act which provoked the nation most was that he terrified the parliament which met at Shrewsbury in 1398 into voting away its powers to a small committee of ten persons, all creatures of his own. This body he used as his instrument of government, treating its assent as equivalent to that of a whole parliament in session. There seemed to be an end to the constitutional liberties of England.

Second expedition to Ireland.

Such violence, however, speedily brought its own punishment. In 1399 Richard sailed over to Ireland to put down a revolt of the native princes, who had defeated and slain the earl of March, his cousin and their lord-lieutenant. While he was absent Henry of Bolingbroke landed at Ravenspur with a small body of exiles and mercenaries. He pretended that he had merely come to claim the estates and title of his father John of Gaunt, who had died a few months before. The adventurer was at once joined by the

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[1] The Nottingham of 1387, who had been promoted to the higher title.

Henry of Bolingbroke lands in England.

Flight of Richard.

Surrender and abdication of Richard.

earl of Northumberland and all the lords of the north; the army which was called out against him refused to fight, and joined his banner, and in a few days he was master of all England (July 1399). King Richard, hurrying back from Ireland, landed at Milford Haven just in time to learn that the levies raised in his name had dispersed or joined the enemy. He still had with him a considerable force, and might have tried the fortune of war with some prospect of success. But his conduct seemed dictated by absolute infatuation; he might have fought, or he might have fled to his father-in-law in France, if he judged his troops untrustworthy. Instead of taking either course, he deserted his army by night, and fled into the Welsh mountains, apparently with the intention of collecting fresh adherents from North Wales and Cheshire, the only regions where he was popular. But Bolingbroke had already seized Chester, and was marching against him at the head of such a large army that the countryside refused to stir. After skulking for three weeks in the hills, Richard surrendered to his cousin at Flint, on the 19th of August 1399, having previously stipulated that if he consented to abdicate his life should be spared, his adherents pardoned, and an honourable livelihood assured to him. This surrender put the crown to his career of folly. He should have known that Henry would never feel safe while he survived, and that no oaths could be trusted in such circumstances. At all costs he should have endeavoured to escape abroad, a course that was still in his power.

Accession of Henry IV.

Richard carried out his part of the bargain; he executed a deed of abdication in which he owned himself "insufficient and useless." It was read to a parliament summoned in his name on the 30th of September, and the throne was declared vacant. There was small doubt as to the personality of his successor; possession is nine points of the law, and Henry of Bolingbroke for the moment had the whole nation at his back. His hereditary title indeed was imperfect; though he was the eldest descendant of Edward III. in the male line after Richard, yet there was a whole family which stood between him and the crown. From Lionel of Clarence, the second son of Edward III. (John of Gaunt was only the third) descended the house of March, and the late king had proclaimed that Edmund of March would be his heir if he should die childless. Fortunately for Bolingbroke the young earl was only six years of age; not a voice was raised in his favour in parliament. When Henry stood forward and claimed the vacant throne by right of conquest and also by right of descent, no one gainsaid him. Lords and commons voted that they would have him for their king, and he was duly crowned on the 13th of October 1399. No faith was kept with the unhappy Richard; he was placed in close and secret confinement, and denied the ordinary comforts of life. Moreover the adherents for whose safety he had stipulated were at once impeached of treason.

Position of the new king.

Henry of Lancaster came to the throne, for all intents and purposes as an elective king; he had to depend for the future on his ability to conciliate and satisfy the baronage and the commons by his governance. For by his usurpation he had sanctioned the theory that kings can be deposed for incapacity and maladministration. If he himself should become unpopular, all the arguments that he had employed against Richard might be turned against himself. The prospect was not reassuring; his revenue was small, and parliament would certainly murmur if he tried to increase it. The late king was not without partisans and admirers. There was a considerable chance that the French king might declare war—nominally to avenge his son-in-law, really to win Calais and Bordeaux. Of the partisans who had placed Henry on the throne many were greedy, and some were wholly unreasonable. But he trusted to his tact and his energy, and cheerfully undertook the task of ruling as a constitutional king—the friend of the parliament that had placed him on the throne.

Rebellion of the earls.

Murder of Richard.

The problem proved more weary and exhausting than he had suspected. From the very first his reign was a time of war, foreign and domestic, of murmuring, and of humiliating shifts and devices. Henry commenced his career by granting the adherents of Richard II. their lives, after they had been first declared guilty of treason and had been deprived of the titles, lands and endowments given them by the late king. Their reply to this very modified show of mercy was to engage in a desperate conspiracy against him. If they had waited till his popularity had waned, they might have had some chance of success, but in anger and resentment they struck too soon. The earls of Kent and Huntingdon, close kinsmen of Richard on his mother's side, the earl of Salisbury—a noted Lollard—and the lords Despenser and Lumley took arms at midwinter (Jan. 4, 1400) and attempted to seize the king at Windsor. They captured the castle, but Henry escaped, raised the levies of London against them, and beat them into the west. Kent and Salisbury were slain at Cirencester, the others captured and executed with many of their followers. Their rebellion sealed the fate of the master in whose cause they had risen. Henry and his counsellors were determined that there should be no further use made of the name of the "lawful king," and Richard was deliberately murdered by privation—insufficient clothing, food and warmth—in his dungeon at Pontefract Castle (Feb. 17, 1400). It is impossible not to pity his fate. He had been wayward, unwise and occasionally revengeful; but his provocation had been great, and if few tyrants have used more violent and offensive language, few have committed such a small list of actual crimes. It was a curious commentary on Henry's policy, that Richard, even when dead, did not cease to give him trouble. Rumour got abroad, owing to the secrecy of his end, that he was not really dead, and an impostor long lived at the Scottish court who claimed to be the missing king, and was recognized as Richard by many malcontents who wished to be deceived.

Welsh rising under Owen Glendower.

The rising of the earls was only the first and the least dangerous of the trials of Henry IV. Only a few months after their death a rebellion of a far more formidable sort broke out in Wales—where Richard II. had been popular, and the house of March, his natural heirs, held large estates. The leader was a gentleman named Owen Glendower, who had the blood of the ancient kings of Gwynedd in his veins. Originally he had taken to the hills as a mere outlaw, in consequence of a quarrel with one of the marcher barons; but after many small successes he began to be recognized as a national leader by his countrymen, and proclaimed himself prince of Wales. The king marched against him in person in 1400 and 1401, but Glendower showed himself a master of guerrilla warfare; he refused battle, and defied pursuit in his mountains, till the stores of the English army were exhausted and Henry was forced to retire. His prestige as a general was shaken, and his treasury exhausted by these fruitless irregular campaigns.

Discontent of the commons.

Statute De heretico comburendo.

Meanwhile worse troubles were to come. The commons were beginning to murmur at the king's administration; they had obtained neither the peace nor the diminished taxation which they had been promised. Moreover, among some classes at least, he had won desperate hatred by his policy in matters of religion. One of his chief supporters in 1399 had been Archbishop Arundel, an old enemy of Richard II. and brother to the earl who had been beheaded in 1397. Arundel was determined to extirpate the Lollards, and used his influence on the king to induce him to frame and pass through parliament the detestable statute *De heretico comburendo*, which recognized death by burning at the stake as the penalty of heresy, and bound the civil authorities to arrest, hand over to the church courts, and receive back for execution, all contumacious Lollards. Henry himself does not seem to have been particularly enthusiastic for persecution, but in order to keep the church party on his side he was forced to sanction it. The burnings began with that of William Sawtré, a London vicar, on the 2nd of

March 1401; they continued intermittently throughout the reign. The victims were nearly all clergy or citizens; the king shrank from touching the Lollards of higher rank, and even employed in his service some who were notoriously tainted with heresy.

War with Scotland.

Battle of Homildon Hill.

External troubles continued to multiply during Henry's earlier years. The Scots had declared war, and there was every sign that the French would soon follow suit, for the king's failure to crush Glendower had destroyed his reputation for capacity. The rebel achieved his greatest success in June 1402, when he surprised and routed the whole levy of the marcher lords at Bryn G'las, between Pilleth and Knighton, capturing (among many other prisoners) Sir Edmund Mortimer, the uncle and guardian of the young earl of March, whom all malcontents regarded as the rightful monarch of England. A few months after the king's fortune seemed to take a turn for the better, when the Scots were defeated at Homildon Hill by the earl of Northumberland and his son Henry Percy, the celebrated "Hotspur." But this victory was to be the prelude to new dangers: half the nobility of Scotland had been captured in the battle, and Northumberland intended to fill his coffers with their ransoms; but the king looked upon them as state prisoners and announced his intention of taking them out of the earl's hands. Northumberland was a greedy and unscrupulous Border chief, who regarded himself as entitled to exact whatever he chose from his master, because he had been the first to join him at his landing in 1399, and had lent him a consistent support ever since. He had been amply rewarded by grants of land and money, but was not yet satisfied. In indignation at the first refusal that he had met, the earl conspired with Glendower to raise rebellion in the name of the rightful heirs of King Richard, the house of March. The third party in the plot was Sir Edmund Mortimer, Glendower's captive, who was easily persuaded to join a movement for the aggrandizement of his own family. He married Owen's daughter, and became his trusted lieutenant. Northumberland also enlisted the services of his chief Scottish prisoner, the earl of Douglas, who promised him aid from beyond Tweed.

Conspiracy of Northumberland with Glendower.

Insurrection in the north and west.

Defeat of the rebels at Shrewsbury.

In July 1403 came the crisis of King Henry's reign; while Glendower burst into South Wales, and overran the whole countryside as far as Cardiff and Carmarthen, the Percies raised their banner in the North. The old earl set himself to subdue Yorkshire; his son Hotspur and the earl of Douglas marched south and opened communication with the Welsh. All Cheshire, a district always faithful to the name of Richard II., rose in their favour, and they were joined by Hotspur's uncle, the earl of Worcester. They then advanced towards Shrewsbury, where they hoped that Glendower might meet them. But long ere the Welsh could appear, King Henry was on the spot; he brought the rebels to action at Hately Field, just outside the gates of Shrewsbury, and inflicted on them a complete defeat, in which his young son Henry of Monmouth first won his reputation as a fighting man. Hotspur was slain, Worcester taken and beheaded, Douglas desperately wounded (July 23, 1403). On receiving this disastrous news the earl of Northumberland sued for pardon; the king was unwise enough to grant it, merely punishing him by fining him and taking all his castles out of his hands.

War with France renewed.

Parliament assumes control of the finances.

By winning the battle of Shrewsbury Henry IV. had saved his crown, but his troubles were yet far from an end. The long-expected breach with France had at last come to pass; the duke of Orleans, without any declaration of war, had entered Guienne, while a French fleet attacked the south-west of England, and burnt Plymouth. Even more menacing to the king's prosperity was the news that another squadron had appeared off the coast of Wales, and landed stores and succours for Glendower, who had now conquered the whole principality save a few isolated fortresses. The drain of money to meet this combination of foreign war and domestic rebellion was more than the king's exchequer could meet. He was driven into unconstitutional ways of raising money, which recalled all the misdoings of his predecessor. Hence came a series of rancorous quarrels with his parliaments, which grew more disloyal and clamorous at every new session. The cry was raised that the taxes were heavy not because of the French or Welsh wars, but because Henry lavished his money on favourites and unworthy dependents. He was forced to bow before the storm, though the charge had small foundation: the greater part of his household was dismissed, and the war-taxes were paid not to his treasurer but to a financial committee appointed by parliament.

Rising of 1405 in the North.

It was not till 1405 that the worst of Henry's troubles came to an end. This year saw the last of the convulsions that threatened to overturn him,—a rising in the North headed by the old earl of Northumberland, by Richard Scrope, archbishop of York, and by Thomas Mowbray the earl marshal. It might have proved even more dangerous than the rebellion of 1403, if Henry's unscrupulous general Ralph, earl of Westmorland, had not lured Scrope and Mowbray to a conference, and then arrested them under circumstances of the vilest treachery. He handed them over to the king, who beheaded them both outside the gate of York, without any proper trial before their peers. Northumberland thereupon fled to Scotland without further fighting. He remained in exile, till January 1408, when he made a final attempt to raise rebellion in the North, and was defeated and slain at the battle of Bramham Moor.

Suppression of the Welsh rising.

Long before this last-named fight Henry's fortunes had begun to mend. Glendower was at last checked by the untiring energy of the king's eldest son, Henry of Monmouth, who had been given charge of the Welsh war. Even when French aid was sent him, the rebel chief proved unable to maintain his grip on South Wales. He was beaten out of it in 1406, and Aberystwyth Castle, where his garrison made a desperate defence for two years, became the southern limit of his dominions. In the end of 1408 Prince Henry captured this place, and six weeks later Harlech, the greatest stronghold of the rebels, where Sir Edmund Mortimer, Owen's son-in-law and most trusted captain, held out till he died of starvation. From this time onwards the Welsh rebellion gradually died down, till Owen relapsed into the position from which he had started, that of a guerrilla chief maintaining a predatory warfare in the mountains. From 1409 onward he ceased to be a public danger to the realm, yet so great was his cunning and activity that he was never caught, and died still maintaining a hopeless rebellion so late as 1416.

End of the French and Scottish wars.

The French war died down about the same time that the Welsh rebellion became insignificant. Louis of Orleans, the head of the French war party, was murdered by his cousin John, duke of Burgundy, in November 1407, and after his death the French turned from the struggle with England to indulge in furious civil wars. Calais, Bordeaux and Bayonne still remained safe under the English banner. The Scottish war had ended even earlier. Prince James, the heir of Robert III., had been captured at sea in 1406. The duke of Albany, who became regent when Robert died, had no wish to see his nephew return, and concluded a corrupt agreement with the king of England, by which he undertook to keep Scotland out of the strife, if Henry would prevent the rightful heir from returning to claim his own.[1] Hence Albany and his son ruled at Edinburgh for seventeen years, while James was detained in an honourable captivity at Windsor.

Illness of the king. Faction in the court.

From 1408 till his death in 1413 Henry was freed from all the dangers which had beset his earlier years. But he got small enjoyment from the crown which no longer tottered on his brow. Soon after his execution of Archbishop Scrope he had been smitten with a painful disorder, which his enemies declared to be the punishment inflicted on him by heaven for the prelate's death. It grew gradually worse, and developed into what his contemporaries called leprosy—a loathsome skin disease accompanied by bouts of fever, which sometimes kept him bedridden for months at a time. From 1409 onwards he became a mere invalid, only able to assert himself in rare intervals of convalescence. The domestic politics of the realm during his last five years were nothing more than a struggle between two court factions who desired to use his name. The one was headed by his son Henry, prince of Wales, and his half-brothers John, Henry and Thomas Beaufort, the base-born but legitimized children of John of Gaunt. The other was under the direction of Archbishop Arundel, the king's earliest ally, who had already twice served him as chancellor, and had the whole church party at his back. Arundel was backed by Thomas duke of Clarence, the king's second son, who was an enemy of the Beauforts, and not on the best terms with his own elder brother, the prince of Wales. The fluctuating influence of each party with the king was marked by the passing of the chancellorship from Arundel to Henry Beaufort and back again during the five years of Henry's illness. The rivalry between them was purely personal; both were prepared to go on with the "Lancastrian experiment," the attempt to govern the realm in a constitutional fashion by an alliance between the king and the parliament; both were eager persecutors of the Lollards; both were eager to make profit for England by interfering in the civil wars of the Orleanists and Burgundians which were now devastating France.

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[1] Mr Andrew Lang takes a different view of the character of Albany and his attitude in this matter. See *Hist. of Scotland*, i. 289, and the article SCOTLAND: *History*.—ED.

Prince Hal.

The prince of Wales, it is clear, gave much umbrage to his father by his eagerness to direct the policy of the crown ere yet it had fallen to him by inheritance. The king suspected, and with good reason, that his son wished him to abdicate, and resented the idea. It seems that a plot with such an object was actually on foot, and that the younger Henry gave it up in a moment of better feeling, when he realized the evil impression that the unfilial act would make upon the nation. At this time the prince gave small promise of developing into the model monarch that he afterwards became. There was no doubt of his military ability, which had been fully demonstrated in the long Welsh wars, but he is reputed to have shown himself arrogant, contentious and over-given to loose-living. There were many, Archbishop Arundel among them, who looked forward with apprehension to his accession to the throne.

English expedition to France.

The two parties in the council of Henry IV. were agreed that it would be profitable to intervene in the wars of France, but they differed as to the side which offered the most advantages. Hence came action which seemed inconsistent, if not immoral; in 1411, under the prince's influence, an English contingent joined the Burgundians and helped them to raise the siege of Paris. In 1412, by Arundel's advice, a second army under the duke of Clarence crossed the Channel to co-operate with the Orleanists. But the French factions, wise for once, made peace at the time of Clarence's expedition, and paid him 210,000 gold crowns to leave the country! The only result of the two expeditions was to give the English soldiery a poor opinion of French military capacity, and a notion that money was easily to be got from the distracted realm beyond the narrow seas.

Accession of Henry V.

On the 20th of March 1413, King Henry's long illness at last reached a fatal issue, and his eldest son ascended the throne. The new king had everything in his favour; his father had borne the odium of usurpation and fought down the forces of anarchy. The memory of Richard II. had been forgotten; the young earl of March had grown up into the most harmless and unenterprising of men, and the nation seemed satisfied with the new dynasty, whose first sovereign had shown himself, under much provocation, the most moderate and accommodating of constitutional monarchs.

His character.

Henry V. on his accession bade farewell to the faults of his youth. He seems to have felt a genuine regret for the unfilial conduct which had vexed his father's last years, and showed a careful determination to turn over a new leaf and give his enemies no scope for criticism. From the first he showed a sober and grave bearing; he reconciled himself to all his enemies, gave up his youthful follies, and became a model king according to the ideas of his day. There is no doubt that he had a strong sense of moral responsibility, and that he was sincerely pious. But his piety inspired him to redouble the persecution of the unfortunate Lollards, whom his father had harried only in an intermittent fashion; and his sense of moral responsibility did not prevent him from taking the utmost advantage of the civil wars of his unhappy neighbours of France.

Persecution of the Lollards.

Rising under Oldcastle.

The first notable event of Henry's reign was his assault upon the Lollards. His father had spared their lay chiefs, and contented himself with burning preachers or tradesmen. Henry arrested John Oldcastle, Lord Cobham, their leading politician, and had him tried and condemned to the stake. But Oldcastle escaped from the Tower before the day fixed for his execution, and framed a wild plot for slaying or deposing his persecutor. He planned to gather the Lollards of London and the Home Counties under arms, and to seize the person of the king—a scheme as wild as the design of Guy Fawkes or the Fifth Monarchy Men in later generations, for the sectaries were not strong enough to coerce the whole nation. Henry received early notice of the plot, and nipped it in the bud, scattering Oldcastle's levies in St Giles' Fields (Jan. 10, 1414) and hanging most of his lieutenants. But their reckless leader escaped, and for three years led the life of an outlaw, till in 1417 he was finally captured, still in arms, and sent to the stake.

Henry V. and France.

This danger having passed, Henry set himself to take advantage of the troubles of France. He threatened to invade that realm unless the Orleans faction, who had for the moment possession of the person of the mad king Charles VI., should restore to him all that Edward III. had owned in 1360, with Anjou and Normandy in addition. The demand was absurd and exorbitant and was refused, though the French government offered him the hand of their king's daughter Catherine with a dowry of 800,000 crowns and the districts of Quercy and Périgord—sufficiently handsome terms. When he began to collect a fleet and an army, they added to the offer the Limousin and other regions; but Henry was determined to pick his quarrel, and declared war in an impudent and hypocritical manifesto, in which he declared that he was driven into strife against his will. The fact was that he had secured the promise of the neutrality or the co-operation of the Burgundian faction, and thought that he could crush the Orleanists with ease.

Henry invades France.

Battle of Agincourt.

He sailed for France in August 1415, with an army compact and well-equipped, but not very numerous. On the eve of his departure he detected and quelled a plot as wild and futile as that of Oldcastle. The conspirators were his cousin, Richard, earl of Cambridge, Lord Scrope, and Sir Thomas Grey, a kinsman of the Percies. They had planned to raise a rebellion in the name of the earl of March, in whose cause Wales and the North were to have been called to arms. But March himself refused to stir, and betrayed them to the king, who promptly beheaded them, and set sail five days later. He landed near the mouth of the Seine, and commenced his campaign by besieging and capturing Harfleur, which the Orleanists made no attempt to succour. But such a large number of his troops perished in the trenches by a pestilential disorder, that he found himself too weak to march on Paris, and took his way to Calais across Picardy, hoping, as it seems, to lure the French to battle by exposing his small army to attack. The plan was hazardous, for the Orleanists turned out in great numbers and almost cut him off in the marshes of the Somme. When he had struggled across them, and was half-way to Calais, the enemy beset him in the fields of Agincourt (Oct. 25, 1415). Here Henry vindicated his military reputation by winning a victory even more surprising than those of Creçy, and Poitiers, for he was outnumbered in an even greater proportion than the two Edwards had been in 1346 and 1356.

and had to take the offensive instead of being attacked in a strong position. The heavily armoured French noblesse, embogged in miry meadows, proved helpless before the lightly equipped English archery. The slaughter in their ranks was terrible, and the young duke of Orleans, the head of the predominant faction of the moment, was taken prisoner with many great nobles. However, so exhausted was the victorious army that Henry merely led it back to Calais, without attempting anything more in this year. The sole tangible asset of the campaign was the possession of Harfleur, the gate of Normandy, a second Calais in its advantages when future invasions were taken in hand. The moral effects were more important. The Orleanist party was shaken in its power; the rival Burgundian faction became more inclined to commit itself to the English cause, and the terror of the English arms weighed heavily upon both.

Effect of the battle.

England and the council of Constance.

It was not till the next year but one that Henry renewed his invasion of France—the intervening space was spent in negotiations with Burgundy, and with the emperor Sigismund, whose aid the king secured in return for help in putting an end to the scandalous "great schism" which had been rending the Western Church for so many years. The English deputation lent their aid to Sigismund at the council of Constance, when Christendom was at last reunited under a single head, though all the reforms which were to have accompanied the reunion were postponed, and ultimately avoided altogether, by the restored papacy.

Henry's second invasion of France.

Conquest of Normandy.

Triumph of the Burgundians.

Henry takes Rouen.

Murder of John of Burgundy.

In July 1417 Henry began his second invasion of France, and landed at the mouth of the Seine with a powerful army of 17,000 men. He had resolved to adopt a plan of campaign very different from those which Edward III. or the Black Prince had been wont to pursue, having in view nothing more than the steady and gradual conquest of the province of Normandy. This he was able to accomplish without any interference from the government at Paris, for the constable Armagnac, who had succeeded the captive Orleans at the head of the anti-Burgundian party, had no troops to spare. He was engaged in a separate campaign with Henry's ally John the Fearless, and left Normandy to shift for itself. One after another all the towns of the duchy were reduced, save Rouen, the siege of which, as the hardest task, King Henry postponed till the rest of the country-side was in his hands. He sat down to besiege it in 1418, and was detained before its walls for many months, for the citizens made an admirable defence. Meanwhile a change had taken place in the domestic politics of France; the Burgundians seized Paris in May 1418; the constable Armagnac and many of his partisans were massacred, and John the Fearless got possession of the person of the mad Charles VI., and became the responsible ruler of France. He had then to choose between buying off his English allies by great concessions, or taking up the position of champion of French interests. He selected the latter rôle, broke with Henry, and tried to relieve Rouen. But all his efforts were foiled, and the Norman capital surrendered, completely starved out, on the 19th of January 1419. On this Burgundy resolved to open negotiations with Henry; he wished to free his hands for an attack on his domestic enemies, who had rallied beyond the Loire under the leadership of the dauphin Charles—from whom the party, previously known first as Orleanists and then as Armagnacs, gets for the future the name of the "Dauphinois." The English king, however, seeing the manifest advantage of his position, tried to drive too hard a bargain; he demanded the old boundaries of 1360, with his new conquest of Normandy, the hand of the princess Catherine, and a great sum of ready money. Burgundy dared not concede so much, under pain of alienating all his more patriotic supporters. He broke off the conference of Meulan, and tried to patch up a peace with the dauphin, in order to unite all Frenchmen against the foreign invader. This laudable intention was wrecked by the treachery of the young heir to the French throne; on the bridge of Montereau Charles deliberately murdered the suppliant duke, as he knelt to do homage, thinking thereby that he would make an end of the Burgundian party (Sept. 9, 1419).

The Burgundians acknowledge Henry as heir of France.

Treaty of Troyes.

This abominable deed gave northern France for twenty years to an English master. The young duke of Burgundy, Philip the Good, and his supporters in Paris and the north, were so incensed with the dauphin's cruel treachery that they resolved that he should never inherit his father's crown. They proffered peace to King Henry, and offered to recognize his preposterous[1] claim to the French throne, on condition that he should marry the princess Catherine and guarantee the constitutional liberties of the realm. The insane Charles VI. should keep nominal possession of the royal title till his death, but meanwhile the Burgundians would do homage to Henry as "heir of France." These terms were welcomed by the English king, and ratified at the treaty of Troyes (May 21, 1420). Henry married the princess Catherine, received the oaths of Duke Philip and his partisans, and started forth to conquer the Dauphinois at the head of an army of which half was composed of Burgundian levies. Paris, Picardy, Champagne, and indeed the greater part of France north of the Loire, acknowledged him as their sovereign.

Death of Henry V.

Henry had only two years longer to live; they were spent in incessant and successful campaigning against the partisans of his brother-in-law, the dauphin Charles; by a long series of sieges the partisans of that worthless prince were evicted from all their northern strongholds. They fought long and bitterly, nor was this to be marvelled at, for Henry had a custom of executing as traitors all who withstood him, and those who had once defied him did well to fight to the last gasp, in order to avoid the block or the halter. In the longest and most desperate of these sieges, that of Meaux (Oct. 1421–March 1422), the king contracted a dysenteric ailment which he could never shake off. He survived for a few months, but died, worn out by his incessant campaigning, on the 31st of August 1422, leaving the crown of England and the heirship of France to his only child Henry of Windsor, an infant less than two years old.

Effects of his conquests.

Few sovereigns in history have accomplished such a disastrous life's work as this much-admired prince. If he had not been a soldier of the first ability and a diplomatist of the most unscrupulous sort, he could never have advanced so far towards his ill-chosen goal, the conquest of France. His genius and the dauphin's murderous act of folly at Montereau conspired to make the incredible almost possible. Indeed, if Henry had lived five years longer, he would probably have carried his arms to the Mediterranean, and have united France and England in uneasy union for some short space of time. It is clear that they could not have been held together after his death, for none but a king of exceptional powers could have resisted their natural impulse to break apart. As it was, Henry had accomplished just enough to tempt his countrymen to persevere for nearly thirty years in the endeavour to complete the task he had begun. France was ruined for a generation, England was exhausted by her effort, and (what was worse) her governing classes learnt in the long and pitiless war lessons of demoralization which were to bear fruit in the ensuing struggle of the two Roses. It is a strange fact that Henry, though he was in many respects a conscientious man, with a strong sense of responsibility, and a sincere piety, was so blind to the unrighteousness of his own actions that he died asserting that "neither ambition nor vainglory had led him into France, but a genuine desire to assert a righteous claim, which he desired his heirs to prosecute to the bitter end."

The guardianship of the infant Henry VI. fell to his two uncles, John of Bedford and Humphrey of Gloucester, the two

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[1] The peculiar absurdity of Henry's claim to be king of France was that if, on the original English claim as set forth by Edward III., heirship through females counted, then the earl of March was entitled to the French throne. A vote of the English parliament superseding March's claim in favour of that of Henry IV. could obviously have no legal effect in France.

Henry VI.

surviving brothers of the late king. Bedford became regent in France, and took over the heritage of the war, in which he was vigorously aided by the young Philip of Burgundy, whose sister he soon after married. Almost his first duty was to bury the insane Charles VI., who only survived his son-in-law for a few months, and to proclaim his little nephew king of France under the name of Henry II. Gloucester, however, had personal charge of the child, who was to be reared in England; he had also hoped to become protector of the realm, and to use the position for his own private interests, for he was a selfish and ambitious prince. But the council refused to let him assume the full powers of a regent, and bound him with many checks and restrictions, because they were well aware of his character. The tiresome and monotonous domestic history of England during the next twenty years consisted of little else than quarrels between Gloucester and the lords of the council, of whom the chief was the duke's half-uncle Henry Beaufort, bishop of Winchester, the last to survive of all the sons of John of Gaunt. The duke and the bishop were both unscrupulous; but the churchman, with all his faults, was a patriotic statesman, while Gloucester cared far more for his own private ends than for the welfare of the realm.

Bedford's rule in France.

Humphrey of Gloucester.

While these two well-matched antagonists were wrangling in England, Bedford, a capable general and a wise administrator, was doing his best to carry out the task which the dying Henry V. had laid upon him, by crushing the dauphin, or Charles VII. as he now called himself since his father's death. As long as the Burgundian party lent the regent their aid, the limits of the land still unsubdued continued to shrink, though the process was slow. Two considerable victories, Cravant (1423) and Verneuil (1424), marked the early years of Bedford's campaigning; at each, it may be noted, a very large proportion of his army was composed of Burgundian auxiliaries. But after a time their assistance began to be given less freely; this was due to the selfish intrigues of Humphrey of Gloucester, who, regardless of the general policy of England, had quarrelled with Philip the Good. He had married Jacoba (Jacquelaine), countess of Hainaut and Holland, a cousin of the Burgundian duke, who coveted and hoped to secure her lands. Pressing her claims, Gloucester came to open blows with Philip in Flanders and Hainaut (1424). In his anger the Burgundian ceased to support Bedford, and would have joined Charles VII. if revenge on the murderers of his father had not still remained his dominant passion. But Gloucester's attempt to seize Hainaut failed, and Philip, when he had got possession of his cousin's person and estates, allowed himself to be pacified by Bedford, who could prove that he had no part in his brother's late intrigues.

Siege of Orleans.

This quarrel having been appeased, the advance against the territories of Charles VII. was resumed. It went slowly on, till in 1428 the tide of war reached the walls of Orleans, now the only place north of the Loire which remained unsubdued. The siege was long; but after the last army which the Dauphinois could raise had been beaten at the battle of Rouvray (Feb. 1429) it seemed that the end was near. Charles VII. was in such a state of despair after this last check, that he was actually taking into consideration a flight to Italy or Spain, and the abandonment of the struggle. He had shown himself so incapable and apathetic that his followers were sick of fighting for such a despicable master.

Joan of Arc.

From this depth of despair the party which, with all its faults, represented the national sentiment of France was rescued by the astonishing exploits of Joan of Arc. Charles and his counsellors had no great confidence in the mission of this prophetess and champion, when she presented herself to them, promising to relieve Orleans and turn back the English. But all expedients are worth trying in the hour of ruin, and seeing that Joan was disinterested and sincere, and that her preaching exercised a marked influence over the people and the soldiery, Charles allowed her to march with the last levies that he put into the field for the relief of Orleans. From that moment the fortune of war turned; the presence of the prophetess with the French troops had an immediate and incalculable effect. Under the belief that they were now led by a messenger from heaven, the Dauphinois fought with a fiery courage that they had never before displayed. Their movements were skilfully directed—whether by Joan's generalship or that of her captains it boots not to inquire—and after the first successes which she achieved, in entering Orleans and capturing some of the besiegers' forts around it, the English became panic-stricken. They were cowed, as they said, "by that disciple and limb of the fiend called La Pucelle, that used false enchantments and sorcery." Suffolk, their commander, raised the siege, and sent to Bedford for reinforcements; but as he retreated he was set upon by the victorious army, and captured with most of his men at Jargeau and Beaugency (June 1429). The succours which were coming to his aid from Paris were defeated by the Maid at Patay a few days later, and for the most part destroyed.

Coronation of Charles VII. at Reims.

The regent Bedford was now in a desperate position. His field army had been destroyed, and on all sides the provinces which had long lain inert beneath the English yoke were beginning to stir. When Joan led forth the French king to crown him at Reims, all the towns of Champagne opened their gates to her one after another. A large reinforcement received from England only just enabled Bedford to save Paris and some of the fortresses of the Île de France. The rest revolted at the sight of the Maid's white banner. If Joan had been well supported by her master and his counsellors, it is probable that she might have completed her mission by expelling the English from France. But, despite all that she had done, Charles VII. and his favourites had a profound disbelief in her inspiration, and generally thwarted her plans. After an ill-concerted attack on Paris, in which Joan was wounded, the French army broke up for the winter. They had shaken the grip of the English on the north, and reconquered a vast stretch of territory, but they had failed by their own fault to achieve complete success. Nevertheless the crucial point of the war had passed; after 1429 the Burgundian party began to slacken in its support of the English cause, and to pass over piecemeal to the national side. This was but natural: the partisans who could remember nothing but the foul deed of Montereau were yearly growing fewer, and it was clear that Charles VII., personally despicable though he might be, represented the cause of French nationality.

Capture and execution of Joan.

The natural drift of circumstances was not stayed even by the disastrous end of the career of Joan of Arc in 1430. The king's ministers had refused to take her counsels or to entrust her with another army, but she went forth with a small force of volunteers to relieve the important fortress of Compiègne. The place was saved, but in a sortie she was captured by the Burgundians, who sold her for 10,000 francs to Bedford. The regent handed her over for punishment as a sorceress to the French clergy of his own party. After a long trial, carried out with elaborate formality and great unfairness, the unhappy Joan was found guilty of proclaiming as divine visions what were delusions of the evil one, or of her own vain imagination, and when she persisted in maintaining their reality she was declared a relapsed heretic, and burnt at Rouen on the 30th of May 1431. Charles VII. took little interest in her fate, which he might easily have prevented by threatening to retaliate on the numerous English prisoners who were in his power. Seldom had a good cause such an unworthy figurehead as that callous and apathetic prince.

Philip of Burgundy joins Charles. Treaty of Arras.

The movement which Joan had set on foot was in no way crushed by her execution. For the next four years the limits of the English occupation continued to recede. It was to no profit that Bedford brought over the young Henry VI. and had him crowned at Paris, in order to appeal to the loyalty of his French partisans by means of the king's forlorn youth and simplicity. Yet by endless feats of skilful generalship the regent continued to maintain a hold on Paris and on Normandy. The fatal blow was administered by Philip of Burgundy, who, tired of maintaining a failing cause, consented at last to forget his father's murder, and to be reconciled to Charles VII. Their alliance was celebrated by the treaty of Arras (Sept. 6, 1435), at which the English were offered peace and the retention of Normandy and Guienne if they would evacuate Paris and the rest of France. They would have been wise to accept the agreement; but with obstinate and misplaced courage they refused to acknowledge Charles as king of France, or to give up to him the capital.

Death of Bedford. English defeats.

Bedford, worn out by long campaigning, died at Rouen on the 14th of September 1435, just before the results of the treaty of Arras began to make themselves felt. With him died the best hope of the English party in France, for he had been well loved by the Burgundians, and many had adhered to the cause of Henry VI. solely because of their personal attachment to him. No worthy successor could be found—England had many hard-handed soldiers but no more statesmen of Bedford's calibre. It was no wonder that Paris was lost within six months of the regent's death, Normandy invaded, and Calais beleaguered by an army headed by England's new enemy, Philip of Burgundy. But the council, still backed by the nation, refused to give up the game; Burgundy was beaten off from Calais, and the young duke of York, the heir of the Mortimers, took the command at Rouen, and recovered much of what had been lost on the Norman side.

Truce with France.

The next eight years of the war were in some respects the most astonishing period of its interminable length. The English fought out the losing game with a wonderful obstinacy Though every town that they held was eager to revolt, and though they were hopelessly outnumbered in every quarter, they kept a tight grip on the greater part of Normandy, and on their old domain in the Bordelais and about Bayonne. They lost nearly all their outlying possessions, but still made head against the generals of Charles VII. in these two regions. The leaders of this period of the war were the duke of York, and the aged Lord Talbot, afterwards earl of Shrewsbury. The struggle only ceased in 1444, when the English council, in which a peace party had at last been formed, concluded a two-year truce with King Charles, which they hoped to turn into a permanent treaty, on the condition that their king should retain what he held in Normandy and Guienne, but sign away his claim to the French crown, and relinquish the few places outside the two duchies which were still in his power—terms very similar to those rejected at Arras nine years before—but there was now much less to give up. To mark the reconciliation of the two powers Henry VI. was betrothed to the French king's niece, Margaret of Anjou. The two years' truce was repeatedly prorogued, and lasted till 1449, but no definitive treaty was ever concluded, owing to the bad faith with which both parties kept their promises.

Supremacy of the Beauforts in England.

The government in England was now in the hands of the faction which Bishop Beaufort had originally led, for after long struggles the churchman had at last crushed his nephew Humphrey. In 1441 the duchess of Gloucester had been arrested and charged with practising sorcery against the health of the young king—apparently not without justification. She was tried and condemned to imprisonment for life; her guilt was visited on her husband, on whose behalf she was acting, for if Henry had died his uncle would have come to the throne. For some years he was constrained to take a minor part in politics, only emerging occasionally to make violent and unwise protests against peace with France. The bishop now ruled, with his nephew Edmund Beaufort, duke of Somerset, and William de la Pole, earl of Suffolk, as his chief instruments. As he grew older he let the power slip into their hands, as it was they who were mainly responsible for the truce of 1444. King Henry, though he had reached the age of 23 at the time of his marriage, counted for nothing. He was a pious young man, simple to the verge of imbecility; a little later he developed actual insanity, the heritage of his grandfather Charles VI. He showed a blind confidence in Suffolk and Somerset, who were wholly unworthy of it, for both were tricky and unscrupulous politicians. His wife Margaret of Anjou, though she possessed all the fire and energy which her husband lacked, was equally devoted to these two ministers, and soon came to share their unpopularity.

Character of Henry VI.

Death of Humphrey of Gloucester and Henry Beaufort.

The truce with France had offended the natural pride of the nation, which still refused to own itself beaten. The evacuation of the French fortresses in Maine and elsewhere, which was the price paid for the suspension of arms, was bitterly resented. Indeed the garrisons had to be threatened with the use of force before they would quit their strongholds. A violent clamour was raised against Suffolk and Somerset, and Humphrey of Gloucester emerged from his retirement to head the agitation. This led to his death; he was arrested by the order of the queen and the ministers at the parliament of Bury. Five days later he died suddenly in prison, probably by foul play, though it was given out that he had been carried off by a paralytic stroke. His estates were confiscated, and distributed among the friends of Suffolk and the queen. Six weeks later the aged Bishop Beaufort followed him to the grave—he had no share in Gloucester's fate, having long before made over his power and the leadership of his party to his nephew Edmund of Somerset (1447).

Renewal of the war with France.

The truce with France lasted for two years after the death of Duke Humphrey, and came to an end partly owing to the eagerness of the French to push their advantages, but much more from the treachery and bad faith of Suffolk and Somerset, who gave the enemy an admirable *casus belli*. By their weakness, or perhaps with their secret connivance, the English garrisons of Normandy carried out plundering raids of the most impudent sort on French territory. When summoned to punish the offenders, and to make monetary compensation, Suffolk and Somerset shuffled and prevaricated, but gave no satisfaction. Thereupon the French king once more declared war (July 1449) and invaded Normandy. Somerset was in command; he showed hopeless incapacity and timidity, and in a few months the duchy which had been so long held by the swords of Bedford, York and Shrewsbury was hopelessly lost. The final blow came when a small army of relief sent over from England was absolutely exterminated by the French at the battle of Formigny (April 15, 1450). Somerset, who had retired into Caen, surrendered two months later after a feeble defence, and the English power in northern France came to an end.

Loss of Normandy.

Jack Cade's Rebellion.

Even before this final disaster the indignation felt against Suffolk and Somerset had raised violent disturbances at home. Suffolk was impeached on many charges, true and false; it was unfair to accuse him of treason, but quite just to lay double-dealing and bad faith to his charge. The king tried to save him from the block by banishing him before he could be tried. But while he was sailing to Flanders his ship was intercepted by some London vessels, which were on the look-out for him, and he was deliberately murdered. The instigators of the act were never discovered. But, though Suffolk was gone, Somerset yet survived, and their partisans still engrossed the confidence of the king. To clear out the government, and punish those responsible for the late disasters, the commons of Kent rose in insurrection under a captain who called himself John Mortimer, though his real name seems to have been John Cade. He was a soldier of fortune who had served in the French wars, and claimed to be in the confidence of the duke of York, the person to whom the eyes of all who hated Somerset and the present régime were now directed.

Cade was not a social reformer, like his predecessor Wat Tyler, with whom he has often been compared, but a politician. Though he called himself "John Amend-all," and promised to put down abuses of every kind, the main part of the programme which he issued was intended to appeal to national sentiment, not to class feeling. Whether he was the tool of other and more highly placed malcontents, or whether he was simply a ready-witted adventurer playing his own game, it is hard to determine. His first success was marvellous; he defeated the king's troops, made a triumphant entry into London and held the city for two days. He seized and beheaded Lord Saye, the treasurer, and several other unpopular persons, and might have continued his dictatorship for some time if the Kentish mob that followed him had not fallen to general pillage and arson. This led to the same results that had been seen in Tyler's day. The propertied classes in London took arms to suppress anarchy, and beat the insurgents out of the city. Cade, striving to keep up the rising outside the walls, was killed in a skirmish a month later, and his bands dispersed.

Richard, duke of York, heads the opposition.

But the troubles of England were only just beginning; the protest against the misgovernment of Somerset and the rest of the confidants of the king and queen was now taken up by a more important personage than the adventurer Cade. Richard, duke of York, the heir to the claims of the house of Mortimer—his mother was the sister of the last earl of March—now placed himself at the head of the opposition. He had plausible grounds for doing so; though he had distinguished himself in the French wars, and was, since the death of Humphrey of Gloucester, the first prince of the blood royal, he had been ignored and flouted by the king's ministers, who had sent him into a kind of honourable banishment as lord-lieutenant of Ireland, and had forbidden him to re-enter the realm. When, in defiance of this mandate, he came home and announced his intention of impeaching Somerset, he took the first step which was to lead to the Wars of the Roses.

Yet he was a cautious and in the main a well-intentioned prince, and the extreme moderation of his original demands seems to prove that he did not at first aim at the crown. He merely required that Somerset and his friends should be dismissed from office and made to answer for their misgovernment. Though he backed his demands by armed demonstration—twice calling out his friends and retainers to support his policy—he carefully refrained for five long years from actual violence. Indeed in 1452 he consented to abandon his protests, and to lend his aid to the other party for a great national object, the recovery of Guienne. For in the previous year Charles VII. had dealt with Bordeaux and Bayonne as he had already dealt with Normandy, and had met with no better resistance while completing the conquest. Six months' experience of French rule, however, had revealed to the Bordelais how much they had lost when they surrendered. Their old loyalty to the house of Plantagenet burst once more into flame; they rose in arms and called for aid to England. For a moment the quarrel of York and Somerset was suspended, and the last English army that crossed the seas during the Hundred Years' War landed in Guienne, joined the insurgents, and for a time swept all before it. But there seemed to be a curse on whatever Henry VI. and Somerset took in hand. On the 17th of July 1453 the veteran earl of Shrewsbury and the greater part of his Anglo-Gascon host were cut to pieces at the hard-fought battle of Castillon. Bordeaux, though left to defend itself, held out for eighty days after Talbot's defeat and death, and then made its final submission to the French. The long struggle was over, and England now retained nothing of her old transmarine possessions save Calais and the Channel Islands. The ambition of Henry V. had finally cost her the long-loyal Guienne, as well as all the ephemeral conquests of his own sword.

Battle of Castillon. Loss of Guienne.

The last crowning disaster of the administration of the favourites of Henry VI. put an end to the chance that a way out of domestic strife might be found in the vigorous prosecution of the French war. For the next twenty years the battles of England were to be fought on her own soil, and between her own sons. It was a righteous punishment for her interference in the unnatural strife of Orleanists and Burgundians that the struggle between York and Lancaster was to be as bitter and as bloody as that between the two French factions.

V. The Wars of the Roses (1453–1497)

Origin of the Wars of the Roses.

The Wars of the Roses have been ascribed to many different causes by different historians. To some their origin is mainly constitutional. Henry VI., it is argued, had broken the tacit compact which the house of Lancaster had made with the nation; instead of committing the administration of the realm to ministers chosen for him by, or at least approved by, his parliament, he persisted in retaining in office persons like Suffolk and Somerset, who had forfeited the confidence of the people by their many failures in war and diplomacy, and were suspected of something worse than incapacity. They might not be so personally odious as the favourites of Edward II. or of Henry III., but they were even more dangerous to the state, because they were not foreign adventurers but great English peers. In spite of the warnings given by the assault on Suffolk in 1450, by Jack Cade's insurrection, and by the first armed demonstrations of Richard of York in 1450 and 1452, the king persisted in keeping his friends in office, and they had to be removed by the familiar and forcible methods that had been applied in earlier ages by the lords ordainers or the lords appellant. Undoubtedly there is much truth in this view of the situation; if Henry VI., or perhaps we should rather say, if his queen Margaret of Anjou, had been content to accept ministries in which the friends of Richard of York were fairly represented, it is probable that he might have died a king, and have transmitted his crown to his natural heir. But this explanation of the Wars of the Roses is not complete; it accounts for their outbreak, but not for their long continuance.

Claims of the duke of York to the crown.

Birth of Edward, prince of Wales.

Queen Margaret.

According to another school the real key to the problem is simply the question of the succession to the crown. If the wedlock of Henry VI. and Margaret of Anjou had been fruitful during the first few years after their marriage, no one would have raised the question of a change of dynasty. But when they remained childless for seven years, and strong suspicion arose that there was a project on foot to declare the Beauforts heirs to the throne, the claim of Richard of York, as the representative of the houses of Clarence and March, was raised by those who viewed the possible accession of the incapable and unpopular Somerset with terror and dislike. When once the claims of York had been displayed and stated by his imprudent partisan, Thomas Yonge, in the parliament of 1451, there was no possibility of hiding the fact that in the strict legitimate line of succession he had a better claim than the reigning king. He disavowed any pretensions to the crown for nine years; it was only in 1460 that he set forth his title with his own mouth. But his friends and followers were not so discreet; hence when a son was at last born to Henry and Margaret, in 1453, the succession question was already in the air and could no longer be ignored. If the claim of York was superior to that of Lancaster in the eyes of a considerable part of the nation, it was no longer possible to consider the problem solved by the birth of a direct heir to the actual occupant of the throne. Though Duke Richard behaved in the most correct fashion, acknowledged the infant Edward as prince of Wales, and made no attempt to assert dynastic claims during his two regencies in 1454 and 1455–1456, yet the queen and her partisans already looked upon him as a pretender to the throne. It is this fact which accounts for the growing bitterness of the Yorkist and Lancastrian parties during the last years of Henry VI. Margaret believed herself to be defending the rights of her son against a would-be usurper. Duke Richard, on the other hand, considered himself as wrongfully oppressed, and excluded from his legitimate position as a prince of the blood and a chief councillor of the crown. Nor can there be any doubt that the queen took every opportunity of showing her suspicion of him, and deliberately kept him and his friends from sharing in the administration of the realm. This might have been more tolerable if the Lancastrian party had shown any governing power; but both while Somerset was their leader, down to his death in the first battle of St Albans, and while in 1456–1459 Exeter, Wiltshire, Shrewsbury and Beaumont were the queen's trusted agents, the condition of England was deplorable. As a contemporary chronicler wrote, "the realm was out of all good governance—as it has been many days before:

the king was simple, and led by covetous councillors, and owed more than be was worth. His debts increased daily, but payment was there none, for all the manors and possessions that pertained to the crown he had given away, so that he had almost nought to live on. For these misgovernances the hearts of the people were turned from them that had the land in rule, and their blessing was turned to cursing. The officers of the realm, and especially the earl of Wiltshire the treasurer, for to enrich himself plundered poor people and disinherited rightful heirs, and did many wrongs. The queen was defamed, that he that was called the prince was not the king's son, but a bastard gotten in adultery." When it is added that the Lancastrian party avoided holding a parliament for three years, because they dared not face it, and that the French were allowed to sack Fowey, Sandwich and other places because there was no English fleet in existence, it is not wonderful that many men thought that the cup of the iniquities of the house of Lancaster was full. In the military classes it was felt that the honour of the realm was lost; in mercantile circles it was thought that the continuance for a few years more of such government would make an end of English trade. Some excuse must be found for getting rid of the queen and her friends, and the doubtful legitimacy of the Lancastrian claim to the crown afforded such an excuse. Hence came the curious paradox, that the party which started as the advocates of the rights of parliament against the incapable ministers appointed by the crown, ended by challenging the right of parliament, exercised in 1399, to depose a legitimate king and substitute for him another member of the royal house. For Richard of York in 1460 and Edward IV. in 1461 put in their claim to the throne, not as the elect of the nation, but as the possessors of a divine hereditary right to the succession, there having been no true king of England since the death of Richard II. Hence Edward assumed the royal title in March 1461, was crowned in June, but called no parliament till November. When it met, it acknowledged him as king, but made no pretence of creating or electing him to be sovereign.

Condition of the country.

Motives of the contending parties.

But putting aside the constitutional aspects of the Wars of the Roses, it is necessary to point out that they had another aspect. From one point of view they were little more than a great faction fight between two alliances of over-powerful barons. Though the Lancastrians made much play with the watchword of loyalty to the crown, and though the Yorkists never forgot to speak of the need for strong and wise governance, and the welfare of the realm, yet personal and family enmities had in many cases more effect in determining their action than a zeal for King Henry's rights or for the prosperity of England. It is true that some classes were undoubtedly influenced in their choice of sides mainly by the general causes spoken of above; the citizens of London and the other great towns (for example) inclined to the Yorkist faction simply because they saw that under the Lancastrian rule the foreign trade of England was being ruined, and insufficient security was given for life and property. But the leading men among the baronage were undoubtedly swayed by ambition and resentment, by family ties and family feuds, far more than by enlightened statesmanship or zeal for the king or the commonweal. It would be going too far to seek the origin of the Yorkist party—as some have done—in the old enmity of the houses of March, Norfolk and Salisbury against Henry IV. But it is not so fantastic to ascribe its birth to the personal hatred that existed between Richard of York and Edmund of Somerset, to the old family grudge (going back to 1405) between the Percies and the Nevilles, to the marriage alliance that bound the houses of York and Neville together, and to other less well-remembered quarrels or blood-ties among the lesser baronage. As an example of how such motives worked, it may suffice to quote the case of those old enemies, the Bonvilles and Courtenays, in the west country. While Lord Bonville supported the queen, the house of Courtenay were staunch Yorkists, and the earl of Devon joined in the armed demonstration of Duke Richard in 1452. But when the earl changed his politics and fought on the Lancastrian side at St Albans in 1455, the baron at once became a strenuous adherent of the duke, adhered firmly to the white rose and died by the axe for its cause.

The baronial party.

The Nevilles.

Richard of York, in short, was not merely the head of a constitutional opposition to misgovernment by the queen's friends, nor was he merely a legitimist claimant to the crown, he was also the head of a powerful baronial league, of which the most prominent members were his kinsmen, the Nevilles, Mowbrays and Bourchiers. The Nevilles alone, enriched with the ancient estates of the Beauchamps and Montagus, and with five of their name in the House of Lords, were a sufficient nucleus for a faction. They were headed by the two most capable politicians and soldiers then alive in England, the two Richards, father and son, who held the earldoms of Salisbury and Warwick, and were respectively brother-in-law and nephew to York. It must be remembered that a baron of 1450 was not strong merely by reason of the spears and bows of his household and his tenantry, like a baron of the 13th century. The pernicious practice of "livery and maintenance" was now at its zenith; all over England in times of stress the knighthood and gentry were wont to pledge themselves, by sealed bonds of indenture, to follow the magnate whom they thought best able to protect them. They mounted his badge, and joined his banner when strife broke out, in return for his championship of their private interests and his promise to "maintain" them against all their enemies. A soldier and statesman of the ability and ambition of Richard of Warwick counted hundreds of such adherents, scattered over twenty shires. The system had spread so far that the majority of the smaller tenants-in-chief, and even many of the lesser barons, were the sworn followers of an insignificant number of the greater lords. An alliance of half-a-dozen of these over-powerful subjects was a serious danger to the crown. For the king could no longer count on raising a national army against them; he could only call out the adherents of the lords of his own party. The factions were fairly balanced, for if the majority of the baronage were, on the whole, Lancastrian, the greatest houses stood by the cause of York.

Attitude of Richard of York.

Despite all this, there was still, when the wars began, a very strong feeling in favour of compromise and moderation. For this there can be no doubt that Richard of York was mainly responsible. When he was twice placed in power, during the two protectorates which followed Henry's two long fits of insanity in 1454 and 1455–1456, he carefully avoided any oppression of his enemies, though he naturally took care to put his own friends in office. Most of all did he show his sincere wish for peace by twice laying down the protectorate when the king was restored to sanity. He was undoubtedly goaded into his last rebellion of 1459 by the queen's undisguised preparations for attacking him. Yet because he struck first, without waiting for a definite *casus belli*, public opinion declared so much against him that half his followers refused to rally to his banner. The revulsion only came when the queen, victorious after the rout of Ludford, applied to the vanquished Yorkists those penalties of confiscation and attainder which Duke Richard had always refused to employ in his day of power. After the harsh doings at the parliament of Coventry (1459), and the commencement of political executions by the sending of Roger Neville and his fellows to the scaffold, the trend of public opinion veered round, and Margaret and her friends were rightly held responsible for the embittered nature of the strife. Hence came the marvellous success of the Yorkist counterstroke in June 1460, when the exiled Warwick, landing in Kent with a mere handful of men, was suddenly joined by the whole of the south of England and the citizens of London, and inflicted a crushing defeat on the Lancastrians at Northampton before he had been fifteen days on shore (July 10, 1460). The growing rancour of the struggle was marked by the fact that the Yorkists, after Northampton, showed themselves by no means so merciful and scrupulous as in their earlier

Suppression of York's rebellion.

Executions and confiscations.

The earl of Warwick defeats the Lancastrians at Northampton.

days. Retaliatory executions began, though on a small scale, and when York reached London he at last began to talk of his rights to the crown, and to propose the deposition of Henry VI. Yet moderation was still so far prevalent in the ranks of his adherents that they refused to follow him to such lengths. Warwick and the other leading men of the party dictated a compromise, by which Henry was to reign for the term of his natural life, but Duke Richard was to be recognized as his heir and to succeed him on the throne. They had obviously borrowed the expedient from the terms of the treaty of Troyes. But the act of parliament which embodied it did not formally disinherit the reigning king's son, as the treaty of Troyes had done, but merely ignored his existence.

Richard of York declared heir to the throne.

Battle of Wakefield. Richard slain.

Battle of St Albans.

It would have been well for England if this agreement had held, and the crown had passed peaceably to the house of York, after the comparatively short and bloodless struggle which had just ended. But Duke Richard had forgotten to reckon with the fierce and unscrupulous energy of Queen Margaret, when she was at bay in defence of her son's rights. Marching with a trifling force to expel her from the north, he was surprised and slain at Wakefield (Dec. 30, 1460). But it was not his death that was the main misfortune, but the fact that in the battle the Lancastrians gave no quarter to small or great, and that after it they put to death York's brother-in-law Salisbury and other prisoners. The heads of the duke and the earl were set up over the gates of York. This ferocity was repeated when Margaret and her northern host beat Warwick at the second battle of St Albans (Feb. 17, 1461), where they had the good fortune to recover possession of the person of King Henry. Lord Bonville and the other captives of rank were beheaded next morning.

Edward, earl of March, proclaimed as Edward IV.

After this it was but natural that the struggle became a mere record of massacres and executions. The Yorkists proclaimed Edward, Duke Richard's heir, king of England; they took no further heed of the claims of King Henry, declared their leader the true successor of Richard II., and stigmatized the whole period of the Lancastrian rule as a mere usurpation. They adopted a strict legitimist theory of the descent of the crown, and denied the right of parliament to deal with the succession. This was the first step in the direction of absolute monarchy which England had seen since the short months of King Richard's tyranny in 1397–1399. It was but the first of many encroachments of the new dynasty upon the liberties that had been enjoyed by the nation under the house of Lancaster.

Changed character of the war.

Battle of Towton.

Ruthless reprisals of the Yorkists.

The revenge taken by the new king and his cousin Richard of Warwick for the slaughter at Wakefield and St Albans was prompt and dreadful. They were now well supported by the whole of southern England; for not only had the queen's ferocity shocked the nation, but the reckless plundering of her northern moss-troopers in the home counties had roused the peasantry and townsfolk to an interest in the struggle which they had never before displayed. Up to this moment the civil war had been conducted like a great faction fight; the barons and their liveried retainers had been wont to seek some convenient heath or hill and there to fight out their quarrel with the minimum of damage to the countryside. The deliberate harrying of the Midlands by Margaret's northern levies was a new departure, and one bitterly resented. The house of Lancaster could never for the future count on an adherent south of Trent or east of Chiltern. The Yorkist army that marched in pursuit of the raiders, and won the bloody field of Towton under Warwick's guidance, gave no quarter. Not only was the slaughter in that battle and the pursuit more cruel than anything that had been seen since the day of Evesham, but the executions that followed were ruthless. Ere Edward turned south he had beheaded two earls—Devon and Wiltshire—and forty-two knights, and had hanged many prisoners of lesser estate. The Yorkist parliament of November 1461 carried on the work by attainting 133 persons, ranging from Henry VI. and Queen Margaret down through the peerage and the knighthood to the clerks and household retainers of the late king. All the estates of the Lancastrian lords, living or dead, were confiscated, and their blood was declared corrupted. This brought into the king's hands such a mass of plunder as no one had handled since William the Conqueror. Edward IV. could not only reward his adherents with it, so as to create a whole new court noblesse, but had enough over to fill his exchequer for many years, and to enable him to dispense with parliamentary grants of money for an unexampled period. Between 1461 and 1465 he only asked for £37,000 from the nation—and won no small popularity thereby. For, in their joy at being quit of taxation, men forgot that they were losing the lever by which their fathers had been wont to move the crown to constitutional concessions.

Personal rule of Edward IV.

Civil war in the north and west.

Battle of Hexham. Imprisonment of Henry VI.

After Towton peace prevailed south of the Tyne and east of the Severn, for it was only in Northumberland and in Wales that the survivors of the Lancastrian faction succeeded in keeping the war alive. King Edward, as indolent and pleasure-loving in times of ease as he was active and ruthless in times of stress and battle, set himself to enjoy life, handing over the suppression of the rebels to his ambitious and untiring cousin Richard of Warwick. The annals of the few contemporary chroniclers are so entirely devoted to the bickerings in the extreme north and west, that it is necessary to insist on the fact that from 1461 onwards the civil war was purely local, and nine-tenths of the realm enjoyed what passed for peace in the 15th century. The campaigns of 1462–63–64, though full of incident and bloodshed, were not of first-rate political importance. The cause of Lancaster had been lost at Towton, and all that Queen Margaret succeeded in accomplishing was to keep Northumberland in revolt, mainly by means of French and Scottish succours. Her last English partisans, attainted men who had lost their lands and lived with the shadow of the axe ever before them, fought bitterly enough. But the obstinate and hard-handed Warwick beat them down again and again, and the old Lancastrian party was almost exterminated when the last of its chiefs went to the block in the series of wholesale executions that followed the battle of Hexham (May 15, 1464). A year later Henry VI. himself fell into the hands of his enemies, as he lurked in Lancashire, and with his consignment to the Tower the dynastic question seemed finally solved in favour of the house of York.

Richard Neville, earl of Warwick.

The first ten years of the reign of Edward IV. fall into two parts, the dividing point being the avowal of the king's marriage to Elizabeth Woodville in November 1464. During the first of these periods Edward reigned but Warwick governed; he was not only the fighting man, but the statesman and diplomatist of the Yorkist party, and enjoyed a complete ascendancy over his young master, who long preferred thriftless ease to the toils of personal monarchy. Warwick represented the better side of the victorious cause; he was no mere factious king-maker, and his later nickname of "the last of the barons" by no means expresses his character or his position. He was strong, not so much by reason of his vast estates and his numerous retainers, as by reason of the confidence which the greater part of the nation placed in him. He never forgot that the Yorkist party had started as the advocates of sound and strong administration, and the mandatories of the popular will against the queen's incapable and corrupt ministers. "He ever had the goodwill of the people because he knew how to give them fair words, and always spoke not of himself but of the augmentation and good governance of the kingdom, for which he would spend his life; and thus he had the goodwill of England, so that in all the land he was the lord who was held in most esteem and faith and credence." As long as he remained supreme, parliaments were regularly held, and the house of York appeared to be keeping its bargain with the nation. His policy was sound; peace with France, the rehabilitation of the dwindling foreign trade of England, and the maintenance of law and justice by strong-handed governance were his main aims.

But Warwick was one of those ministers who love to do everything for themselves, and chafe at masters and colleagues who presume to check or to criticise their actions. He was surrounded and supported, moreover, by a group of brothers and cousins, to whom he gave most of his confidence, and most of the preferment that came to his hands. England has always chafed against a family oligarchy, however well it may do its work. The Yorkist magnates who did not belong to the clan of the Nevilles were not unnaturally jealous of that house, and Edward IV. himself gradually came to realize the ignominious position of a king who is managed and overruled by a strong-willed and arbitrary minister.

Edward IV. marries Elizabeth Woodville.

Breach between Warwick and the king.

His first sign of revolt was his secret marriage to Elizabeth Woodville, a lady of decidedly Lancastrian connexions, for her father and her first husband were both members of the defeated faction. Warwick was at the moment suing for the hand of Louis XI.'s sister-in-law in his master's name, and had to back out of his negotiations in a sudden and somewhat ridiculous fashion. His pride was hurt, but for two years more there was no open breach between him and his master, though their estrangement grew more and more marked when Edward continued to heap titles and estates on his wife's numerous relatives, and to conclude for them marriage alliances with all the great Yorkist families who were not of the Neville connexion. In this way he built up for himself a personal following within the Yorkist party; but the relative strength of this faction and of that which still looked upon Warwick as the true representative of the cause had yet to be tried. The king had in his favour the prestige of the royal name, and a popularity won by his easy-going affability and his liberal gifts. The earl had his established reputation for disinterested devotion to the welfare of the realm, and his brilliant record as a soldier and statesman. In districts as far apart as Kent and Yorkshire, his word counted for a good deal more than that of his sovereign.

Warwick organizes a rebellion.

Rising of "Robin of Redesdale."

Unhappily for England and for himself, Warwick's loyalty was not sufficient to restrain his ambition and his resentment. He felt the ingratitude of the king, whom he had made, so bitterly that he stooped ere long to intrigue and treason. Edward in 1467 openly broke with him by dismissing his brother George Neville from the chancellorship, by repudiating a treaty with France which the earl had just negotiated, and by concluding an alliance with Burgundy against which he had always protested. Warwick enlisted in his cause the king's younger brother George of Clarence, who desired to marry his daughter and heiress Isabella Neville, and with the aid of this unscrupulous but unstable young man began to organize rebellion. His first experiment in treason was the so-called "rising of Robin of Redesdale," which was ostensibly an armed protest by the gentry and commons of Yorkshire against the maladministration of the realm by the king's favourites—his wife's relatives, and the courtiers whom he had lately promoted to high rank and office. The rebellion was headed by well-known adherents of the earl, and the nickname of "Robin of Redesdale" seems to have covered the personality of his kinsman Sir John Conyers. When the rising was well started Warwick declared his sympathy with the aims of the insurgents, wedded his daughter to Clarence despite the king's prohibition of the match, and raised a force at Calais with which he landed in Kent.

Battle of Edgecott. Edward a prisoner.

Execution of the queen's relatives.

But his plot was already successful before he reached the scene of operations. The Yorkshire rebels beat the royalist army at the battle of Edgecott (July 6, 1469). A few days later Edward himself was captured at Olney and put into the earl's hands. Many of his chief supporters, including the queen's father, Lord Rivers, and her brother, John Woodville, as well as the newly-created earls of Pembroke and Devon, were put to death with Warwick's connivance, if not by his direct orders. The king was confined for some weeks in the great Neville stronghold of Middleham Castle, but presently released on conditions, being compelled to accept new ministers nominated by Warwick. The earl supposed that his cousin's spirit was broken and that he would give no further trouble. In this he erred grievously. Edward vowed revenge for his slaughtered favourites, and waited his opportunity. Warwick had lost credit by using such underhand methods in his attack on his master, and had not taken sufficient care to conciliate public opinion when he reconstructed the government. His conduct had destroyed his old reputation for disinterestedness and honesty.

King Edward drives Warwick into exile.

In March 1470 the king seized the first chance of avenging himself. Some unimportant riots had broken out in Lincolnshire, originating probably in mere local quarrels, but possibly in Lancastrian intrigues. To suppress this rising the king gathered a great force, carefully calling in to his banner all the peers who were offended with Warwick or, at any rate, did not belong to his family alliance. Having scattered the Lincolnshire bands, he suddenly turned upon Warwick with his army, and caught him wholly unprepared. The earl and his son-in-law Clarence were hunted out of the realm before they could collect their partisans, and fled to France; Edward seemed for the first time to be master in his own realm.

Warwick takes up the cause of Henry VI.

He lands in England.

King Edward in exile.

But the Wars of the Roses had one more phase to come. Warwick's name was still a power in the land, and his expulsion had been so sudden that he had not been given an opportunity of trying his strength. His old enmity for the house of Lancaster was completely swallowed up in his new grudge against the king that he had made. He opened negotiations with the exiled Queen Margaret, and offered to place his sword at her disposition for the purpose of overthrowing King Edward and restoring King Henry. The queen had much difficulty in forcing herself to come to terms with the man who had been the bane of her cause, but finally, was induced by Louis XI. to conclude a bargain. Warwick married his younger daughter to her son Edward, prince of Wales, as a pledge of his good faith, and swore allegiance to King Henry in the cathedral of Angers. He then set himself to stir up the Yorkshire adherents of the house of Neville to distract the attention of Edward IV. When the king had gone northward to attack them, the earl landed at Dartmouth (Sept. 1470) with a small force partly composed of Lancastrian exiles, partly of his own men. His appearance had the effect on which he had calculated. Devon rose in the Lancastrian interest; Kent, where the earl's name had always been popular, took arms a few days later; and London opened its gates. King Edward, hurrying south to oppose the invader, found his army melting away from his banner, and hastily took ship at Lynn and fled to Holland. He found a refuge with his brother-in-law and ally Charles the Bold, the great duke of Burgundy.

Restoration of Henry VI.

Edward returns to England.

King Henry was released and replaced on the throne, and for six months Warwick ruled England as his lieutenant. But there was bitterness and mistrust between the old Lancastrian faction and the Nevilles, and Queen Margaret refused to cross to England or to trust her son in the king-maker's hands. Her partisans doubted his sincerity, while many of the Yorkists who had hitherto followed Warwick in blind admiration found it impossible to reconcile themselves to the new *régime*. The duke of Clarence in particular, discontented at the triumph of Lancaster, betrayed his father-in-law, and opened secret negotiations with his exiled brother. Encouraged by the news of the dissensions among his enemies, Edward IV. resolved to try his fortune once more, and landed near Hull on the 15th of March 1471 with a body of mercenaries lent him by the duke of Burgundy. The campaign that followed was most creditable to Edward's generalship, but must have been fatal to him if Warwick had been honestly supported by his

Battle of Barnet. Death of Warwick.

lieutenants. But the duke of Clarence betrayed to his brother the army which he had gathered in King Henry's name, and many of the Lancastrians were slow to join the earl, from their distrust of his loyalty. Edward, dashing through the midst of the slowly gathering levies of his opponents, seized London, and two days later defeated and slew Warwick at the battle of Barnet (April 13, 1471).

Battle of Tewkesbury. Death of Edward, prince of Wales.

Capture of Queen Margaret and murder of Henry VI.

On that same day Queen Margaret and her son landed at Weymouth, only to hear that the earl was dead and his army scattered. But she refused to consider the struggle ended, and gathered the Lancastrians of the west for a final rally. On the fatal day of Tewkesbury (May 3, 1471) her army was beaten, her son was slain in the flight, and the greater part of her chief captains were taken prisoner. She herself was captured next day. The victorious Edward sent to the block the last Beaufort duke of Somerset, and nearly all the other captains of rank, whether Lancastrians or followers of Warwick. He then moved to London, which was being threatened by Kentish levies raised in Warwick's name, delivered the city, and next day caused the unhappy Henry VI. to be murdered in the Tower (May 21, 1471).

Edward IV.

The descendants of Henry IV. were now extinct, and the succession question seemed settled for ever. No one dreamed of raising against King Edward the claims of the remoter heirs of John of Gaunt—the young earl of Richmond, who represented the Beauforts by a female descent, or the king of Portugal, the grandson of Gaunt's eldest daughter. Edward was now king indeed, with no over-powerful cousin at his elbow to curb his will. He had, moreover, at his disposal plunder almost as valuable as that which he had divided up in 1461—the estates of the great Neville clan and their adherents. A great career seemed open before him; he had proved himself a fine soldier and an unscrupulous diplomatist; he was in the very prime of life, having not yet attained his thirty-first year. He might have devoted himself to foreign politics and have rivalled the exploits of Edward III. or Henry V.—for the state of the continent was all in his favour—or might have set himself to organize an absolute monarchy on the ruins of the parliament and the baronage. For the successive attainders of the Lancastrians and the Nevilles had swept away many of the older noble families, and Edward's house of peers consisted for the main part of new men, his own partisans promoted for good service, who had not the grip on the land that their predecessors had possessed.

Character of the reign.

Murder of the duke of Clarence.

But Edward either failed to see his opportunity or refused to take it. He did not plunge headlong into the wars of Louis XI. and Charles of Burgundy, nor did he attempt to recast the institutions of the realm. He settled down into inglorious ease, varied at long intervals by outbursts of spasmodic tyranny. It would seem that the key to his conduct was that he hated the hard work without which a despotic king cannot hope to assert his personality, and preferred leisure and vicious self-indulgence. In many ways the later years of his reign were marked with all the signs of absolutism. Between 1475 and 1483 he called only one single parliament, and that was summoned not to give him advice, or raise him money, but purely and solely to attaint his brother of Clarence, whom he had resolved to destroy. The duke's fate (Feb. 17, 1478) need provoke no sympathy, he was a detestable intriguer, and had given his brother just offence by a series of deeds of high-handed violence and by perpetual cavilling. But he had committed no act of real treason since his long-pardoned alliance with Warwick, and was not in any way dangerous; so that when the king caused him to be attainted, and then privately murdered in the Tower, there was little justification for the fratricide.

Fiscal policy.

Edward was a thrifty king; he was indeed the only medieval monarch of England who succeeded in keeping free of debt and made his revenue suffice for his expenses. But his methods of filling his purse were often unconstitutional and sometimes ignominious. When the resources drawn from confiscations were exhausted, he raised "benevolences"—forced gifts extracted from men of wealth by the unspoken threat of the royal displeasure—instead of applying to parliament for new taxes. But his most profitable source of revenue was drawn from abroad. Having allied himself with his brother-in-law Charles of Burgundy against the king of France, he led an army into Picardy in 1475, and then by the treaty of Picquigny sold peace to Louis XI. for 75,000 gold crowns down, and an annual pension (or tribute as he preferred to call it) of 50,000 crowns more. It was regularly paid up to the last year of his reign. Charles the Bold, whom he had thus deliberately deserted in the middle of their joint campaign, used the strongest language about this mean act of treachery, and with good cause. But the king cared not when his pockets were full. Another device of Edward for filling his exchequer was a very stringent enforcement of justice; small infractions of the laws being made the excuse for exorbitant fines. This was a trick which Henry VII. was to turn to still greater effect. In defence of both it may be pleaded that after the anarchy of the Wars of the Roses a strong hand was needed to restore security for life and property, and that it was better that penalties should be overheavy rather than that there should be no penalties at all. Another appreciable source of revenue to Edward was his private commercial ventures. He owned many ships, and traded with great profit to himself abroad, because he could promise, as a king, advantages to foreign buyers and sellers with which no mere merchant could compete.

During the last period of Edward's rule England might have been described as a despotism, if only the king had cared to be a despot. But except on rare occasions he allowed his power to be disguised under the old machinery of the medieval monarchy, and made no parade of his autocracy. Much was pardoned by the nation to one who gave them comparatively efficient and rather cheap government, and who was personally easy of access, affable and humorous. It is with little justification that he has been called the "founder of the new monarchy," and the spiritual ancestor of the Tudor despotism. Another king in his place might have merited such titles, but Edward was too careless, too unsystematic, too lazy, and too fond of self-indulgence to make a real tyrant. He preferred to be a man of pleasure and leisure, only awaking now and then to perpetrate some act of arbitrary cruelty.

Condition of the country.

England was not unprosperous under him. The lowest point of her fortunes had been reached under the administration of Margaret of Anjou, during the weary years that preceded the outbreak of the civil wars in 1459. At that time the government had been bankrupt, foreign trade had almost disappeared, the French and pirates of all nations had possession of the Channel, and the nation had lost heart, because there seemed no way out of the trouble save domestic strife, to which all looked forward with dismay. The actual war proved less disastrous than had been expected. It fell heavily upon the baronage and their retainers, but passed lightly, for the most part, over the heads of the middle classes. The Yorkists courted the approval of public opinion by their careful avoidance of pillage and requisitions; and the Lancastrians, though less scrupulous, only once launched out into general raiding and devastation, during the advance of the queen's army to St Albans in the early months of 1461. As a rule the towns suffered little or nothing—they submitted to the king of the moment, and were always spared by the victors. It is one of the most curious features of these wars that no town ever stood a siege, though there were several long and arduous sieges of baronial castles, such as Harlech, Alnwick and Bamborough. Warwick, with his policy of conciliation for the masses and hard blows for the magnates, was mainly responsible for this moderation. In battle he was wont to bid his followers spare the commons in the pursuit, and to smite only the knights and nobles. Towton, where the Yorkist army was infuriated by the harrying of the Midlands by their enemies in the preceding

Commercial development.

Manufactures and wool trade.

campaign, was the only fight that ended in a general massacre. There were, of course, many local feuds and riots which led to the destruction of property; well-known instances are the private war about Caister Castle between the duke of Norfolk and the Pastons, and the "battle of Nibley Green," near Bristol, between the Berkeleys and the Talbots. But on the whole there was no ruinous devastation of the land. Prosperity seems to have revived early during the rule of York; Warwick had cleared the seas of pirates, and both he and King Edward were great patrons of commerce, though the earl's policy was to encourage trade with France, while his master wished to knit up the old alliance with Flanders by adhering to the cause of Charles of Burgundy. Edward did much in his later years to develop interchange of commodities with the Baltic, making treaties with the Hanseatic League which displeased the merchants of London, because of the advantageous terms granted to the foreigner. The east coast ports seem to have thriven under his rule, but Bristol was not less prosperous. On the one side, developing the great salt-fish trade, her vessels were encompassing Iceland, and feeling their way towards the Banks of the West; on the other they were beginning to feel their way into the Mediterranean. The famous William Canynges, the patriarch of Bristol merchants, possessed 2500 tons of shipping, including some ships of 900 tons, and traded in every sea. Yet we still find complaints that too much merchandize reached and left England in foreign bottoms, and King Edward's treaty with the Hansa was censured mainly for this reason. Internal commerce was evidently developing in a satisfactory style, despite of the wars; in especial raw wool was going out of England in less bulk than of old, because cloth woven at home was becoming the staple export. The woollen manufactures which had begun in the eastern counties in the 14th century were now spreading all over the land, taking root especially in Somersetshire, Yorkshire and some districts of the Midlands. Coventry, the centre of a local woollen and dyeing industry, was probably the inland town which grew most rapidly during the 15th century. Yet there was still a large export of wool to Flanders, and the long pack-trains of the Cotswold flockmasters still wound eastward to the sea for the benefit of the merchants of the staple and the continental manufacturer.

State of the rural population.

As regards domestic agriculture, it has been often stated that the 15th century was the golden age of the English peasant, and that his prosperity was little affected either by the unhappy French wars of Henry VI. or by the Wars of the Roses. There is certainly very little evidence of any general discontent among the rural population, such as had prevailed in the times of Edward III. or Richard II. Insurrections that passed as popular, like the risings of Jack Cade and Robin of Redesdale, produced manifestos that spoke of political grievances but hardly mentioned economic ones. There is a bare mention of the Statute of Labourers in Jack Cade's ably drafted chapter of complaints. It would seem that the manorial grudges between landowner and peasant, which had been so fierce in the 14th century, had died down as the lords abandoned the old system of working their demesne by villein labour. They were now for the most part letting out the soil to tenant-farmers at a moderate rent, and the large class of yeomanry created by this movement seem to have been prosperous. The less popular device of turning old manorial arable land into sheep-runs was also known, but does not yet seem to have grown so common as to provoke the popular discontents which were to prevail under the Tudors. Probably such labour as was thrown out of work by this tendency was easily absorbed by the growing needs of the towns. Some murmurs are heard about "enclosures," but they are incidental and not widely spread.

Architecture.

One of the best tests of the prosperity of England under the Yorkist rule seems to be the immense amount of building that was on hand. Despite the needs of civil war, it was not on castles that the builders' energy was spent; the government discouraged fortresses in private hands, and the dwellings of the new nobility of Edward IV. were rather splendid manor-houses, with some slight external protection of moat and gate-house, than old-fashioned castles. But the church-building of the time is enormous and magnificent. A very large proportion of the great Perpendicular churches of England date back to this age, and in the cathedrals also much work was going on.

Religious condition of the country.

Material prosperity does not imply spiritual development, and it must be confessed that from the intellectual and moral point of view 15th-century England presents an unpleasing picture. The Wycliffite movement, the one phenomenon which at the beginning of the century seemed to give some promise of better things, had died down under persecution. It lingered on in a subterranean fashion among a small class in the universities and the minor clergy, and had some adherents among the townsfolk and even among the peasantry. But the Lollards were a feeble and helpless minority; they no longer produced writers, organizers or missionaries. They continued to be burnt, or more frequently to make forced recantations, under the Yorkist rule, though the list of trials is not a long one. Little can be gathered concerning them from chronicles or official records. We only know that they continued to exist, and occasionally produced a martyr. But the governing powers were not fanatics, bent on seeking out victims; the spirit of Henry V. and Archbishop Arundel was dead. The life of the church seems, indeed, to have been in a more stagnant and torpid condition in this age than at any other period of English history. The great prelates from Cardinal Beaufort down to Archbishops Bourchier and Rotherham, and Bishop John Russell—trusted supporters of the Yorkist dynasty—were mere politicians with nothing spiritual about them. Occasionally they appear in odious positions. Rotherham was the ready tool of Edward IV. in the judicial murder of Clarence. Russell became the obsequious chancellor of Richard III. Bourchier made himself responsible in 1483 for the taking of the little duke of York from his mother's arms in order to place him in the power of his murderous uncle. It is difficult to find a single bishop in the whole period who was respected for his piety or virtue. The best of them were capable statesmen, the worst were mean time-servers. Few of the higher clergy were such patrons of learning as many prelates of earlier ages. William Grey of Ely and James Goldwell of Norwich did something for scholars, and there was one bishop in the period who came to sad grief through an intellectual activity which was rare among his contemporaries. This was the eccentric Reginald Pecock of Chichester, who, while setting himself to confute Lollard controversialists, lapsed into heresy by setting "reason" above "authority." He taught that the organization and many of the dogmas of the medieval church should be justified by an appeal to private judgment and the moral law, rather than to the scriptures, the councils, or the fathers. For taking up this dangerous line of defence, and admitting his doubts about several received articles of faith, he was attacked by the Yorkist archbishop Bourchier in 1457, compelled to do penance, and shut up in a monastery for the rest of his life. He seems to have had no school of followers, and his doctrines died with him.

The monasteries.

In nothing is the general stagnation of the church in the later 15th century shown better than by the gradual cessation of the monastic chronicles. The stream of narrative was still flowing strongly in 1400; by 1485 it has run dry, even St Albans, the mother of historians, produced no annalist after Whethamstede, whose story ceases early in the Wars of the Roses. The only monastic chronicler who went on writing for a few years after the extinction of the house of York was the "Croyland continuator." For the last two-thirds of the century the various "London chronicles," the work of laymen, are much more important than anything which was produced in the religious houses. The regular clergy indeed seem to have been sunk in intellectual torpor. Their numbers were falling off, their zeal was gone; there is little good to be said of them save that they were still in some cases endowing

England with splendid architectural decorations. But even in the wealthier abbeys we find traces of thriftless administration, idleness, self-indulgence and occasionally grave moral scandals. The parochial clergy were probably in a healthier condition; but the old abuses of pluralism and non-residence were as rampant as ever, and though their work may have been in many cases honourably carried out, it is certain that energy and intelligence were at a low ebb.

Moral decay of the nation.

The "Paston Letters."

Influence of the Italian Renaissance.

The moral faults of the church only reflected those of the nation. It was a hard and selfish generation which witnessed the Wars of the Roses and the dictatorship of Edward IV. The iniquitous French war, thirty years of plunder and demoralization, had corrupted the minds of the governing classes before the civil strife began. Afterwards the constant and easy changes of allegiance, as one faction or the other was in the ascendant, the wholesale confiscations and attainders, the never-ending executions, the sudden prosperity of adventurers, the premium on time-serving and intrigue, sufficed to make the whole nation cynical and sordid. The claim of the Yorkists to represent constitutional opposition to misgovernment became a mere hypocrisy. The claim of the Lancastrians to represent loyalty soon grew almost as hollow. Edward IV. with his combination of vicious self-indulgence and spasmodic cruelty was no unfit representative of his age. The *Paston Letters*, that unique collection of the private correspondence of a typical family of *nouveaux riches*, thriftless, pushing, unscrupulous, give us the true picture of the time. All that can be said in favour of the Yorkists is that they restored a certain measure of national prosperity, and that their leaders had one redeeming virtue in their addiction to literature. The learning which had died out in monasteries began to flourish again in the corrupt soil of the court. Most of Edward's favourites had literary tastes. His constable Tiptoft, the " butcher earl " of Worcester, was a figure who might have stepped out of the Italian Renaissance. A graduate of Pavia, a learned lawyer, who translated Caesar and Cicero, composed works both in Latin and English, and habitually impaled his victims, he was a man of a type hitherto unknown in England. Antony, Lord Rivers, the queen's brother, was a mere adventurer, but a poet of some merit, and a great patron of Caxton. Hastings, the Bourchiers, and other of the king's friends were minor patrons of literature. It is curious to find that Caxton, an honest man, and an enthusiast as to the future of the art of printing, which he had introduced into England, waxes enthusiastic as to the merits of the intelligent but unscrupulous peers who took an interest in his endeavours. Of the detestable Tiptoft he writes that " there flowered in virtue and cunning none like him among the lords of the temporalty in science and moral virtue "! And this is no time-serving praise of a patron, but disinterested tribute to a man who had perished long before on the scaffold.

Death of Edward IV.

Richard, duke of Gloucester.

The uneventful latter half of the reign of Edward IV. ended with his death at the age of forty-one on the 9th of April 1483. He had ruined a splendid constitution by the combination of sloth and evil living, and during his last years had been sinking slowly into his grave, unable to take the field or to discharge the more laborious duties of royalty. Since Clarence's death he had been gradually falling into the habit of transferring the conduct of great matters of state to his active and hard-working youngest brother, Richard, duke of Gloucester, who had served him well and faithfully ever since he first took the field at Barnet. Gloucester passed as a staid and religious prince, and if there was blood on his hands, the same could be said of every statesman of his time. His sudden plunge into crime and usurpation after his brother's death was wholly unexpected by the nation. Indeed it was his previous reputation for loyalty and moderation which made his scandalous *coup d'état* of 1483 possible. No prince with a sinister reputation would have had the chance of executing the series of crimes which placed him on the throne. But when Richard declared that he was the victim of plots and intrigues, and was striking down his enemies only to defend his own life and honour, he was for some time believed.

Gloucester proclaims himself protector.

At the moment of King Edward's death his elder son by Elizabeth Woodville, Edward, prince of Wales, was twelve; his younger son Richard, duke of York, was nine. It was clear that there would be a long minority, and that the only possible claimants for the regency were the queen and Richard of Gloucester. Elizabeth was personally unpopular, and the rapacity and insolence of her family was well known. Hence when Richard of Gloucester seized on the person of the young king, and imprisoned Lord Rivers and Sir Richard Grey, the queen's brother and son, on the pretence that they were conspiring against him, his action was regarded with equanimity by the people. Nor did the fact that the duke took the title of "protector and defender of the realm" cause any surprise. Suspicions only became rife after Richard had seized and beheaded without any trial. Lord Hastings, the late king's most familiar friend, and had arrested at the same moment the archbishop of York, Morton, bishop of Ely, and Lord Stanley, all persons of unimpeachable loyalty to the house of Edward IV. It was not plausible to accuse such persons of plotting with the queen to overthrow the protector, and public opinion began to turn against Gloucester. Nevertheless he went on recklessly with his design, having already enlisted the support of a party of the greater peers, who were ready to follow him to any length of treason. These confidants, the duke of Buckingham, the lords Howard and Lovel, and a few more, must have known from an early date that he was aiming at the crown, though it is improbable that they suspected that his plan involved the murder of the rightful heirs as well as mere usurpation.

Richard III. crowned.

On the 16th of June, Richard, using the aged archbishop Bourchier as his tool, got the little duke of York out of his mother's hands, and sent him to join his brother in the Tower. A few days later, having packed London with his own armed retainers and those of Buckingham and his other confidants, he openly put forward his pretensions to the throne. Edward IV., as he asserted, had been privately contracted to Lady Eleanor Talbot before he ever met Queen Elizabeth. His children therefore were bastards, the offspring of a bigamous union. As to the son and daughter of the duke of Clarence, their blood had been corrupted by their father's attainder, and they could not be reckoned as heirs to the crown. He himself, therefore, was the legitimate successor of Edward IV. This preposterous theory was set forth by Buckingham, first to the mayor and corporation of London, and next day to an assembly of the estates of the realm held in St Paul's. Cowed by the show of armed force, and remembering the fate of Hastings, the two assemblies received the claim with silence which gave consent. Richard, after a hypocritical show of reluctance, allowed himself to be saluted as king, and was crowned on the 6th of July 1483. Before the coronation ceremony he had issued orders for the execution of the queen's relatives, who had been in prison since the beginning of May. He paid his adherents lavishly for their support, making Lord Howard duke of Norfolk, and giving Buckingham enormous grants of estates and offices.

Murder of the princes.

Having accomplished his *coup d'état* Richard started for a royal progress through the Midlands, and a few days after his departure sent back secret orders to London for the murder of his two nephews in the Tower. There is no reason to doubt that they were secretly smothered on or about the 15th of July by his agent Sir James Tyrrell, or that the bones found buried under a staircase in the fortress two hundred years after belonged to the two unhappy lads. But the business was kept dark at the time, and it was long before any one could assert with certainty that they were dead or alive. Richard never published any statement as to their end, though some easy tale of a fever, a conflagration, or an accident might have served him better than the mere silence that he employed. For while many persons believed that the princes still existed there was room for all manner of impostures and false rumours.

Buckingham's rebellion.

The usurper's reign was from the first a troubled one. Less than three months after his coronation the first insurrection broke out; it was headed—strangely enough—by the duke of Buckingham, who seems to have been shocked by the murder of the princes; he must have been one of the few who had certain information of the crime. He did not take arms in his own cause, though after the house of York the house of Buckingham had the best claim to the throne, as representing Thomas of Woodstock, the youngest son of Edward III. His plan was to unite the causes of York and Lancaster by wedding the Lady Elizabeth, the eldest sister of the murdered princes, to Henry Tudor, earl of Richmond, a young exile who represented the very doubtful claim of the Beauforts to the Lancastrian heritage. Henry was the son of Margaret Beaufort, the daughter of John, first duke of Somerset, and the niece of Edmund, second duke, who fell at St Albans. All her male kinsmen had been exterminated in the Wars of the Roses.

Execution of Buckingham.

This promising scheme was to be supported by a rising of those Yorkists who rejected the usurpation of Richard III., and by the landing on the south coast of Henry of Richmond with a body of Lancastrian exiles and foreign mercenaries. But good organization was wanting, and chance fought for the king. A number of scattered risings in the south were put down by Richard's troops, while Buckingham, who had raised his banner in Wales, was prevented from bringing aid by a week of extraordinary rains which made the Severn impassable. Finding that the rest of the plan had miscarried, Buckingham's retainers melted away from him, and he was forced to fly. A few days later he was betrayed, handed over to the king, and beheaded (Nov. 2, 1483). Meanwhile Richmond's little fleet was dispersed by the same storms that scattered Buckingham's army, and he was forced to return to Brittany without having landed in England.

Here King Richard's luck ended. Though he called a parliament early in 1484, and made all manner of gracious promises of good governance, he felt that his position was insecure. The nation was profoundly disgusted with his unscrupulous policy, and the greater part of the leaders of the late insurrection had escaped abroad and were weaving new plots. Early in the spring he lost his only son and heir, Edward, prince of Wales, and the question of the succession to the crown was opened from a new point of view. After some hesitation Richard named his nephew John de la Pole, earl of Lincoln, a son of his sister, as his heir. But he also bethought him of another and a most repulsive plan for strengthening his position. His queen, Anne Neville, the daughter of the kingmaker, was on her death-bed. With indecent haste he began to devise a scheme for marrying his niece Elizabeth, whose brothers he had murdered but a year before. Knowledge of this scheme is said to have shortened the life of the unfortunate Anne, and many did not scruple to say that her husband had made away with her.

Henry of Richmond lands at Milford.

When the queen was dead, and some rumours of the king's intentions got abroad, the public indignation was so great that Richard's councillors had to warn him to disavow the projected marriage, if he wished to retain a single adherent. He yielded, and made public complaint that he had been slandered—which few believed. Meanwhile the conspirators of 1483 were busy in organizing another plan of invasion. This time it was successfully carried out, and the earl of Richmond landed at Milford Haven with many exiles, both Yorkists and Lancastrians, and 1000 mercenaries lent him by the princess regent of France. The Welsh joined him in great numbers, not forgetting that by his Tudor descent he was their own kinsman, and when he reached Shrewsbury English adherents also began to flock in to his banner, for the whole country was seething with discontent, and Richard III. had but few loyal adherents. When the rivals met at Bosworth Field (Aug. 22, 1485) the king's army was far the larger, but the greater part of it was determined not to fight. When battle was joined some left the field and many joined the pretender. Richard, however, refused to fly, and was slain, fighting to the last, along with the duke of Norfolk and a few other of his more desperate partisans. The slaughter was small, for treason, not the sword, had settled the day. The battered crown which had fallen from Richard's helmet was set on the victor's head by Lord Stanley, the chief of the Yorkist peers who had joined his standard, and his army hailed him by the new title of Henry VII.

Battle of Bosworth.

Henry VII.

No monarch of England since William the Conqueror, not excluding Stephen and Henry IV., could show such a poor title to the throne as the first of the Tudor kings. His claim to represent the house of Lancaster was of the weakest—when Henry IV. had assented to the legitimating of his brothers the Beauforts, he had attached a clause to the act, to provide that they were given every right save that of counting in the line of succession to the throne. The true heir to the house of John of Gaunt should have been sought among the descendants of his eldest legitimate daughter, not among those of his base-born sons. The earl of Richmond had been selected by the conspirators as their figure-head mainly because he was known as a young man of ability, and because he was unmarried and could therefore take to wife the princess Elizabeth, and so absorb the Yorkist claim in his own. This had been the essential part of the bargain, and Henry was ready to carry it out, but he insisted that he should first be recognized as king in his own right, lest it might be held that he ruled merely as his destined wife's consort. He was careful to hold his first parliament and get his title acknowledged before he married the princess. When he had done so, he had the triple claim by conquest, by election and by inheritance, safely united. Yet his position was even then insecure; the vicissitudes of the last thirty years had shaken the old prestige of the name of king, and a weaker and less capable man than Henry Tudor might have failed to retain the crown that he had won. There were plenty of possible pretenders in existence; the earl of Lincoln, whom Richard III. had recognized as his heir, was still alive; the two children of the duke of Clarence might be made the tools of conspirators; and there was a widespread doubt as to whether the sons of Edward IV. had actually died in the Tower. The secrecy with which their uncle had carried out their murder was destined to be a sore hindrance to his successor.

Early years of the reign.

Bosworth Field is often treated as the last act of the Wars of the Roses. This is an error; they were protracted for twelve years after the accession of Henry VII., and did not really end till the time of Blackheath Field and the siege of Exeter (1497). The position of the first Tudor king is misconceived if his early years are regarded as a time of strong governance and well-established order. On the contrary he was in continual danger, and was striving with all the resources of a ready and untiring mind to rebuild foundations that were absolutely rotten. Phenomena like the Cornish revolt (which recalls Cade's insurrection) and the Yorkshire rising of 1489, which began with the death of the earl of Northumberland, show that at any moment whole counties might take arms in sheer lawlessness, or for some local grievance. Loyalty was such an uncertain thing that the king might call out great levies yet be forced to doubt whether they would fight for him—at Stoke Field it seems that a large part of Henry's army misbehaved, much as that of Richard III. had done at Bosworth. The demoralization brought about by the evil years between 1453 and 1483 could not be lived down in a day—any sort of treason was possible to the generation that had seen the career of Warwick and the usurpation of Gloucester. The survivors of that time were capable of taking arms for any cause that offered a chance of unreasonable profit, and no one's loyalty could be trusted. Did not Sir William Stanley, the best paid of those who betrayed Richard III., afterwards lose his head for a deliberate plot to betray Henry VII.? The various attempts that were made to overturn the new dynasty seem contemptible to the historian of the 20th century. They were not so contemptible at the time, because England and Ireland were full

Insurrections and plots.

of adventurers who were ready to back any cause, and who looked on the king of the moment as no more than a successful member of their own class—a base-born Welshman who had been lucky enough to become the figurehead of the movement that had overturned an unpopular usurper. The organizing spirits of the early troubles of the reign of Henry VII. were irreconcilable Yorkists who had suffered by the change of dynasty; but their hopes of success rested less on their own strength than on the not ill-founded notion that England would tire of any ruler who had to raise taxes and reward his partisans. The position bore a curious resemblance to that of the early years of Henry IV., a king who, like Henry VII., had to vindicate a doubtful elective title to the throne by miracles of cunning and activity. The later representative of the house of Lancaster was fortunate, however, in having less formidable enemies than the earlier; the power of the baronage had been shaken by the Wars of the Roses no less than the power of the crown; so many old estates had passed rapidly from hand to hand, so many old titles were represented by upstarts destitute of local influence, that the feudal danger had become far less. Risings like that of the Percies in 1403 were not the things which the seventh Henry had to fear. He was lucky too in having no adversary of genius of the type of Owen Glendower. Welsh national spirit indeed was enlisted on his own side. Yet leaderless seditions and the plots of obvious impostors sufficed to make his throne tremble, and a ruler less resolute, less wary, and less unscrupulous might have been overthrown.

Lambert Simnel.

The first of the king's troubles was an abortive rising in the north riding of Yorkshire, the only district where Richard III. seems to have enjoyed personal popularity. It was led by Lord Lovel, Richard's chamberlain and admiral; but the insurgents dispersed when Henry marched against them with a large force (1486), and Lovel took refuge in Flanders with Margaret of York, the widow of Charles the Bold of Burgundy, whose dower towns were the refuge of all English exiles, and whose coffers were always open to subsidize plots against her niece's husband. Under the auspices of this rancorous princess the second conspiracy was hatched in the following year (1487). Its leaders were Lovel and John, earl of Lincoln, whom Richard III. had designated as his heir. But the Yorkist banner was to be raised, not in the name of Lincoln, but in that of the boy Edward of Clarence, then a prisoner in the Tower. His absence and captivity might seem a fatal hindrance, but the conspirators had prepared a "double" who was to take his name till he could be released. This was a lad named Lambert Simnel, the son of an Oxford organ-maker, who bore a personal resemblance to the young captive. The conspirators seem to have argued that Henry VII. would not proceed to murder the real Edward, but would rather exhibit him to prove the imposition; if he took the more drastic alternative Lincoln could fall back on his own claim to the crown.

Battle of Stoke.

In May 1487 Lincoln and Lovel landed in Ireland accompanied by other exiles and 2000 German mercenaries. The cause of York was popular in the Pale, and the Anglo-Irish barons seem to have conceived the notion that Henry VII. was likely to prove too strong and capable a king to suit their convenience. The invading army was welcomed by almost all the lords, and the spurious Clarence was crowned at Dublin by the name of Edward VI. A few weeks later Lincoln had recruited his army with 4000 or 5000 Irish adventurers under Thomas Fitzgerald, son of the earl of Kildare, and had taken ship for England. He landed in Lancashire, and pushed forward, hoping to gather the English Yorkists to his aid. But few had joined him when King Henry brought him to action at Stoke, near Newark, on the 17th of July. Despite the doubtful conduct of part of the royal army, and the fierce resistance of the Germans and Irish, the rebel army was routed. Lincoln and Fitzgerald were slain; Lovel disappeared in the rout; the young impostor Simnel was taken prisoner. Henry treated him with politic contempt, and made him a cook boy in his kitchen. He lived for many years after in the royal household. The Irish lords were pardoned on renewing their oaths of fealty; the king did not wish to entangle himself in costly campaigns beyond St George's Channel till he had made his position in England more stable.

Foreign alliances.

The Yorkist cause was crushed for four years, till it was raised again by Margaret of Burgundy, with an imposture even more preposterous than that of Lambert Simnel. In the intervening space, however, while Henry VII. was comparatively undisturbed by domestic rebellion, he found opportunity for a first tentative experiment at interfering in European politics. He allied himself with Ferdinand and Isabella of Spain and with Maximilian of Austria, who was ruling the Netherlands in behalf of his young son, Philip, the heir of the Burgundian inheritance, for the purpose of preventing France from annexing Brittany, the last great fief of the crown which had not yet been absorbed into the Valois royal domain. This struggle, the only continental war in which the first of the Tudors risked his fortunes, was not prosecuted with any great energy, and came to a necessary end when Anne, duchess of Brittany, in whose behalf it was being waged, disappointed her allies by marrying Charles VIII. of her own freewill (Dec. 1491) Henry very wisely proceeded to get out of the war on the best terms possible, and, to the disgust of Maximilian, sold peace to the French king for 600,000 crowns, as well as an additional sum representing arrears of the pension which Louis XI. had been bound to pay to Edward IV. This treaty of Étaples was, in short, a repetition of Edward's treaty of Picquigny, equally profitable and less disgraceful, for Maximilian of Austria, whom Henry thus abandoned, had given more cause of offence than had Charles of Burgundy in 1475. Domestic malcontents did not scruple to hint that the king, like his father-in-law before him, had made war on France, not with any hope of renewing the glories of Crecy or Agincourt, still less with any design of helping his allies, but purely to get first grants from his parliament, and then a war indemnity from his enemies. In any case he was wise to make peace. France was now too strong for England, and both Maximilian and Ferdinand of Spain were selfish and shifty allies. Moreover, it was known that the one dominating desire of Charles VIII. was to conquer Italy, and it was clear that his ambitions in that direction were not likely to prove dangerous to England.

Treaty of Étaples.

Yorkist plots. Perkin Warbeck.

In the year of the treaty of Étaples the Yorkist conspiracies began once more to thicken, and Henry was fortunate to escape with profit from the French war before his domestic troubles recommenced. Ever since 1483 it had been rumoured that one or both of the sons of Edward IV. had escaped, not having been murdered in the Tower. Of this widespread belief the plotters now took advantage; they held that much more could be accomplished with such a claim than by using that of the unfortunate Edward of Clarence, whose chances were so severely handicapped by his being still the prisoner of Henry VII. The scheme for producing a false Plantagenet was first renewed in Ireland, where Simnel's imposture had been so easily taken up a few years before. The tool selected was one Perkin Warbeck, a handsome youth of seventeen or eighteen, the son of a citizen of Tournai, who had lived for some time in London, where Perkin had actually been born. There is a bare possibility that the young adventurer may have been an illegitimate son of Edward IV.; his likeness to the late king was much noticed. When he declared himself to be Richard of York, he obtained some support in Ireland from the earl of Desmond and other lords; but he did not risk open rebellion till he had visited Flanders, and had been acknowledged as her undoubted nephew by Duchess Margaret. Maximilian of Austria also took up his cause, as a happy means of revenging himself on Henry VII. for the treaty of Étaples. There can be small doubt that both the duchess and the German King (Maximilian had succeeded to his father's crown in 1493) were perfectly well aware that they were aiding a manifest fraud. But they made much of Perkin, who followed the imperial court for two years, while his patron was intriguing with English malcontents. The emissaries from Flanders got many promises of assistance, and a formidable rising might have taken place had not Henry VII. been well served by his spies. But in the winter of 1494–1495 the traitors were themselves betrayed, and a large number of arrests were made, including not only Lord Fitzwalter and a number of well-known knights of Yorkist families, but Sir William Stanley, the king's chamberlain, who had been rewarded with enormous gifts for his good service at Bosworth, and was reckoned one of the chief supports of the throne. Stanley and several others were beheaded, the rest hanged or imprisoned. This vigorous action on the part of the king seems to have cowed all Warbeck's supporters on English soil. But the pretender nevertheless sailed from Flanders in July 1495 with a following of 2000 exiles and German mercenaries. He attempted to land at Deal, but his vanguard was destroyed by Kentish levies, and he drew off and made for Ireland. Suspecting that this would be his goal, King Henry had been doing his best to strengthen his hold on the Pale, whither he had sent his capable servant Sir Edward Poynings as lord deputy. Already before Warbeck's arrival Poynings had arrested the earl of Kildare, Simnel's old supporter, cowed some of the Irish by military force, and bought over others by promises of subsidies and pensions. But his best-remembered achievement was that he had induced the Irish parliament to pass the ordinances known as "Poynings' Law," by which it acknowledged that it could pass no legislation which had not been approved by the king and his council, and agreed that all statutes passed by the English parliament should be in force in Ireland. That such terms could be imposed shows the strength of Poynings' arm, and his vigour was equally evident when Warbeck came ashore in Munster in July 1495. Few joined the impostor save the earl of Desmond, and he was repulsed from Waterford, and dared not face the army which the lord deputy put into the field against him. Thereupon, abandoning his Irish schemes, Warbeck sailed to Scotland, whose young king James IV. had just been seduced by the emperor Maximilian into declaring war on England. He promised the Scottish king Berwick and 50,000 crowns in return for the aid of an army. James took the offer, gave him the hand of his kinswoman Catherine Gordon, daughter of the earl of Huntly, and took him forth for a raid into Northumberland (1496). But a pretender backed by Scottish spears did not appeal to the sympathies of the English borderers. The expedition fell flat; not a man joined the banner of the white rose, and James became aware that he had set forth on a fool's errand. But Warbeck soon found other allies of a most unexpected sort. The heavy taxation granted by the English parliament for the Scottish war had provoked discontent and rioting in the south-western counties. In Cornwall especially the disorders grew to such a pitch that local demagogues called out several thousand men to resist the tax-collectors, and finally raised open rebellion, proposing to march on London and compel the king to dismiss his ministers. These spiritual heirs of Jack Cade were Flammock, a lawyer of Bodmin, and a farrier named Michael Joseph. Whether they had any communication with Warbeck it is impossible to say; there is no proof of such a connexion, but their acts served him well. A Cornish army marched straight on London, picking up some supporters in Devon and Somerset on their way, including a discontented baron, Lord Audley, whom they made their captain.

Cornish rebellion.

Battle of Blackheath.

So precarious was the hold of Henry VII. on the throne that he was in great danger from this outbreak of mere local turbulence. The rebels swept over five counties unopposed, and were only stopped and beaten in a hard fight on Blackheath, when they had reached the gates of London. Audley, the farrier and the lawyer were all captured and executed (June 18, 1497). But the crisis was not yet at an end. Warbeck, hearing of the rising, but not of its suppression, had left Scotland, and appeared in Devonshire in August. He rallied the wrecks of the west country rebels, and presently appeared before the gates of Exeter with nearly 8000 men. But the citizens held out against him, and presently the approach of the royal army was reported. The pretender led off his horde to meet the relieving force, but when he reached Taunton he found that his followers were so dispirited that disaster was certain. Thereupon he absconded by night, and took sanctuary in the abbey of Beaulieu. He offered to confess his imposture if he were promised his life, and the king accepted the terms. First at Taunton and again at Westminster, Perkin publicly recited a long narrative of his real parentage, his frauds and his adventures. He was then consigned to not over strict confinement in the Tower, and might have fared no worse than Lambert Simnel if he had possessed his soul in patience. But in the next year he corrupted his warders, broke out from his prison, and tried to escape beyond seas. He was captured, but the king again spared his life, though he was placed for the future in a dungeon "where he could see neither moon nor sun." Even this did not tame the impostor's mercurial temperament. In 1499 he again planned an escape, which was to be shared by another prisoner, the unfortunate Edward of Clarence, earl of Warwick, whose cell was in the storey above his own. But there were traitors among the Tower officials whom they suborned to help them, and the king was warned of the plot. He allowed it to proceed to the verge of execution, and then arrested both the false and the true Plantagenet. Evidence of a suspicious character was produced to show that they had planned rebellion as well as mere escape, and both were put to death with some of their accomplices. Warbeck deserved all that he reaped, but the unlucky Clarence's fate estranged many hearts from the king. The simple and weakly young man, who had spent fifteen of his twenty-five years in confinement, had, in all probability, done no more than scheme for an escape from his dungeon. But as the true male heir of the house of Plantagenet he was too dangerous to be allowed to survive.

Execution of Warbeck and Edward of Clarence.

The turbulent portion of the reign of Henry VII. came to an end with Blackheath Field and the siege of Exeter. From that time forward the Tudor dynasty was no longer in serious danger; there were still some abortive plots, but none that had any prospect of winning popular support. The chances of Warbeck and Clarence had vanished long before they went to the scaffold. The Yorkist claim, after Clarence's death, might be supposed to have passed to his cousin Edmund, earl of Suffolk, the younger brother of that John, earl of Lincoln, who had been declared heir to the crown by Richard III., and had fallen at Stoke field. Fully conscious of the danger of his position, Suffolk fled to the continent, and lived for many years as a pensioner of the emperor Maximilian. Apparently he dabbled in treason; it is at any rate certain that in 1501 King Henry executed some, and imprisoned others, of his relatives and retainers. But his plots, such as they were, seem to have been futile. There was no substratum of popular discontent left in England on which a dangerous insurrection might be built up. It was to be forty years before another outbreak of turbulence against the crown was to break forth.

Establishment of the Tudor dynasty.

VI. The Tudor Despotism and the Beginnings of the Reformation (1497–1528)

The last twelve years of the reign of Henry VII. present in most respects a complete contrast to the earlier period, 1485–1497. There were no more rebellions, and—as we have already seen—no more plots that caused any serious danger. Nor did the king indulge his unruly subjects in foreign wars, though he was constantly engaged in negotiations with France, Scotland, Spain and the emperor, which from time to time took awkward turns. But Henry was determined to win all that he could by diplomacy, and not by force of arms. His cautious, but often unscrupulous, dealings with the rival continental powers had two main ends: the first was to keep his own position safe by playing off France against the Empire and Spain; the second was to get commercial advantages by dangling his alliance before each power in turn. Flanders was still the greatest customer of England, and it was therefore necessary above all things to keep on good terms with the archduke Philip, the son of Maximilian, who on coming of age had taken over the rule of the Netherlands from his father.

Commercial treaties.

The king's great triumphs were the conclusion of the *Intercursus Magnus* of 1496 and the *Intercursus Malus* (so called by the Flemings, not by the English) of 1506. The former provided for a renewal of the old commercial alliance with the house of Burgundy, on the same terms under which it had existed in the time of Edward IV.; the rupture which had taken place during the years when Maximilian was backing Perkin Warbeck had been equally injurious to both parties. The *Malus Intercursus* on the other hand gave England some privileges which she had not before enjoyed—exemption from local tolls in Antwerp and Holland, and a licence for English merchants to sell cloth retail as well as wholesale—a concession which hit the Netherland small traders and middlemen very hard. Another great commercial advantage secured by Henry VII. for his subjects was an increased share of the trade to the Scandinavian countries. The old treaties of Edward IV. with the Hanseatic League had left the Germans still in control of the northern seas. Nearly all the Baltic goods, and most of those from Denmark and Norway, had been reaching London or Hull in foreign bottoms. Henry allied himself with John of Denmark, who was chafing under the monopoly of the Hansa, and obtained the most ample grants of free trade in his realms. The Germans murmured, but the English shipping in eastern and northern waters continued to multiply. Much the same policy was pursued in the Mediterranean. Southern goods hitherto had come to Southampton or Sandwich invariably in Venetian carracks, which took back in return English wool and metals. Henry concluded a treaty with Florence, by which that republic undertook to receive his ships in its harbours and to allow them to purchase all eastern goods that they might require. From this time forward the Venetian monopoly ceased, and the visits of English merchant vessels to the Mediterranean became frequent and regular.

English navigators.

Nor was it in dealing with old lines of trade alone that Henry Tudor showed himself the watchful guardian of the interests of his subjects. He must take his share of credit for the encouragement of the exploration of the seas of the Far West. The British traders had already pushed far into the Atlantic before Columbus discovered America; fired by the success of the great navigator they continued their adventures, hoping like him to discover a short "north-west passage" to Cathay and Japan. With a charter from the king giving him leave to set up the English banner on all the lands he might discover, the Bristol Genoese trader John Cabot successfully passed the great sea in 1497, and discovered Newfoundland and its rich fishing stations. Henry rewarded him with a pension of £20 a year, and encouraged him to further exploration, in which he discovered all the American coast-line from Labrador to the mouth of the Delaware—a great heritage for England, but one not destined to be taken up for colonization till more than a century had passed.

Foreign policy of Henry VII.

Henry's services to English commerce were undoubtedly of far more importance to the nation than all the tortuous details of his foreign policy. His chicanery need not, however, be censured over much, for the princes with whom he had to deal, and notably Ferdinand and Maximilian, were as insincere and selfish as himself. Few diplomatic hagglings have been so long and so sordid as that between England and Spain over the marriage treaty which gave the hand of Catherine of Aragon first to Henry's eldest son Arthur, and then, on his premature death in 1502, to his second son Henry. The English king no doubt imagined that he had secured a good bargain, as he had kept the princess's dowry, and yet never gave Ferdinand any practical assistance in war or peace. It is interesting to find that he had for some time at the end of his reign a second Spanish marriage in view; his wife Elizabeth of York having died in 1503, he seriously proposed himself as a suitor for Joanna of Castile, the elder sister of Catherine, and the widow of the archduke Philip, though she was known to be insane. Apparently he hoped thereby to gain vantage ground for an interference in Spanish politics, which would have been most offensive to Ferdinand. Nothing came of the project, which contrasts strangely with the greater part of Henry's sober and cautious schemes.

Marriage of James IV. of Scotland and Margaret Tudor.

On the other hand a third project of marriage alliance which Henry carried out in 1503 was destined to be consummated, and to have momentous, though long-deferred, results. This was the giving of the hand of his daughter Margaret to James IV. of Scotland. Thereby he bought quiet on the Border and alliance with Scotland for no more than some ten years. But—as it chanced—the issue of this alliance was destined to unite the English and the Scottish crowns, when the male line of the Tudors died out, and Henry, quite unintentionally, had his share in bringing about the consummation, by peaceful means, of that end which Edward I. had sought for so long to win by the strong hand.

Character of Henry's internal rule.

All the foreign politics of the reign of Henry VII. have small importance compared with his work within the realm. The true monument of his ability was that he left England tamed and orderly, with an obedient people and a full exchequer, though he had taken it over wellnigh in a state of anarchy. The mere suppression of insurrections like those of Simnel and Warbeck was a small part of his task. The harder part was to recreate a spirit of order and subordination among a nation accustomed to long civil strife. His instruments were ministers of ability chosen from the clergy and the gentry—he seems to have been equally averse to trusting the baronage at the one end of the social scale, or mere upstarts at the other, and it is notable that no one during his reign can be called a court favourite. The best-known names among his servants were his great chancellor, Archbishop Morton, Foxe, bishop of Winchester, Sir Reginald Bray, and the lawyers Empson and Dudley. These two last bore the brunt of the unpopularity of the financial policy of the king during the latter half of his reign, when the vice of avarice seems to have grown upon him beyond all reason. But Henry was such a hard-working monarch, and so familiar with all the details of administration, that his ministers cannot be said to have had any independent authority, or to have directed their master's course of action.

The Star Chamber.

The machinery employed by the first of the Tudors for the suppression of domestic disorder is well known. The most important item added by him to the administrative machinery of the realm was the famous Star Chamber, which was licensed by the parliament of 1487. It consisted of a small committee of ministers, privy councillors and judges, which sat to deal with offences that seemed to lie outside the scope of the common law, or more frequently with the misdoings of men who were so powerful that the local courts could not be trusted to execute justice upon them, such as great landowners, sheriffs and other royal officials, or turbulent individuals who were the terror of their native districts. The need for a strong central court directly inspired by the king, which could administer justice without respect of persons, was so great, that the constitutional danger of establishing an autocratic judicial committee, untrammelled by the ordinary rules of law, escaped notice at the time. It was not till much later that the nation came to look upon the Star Chamber as the special engine of royal tyranny and to loathe its name. In 1500 it was for the common profit of the realm that there should exist such a court, which could reduce even the most powerful offender to order.

Suppression of livery and maintenance.

One of the most notable parts of the king's policy was his long-continued and successful assault on the abuse of "livery and maintenance," which had been at its height during the Wars of the Roses. We have seen the part which it had taken in strengthening the influence of those who were already too powerful, and weakening the ordinary operation of the law. Henry put it down with a strong hand, forbidding all liveries entirely, save for the mere domestic retainers of each magnate. His determination to end the system was well shown by the fact that he heavily fined even the earl of Oxford, the companion of his exile, the victor of Bosworth, and the most notoriously loyal peer in the realm, for an ostentatious violation of the statute. Where Oxford was punished, no less favoured person could hope to escape. By the end of the reign the little hosts of badged adherents which had formed the nucleus for the armies of the Wars of the Roses had ceased to exist.

Personal rule.

Edward IV., as has been already remarked, had many of the opportunities of the autocrat, if only he had cared to use them; but his sloth and self-indulgence stood in the way. Henry VII., the most laborious and systematic of men, turned them to account. He formed his personal opinion on every problem of administration and intervened himself in every detail. In many respects he was his own prime minister, and nothing was done without his knowledge and consent. A consistent policy may be detected in all his acts—that of gathering all the machinery of government into his own hands. Under the later Plantagenets and the Lancastrian kings the great check on the power of the crown had been that financial difficulties were continually compelling the sovereign to summon parliaments. The estates had interfered perpetually in all the details of governance, by means of the power of the purse. Edward IV., first among English sovereigns, had been able to dispense with parliaments for periods of many years, because he did not need their grants save at long intervals. Henry was in the same position; by strict economy, by the use of foreign subsidies, by the automatic growth of his revenues during a time of peace and returning prosperity, by confiscation and forfeitures, he built himself up a financial position which rendered it unnecessary for him to make frequent appeals to parliament. Not the least fertile of his expedients was that regular exploitation of the law as a source of revenue, which had already been seen in the time of his father-in-law. This part of Henry's policy is connected with the name of his two extortionate "fiscal judges" Empson and Dudley, who "turned law and justice into rapine" by their minute inquisition into all technical breaches of legality, and the nice fashion in which they adapted the fine to the wealth of the misdemeanant, without any reference to his moral guilt or any regard for extenuating circumstances. The king must take the responsibility for their unjust doings; it was his coffers which mainly profited by their chicane. In his later years he fell into the vice of hoarding money for its own sake; so necessary was it to his policy that he should be free, as far as possible, from the need for applying to parliament for money, that he became morbidly anxious to have great hoards in readiness for any possible day of financial stress. At his death he is said to have had £1,800,000 in hard cash laid by. Hence it is not strange to find that he was able to dispense with parliaments in a fashion that would have seemed incredible to a 14th-century king. In his whole reign he only asked them five times for grants of taxation, and three of the five requests were made during the first seven years of his reign. In the eyes of many men parliament lost the main reason for its existence when it ceased to be the habitual provider of funds for the ordinary expenses of the realm. Those who had a better conception of its proper functions could see that it had at any rate been stripped of its chief power when the king no longer required its subsidies. There are traces of a want of public interest in its proceedings, very different from the anxiety with which they used to be followed in Plantagenet and Lancastrian times. Legislation, which only incidentally affects him, is very much less exciting to the ordinary citizen than taxation, which aims directly at his pocket. It is at any rate clear that during the latter years of his reign, when the time of impostures and rebellions had ended, Henry was able to dispense with parliaments to a great extent, and incurred no unpopularity by doing so. Indeed he was accepted by the English people as the benefactor who had delivered them from anarchy; and if they murmured at his love of hoarding, and cursed his inquisitors Empson and Dudley, they had no wish to change the Tudor rule, and were far from regarding the times of the "Lancastrian experiment" as a lost golden age. The present king might be unscrupulous and avaricious, but he was cautious, intelligent and economical; no one would have wished to recall the régime of that "crowned saint" Henry VI.

Henry VIII.

Nevertheless when the first of the Tudors died, on the 21st of April 1509, there were few who regretted him. He was not a monarch to rouse enthusiasm, while much was expected from his brilliant, clever and handsome son Henry VIII., whose magnificent presence and manly vigour recalled the early prime of Edward IV. Some years later England realized that its new king had inherited not only the physical beauty and strength of his grandfather, but also every one of his faults, with the sole exception of his tendency to sloth. Henry VIII. indeed may be said, to sum up his character in brief, to have combined his father's brains with his grandfather's passions. Edward IV. was selfish and cruel, but failed to become a tyrant because he lacked the energy for continuous work. Henry VII. was unscrupulous and untiring, but so cautious and wary that he avoided violent action and dangerous risks. Their descendant had neither Edward's sloth nor Henry's moderation; he was capable of going to almost any lengths in pursuit of the gratification of his ambition, his passions, his resentment or his simple love of self-assertion. Yet, however far he might go on the road to tyranny, Henry had sufficient cunning, versatility and power of cool reflection, to know precisely when he had reached the edge of the impossible. He had his father's faculty for gauging public opinion, and estimating dangers, and though his more venturous temperament led him to press on far beyond the point at which the seventh Henry would have halted, he always stopped short on the hither side of the gulf. It was the most marvellous proof of his ability that he died on his throne after nearly forty years of autocratic rule, during which he had roused more enmities and done more to change the face of the realm than any of the kings that were before him.

But it was long before the nation could estimate all the features of the magnificent but sinister figure which was to dominate England from 1509 to 1547. At his accession Henry VIII. was only eighteen years of age, and, if his character was already formed, it was only the attractive side of it that was yet visible. His personal beauty, his keen intelligence, his scholarship, his love of music and the arts, his kingly ambition, were all obvious enough. His selfishness, his cruelty, his ingratitude, his fierce hatred of criticism and opposition, his sensuality, had yet to be discovered by his subjects. A suspicious observer might have detected something ominous in the first act of his reign—the arrest and attainder of his father's unpopular ministers, Empson and Dudley, whose heads he flung to the people in order to win a moment's applause. Whatever their faults, they had served the house of Tudor well, and it was a grotesque perversion of justice to send them to the scaffold on a charge of high treason. A similar piece of cruelty was the execution, some time later, of the earl of Suffolk, who had been languishing long years in the Tower; he was destroyed not for any new plots, but simply for his Yorkist descent. But in Henry's earlier years such acts were still unusual; it was not till he had grown older, and had learnt how much the nation would endure, that judicial murder became part of his established policy.

Continental projects of Henry VIII.

Henry's first outburst of self-assertion took the form of reversing his father's thrifty and peaceful policy, by plunging into the midst of the continental wars from which England had been held back by his cautious parent. The adventure was wholly unnecessary, and also unprofitable. But while France was engaged in the "Holy War" against the pope, Venice, the emperor, and Ferdinand of Spain, Henry renewed the old claims of the Plantagenets, and hoped, if not to win back the position of Edward III., at least to recover the duchy of Aquitaine, or some parts of it. He lent an army to Ferdinand for the invasion of Gascony, and landed himself at Calais with 25,000 men, to beat up the northern border of France. Little good came of his efforts. The Spanish king gave no assistance, and the northern campaign, though it included the brilliant battle of the Spurs (August 16th, 1513), accomplished nothing more than the capture of Tournai and Thérouanne. It was soon borne in upon

Treaty of Étaples.

King Henry that France, even when engaged with other enemies, was too strong to be overrun in the old style. Moreover, his allies were giving him no aid, though they had eagerly accepted his great subsidies. With a sudden revulsion of feeling Henry offered peace to France, which King Louis XII. gladly bought, agreeing to renew the old pension or tribute that Henry VII. had received by the treaty of Étaples. Their reconciliation and alliance were sealed by the marriage of the French king to Henry's favourite sister Mary, who was the bridegroom's junior by more than thirty years. Their wedlock and the Anglo-French alliance lasted only till the next year, when Louis died, and Mary secretly espoused an old admirer, Charles Brandon, afterwards duke of Suffolk, King Henry's greatest friend and confidant.

War with Scotland. Battle of Flodden.

While the French war was still in progress there had been heavy fighting on the Scottish border. James IV., reverting to the traditionary policy of his ancestors, had taken the opportunity of attacking England while her king and his army were over-seas. He suffered a disaster which recalls that of David II. at Neville's Cross—a fight which had taken place under precisely similar political conditions. After taking a few Northumbrian castles, James was brought to action at Flodden Field by the earl of Surrey (September 9th, 1513). After a desperate fight lasting the greater part of a day, the Scots were outmanœuvred and surrounded. James IV.—who had refused to quit the field—was slain in the forefront of the battle, with the greater part of his nobles; with him fell also some 10,000 or 12,000 of his men. Scotland, with her military power brought low, and an infant king on the throne, was a negligible quantity in international politics for some years. The queen dowager, Margaret Tudor, aided by a party that favoured peace and alliance with England, was strong enough to balance the faction under the duke of Albany which wished for perpetual war and asked for aid from France.

Thomas Wolsey.

With the peace of 1514 ended the first period of King Henry's reign. He was now no longer a boy, but a man of twenty-three, with his character fully developed; he had gradually got rid of his father's old councillors, and had chosen for himself a minister as ambitious and energetic as himself, the celebrated Thomas Wolsey, whom he had just made archbishop of York, and who obtained the rank of cardinal from the pope in the succeeding year. Wolsey was the last of the great clerical ministers of the middle ages, and by no means the worst. Like so many of his predecessors he had risen from the lower middle classes, through the royal road of the church; he had served Henry VII.'s old councillor Foxe, bishop of Winchester, as secretary, and from his household had passed into that of his master. He had been an admirable servant to both, full of zeal, intelligence and energy, and not too much burdened with scruples. The young king found in him an instrument well fitted to his hand, a man fearless, ingenious, and devoted to the furtherance of the power of the crown, by which alone he had reached his present position of authority. For fourteen years he was his master's chief minister—the person responsible in the nation's eyes for all the more unpopular assertions of the royal prerogative, and for all the heavy taxation and despotic acts which Henry's policy required. It mattered little to Henry that the cardinal was arrogant, tactless and ostentatious; indeed it suited his purpose that Wolsey should be saddled by public opinion with all the blame that ought to have been laid on his own shoulders. It was convenient that the old nobility should detest the upstart, and that the commons should imagine him to be the person responsible for the demands for money required for the royal wars. As long as his minister served his purposes and could execute his behests Henry gave him a free hand, and supported him against all his enemies. It was believed at the time, and is still sometimes maintained by historians, that Wolsey laid down schemes of policy and persuaded his master to adopt them; but the truth would appear to be that Henry was in no wise dominated by the cardinal, but imposed on him his own wishes, merely leaving matters of detail to be settled by his minister. Things indifferent might be trusted to him, but the main lines of English diplomacy and foreign policy show rather the influence of the king's personal desires of the moment than that of a statesman seeking national ends.

It has often been alleged that Henry, under the guidance of Wolsey, followed a consistent scheme for aggrandizing England, by making her the state which kept the balance of power of Europe in her hands. And it is pointed out that during the years of the cardinal's ascendancy the alliance of England was sought in turn by the great princes of the continent, and proved the make-weight in the scales. This is but a superficial view of the situation. Henry, if much courted, was much deceived by his contemporaries. They borrowed his money and his armies, but fed him with vain promises and illusory treaties. He and his minister were alternately gulled by France and by the emperor, and the net result of all their activity was bankruptcy and discontent at home and ever-frustrated hopes abroad. It is hard to build up a reputation for statecraft for either Henry or Wolsey on the sum total of English political achievement during their collaboration.

Henry VIII. and the rivalry of Francis I. and Charles V.

During the first few years of the cardinal's ascendancy the elder race of European sovereigns, the kings with whom Henry VII. had been wont to haggle, disappeared one after the other. Louis of France died in 1515, Ferdinand of Aragon in 1516, the emperor Maximilian—the last survivor of his generation—in 1519. Louis was succeeded by the active, warlike and shifty Francis I.; the heritage of both Ferdinand and Maximilian—his maternal and paternal grandfathers—fell to Charles of Habsburg, who already possessed the Netherlands in his father's right and Castile in that of his mother. The enmity of the house of Valois and the house of Habsburg, which had first appeared in the wars of Charles VIII. and Maximilian, took a far more bitter shape under Francis I. and Charles V., two young princes who were rivals from their youth. Their wars were almost perpetual, their peaces never honestly carried out. Their powers were very equally balanced; if Charles owned broader lands than Francis, they were more scattered and in some cases less loyal. The solid and wealthy realm of France proved able to make head against Spain and the Netherlands, even when they were backed by the emperor's German vassals. Charles was also distracted by many stabs in the back from the Ottoman Turks, who were just beginning their attack on Christendom along the line of the Danube. To each of the combatants it seemed that the English alliance would turn the scale in his own favour. Henry was much courted, and wooed with promises of lands to be won from the other side by his ally of the moment. But neither Charles nor Francis wished him to be a real gainer, and he himself was a most untrustworthy friend, for he was quite ready to turn against his ally if he seemed to be growing too powerful, and threatened to dominate all Europe; the complete success of either party would mean that England would sink once more into a second-rate power. How faithless and insincere was Henry's policy may be gauged from the fact that in 1520, after all the pageantry of the "Field of the Cloth of Gold" and his vows of undying friendship for Francis, he met Charles a few weeks later at Gravelines, and concluded with him a treaty which pledged England to a defensive alliance against the king's "good brother" of France. Such things happened not once nor twice during the years of Wolsey's ministry. It was hardly to be wondered at, therefore, if Henry's allies regularly endeavoured to cheat him out of his share of their joint profits. What use was there in rewarding a friend who might become an enemy to-morrow? The greatest deception of all was in 1522, when Charles V., who had made the extraordinary promise that he would get Wolsey made pope, and lend Henry an army to conquer northern France, failed to redeem his word in both respects. He caused his own old tutor, Adrian of Utrecht, to be crowned with the papal tiara, and left the English to invade Picardy entirely unassisted. But this was only one of many such disappointments.

Failure of Henry's diplomacy.

Beginnings of parliamentary resistance.

The result of some twelve years of abortive alliances and ill-kept treaties was that Henry had obtained no single one of the advantages which he had coveted, and that he had lavished untold wealth and many English lives upon phantom schemes which crumbled between his fingers. His subjects had already begun to murmur; the early parliaments of his reign had been passive and complaisant; but by 1523 the Commons had been goaded into resistance. They granted only half the subsidies asked from them, pleading that three summers more of such taxation as the cardinal demanded for his master would leave the realm drained of its last penny, and reduced to fall back on primitive forms of barter, "clothes for victuals and bread for cheese," out of mere want of coin. Fortunately for the king his subjects laid all the blame upon his mouthpiece the cardinal, instead of placing it where it was due. On Wolsey's back also was saddled the most iniquitous of Henry's acts of tyranny against individuals—the judicial murder of the duke of Buckingham, the highest head among the English nobility. For some hasty words, amplified by the doubtful evidence of treacherous retainers, together with a foolish charge of dabbling with astrologers, the heir of the royal line of Thomas of Woodstock had been tried and executed with scandalous haste. His only real crime was that, commenting on the lack of male heirs to the crown—for after many years of wedlock with Catherine of Aragon Henry's sole issue was one sickly daughter—he had been foolish enough to remark that if anything should happen to the king he himself was close in succession to the crown. The cardinal bore the blame, because he and Buckingham had notoriously disliked each other; but the deed had really been of the king's own contriving. He was roused to implacable wrath by anyone who dared to speak on the forbidden topic of the succession question.

Execution of the duke of Buckingham.

Question of the king's divorce.

In the later years of Wolsey's ascendancy, nevertheless, that same question was the subject of many anxious thoughts. From Henry's own mind it was never long absent; he yearned for a male heir, and he was growing tired of his wife Catherine, who was some years older than himself, had few personal attractions, and was growing somewhat of an invalid. Somewhere about the end of 1526 those who were in the king's intimate confidence began to be aware that he was meditating a divorce—a thing not lightly to be taken in hand, for the queen was the aunt of the emperor Charles V., who would be vastly offended at such a proposal. But Henry's doubts had been marvellously stimulated by the fact that he had become enamoured of another lady—the beautiful, ambitious and cunning Anne Boleyn, a niece of the duke of Norfolk, who had no intention of becoming merely the king's mistress, but aspired to be his consort.

England and the Reformation.

The question of the king's divorce soon became inextricably confused with another problem, whose first beginnings go back to a slightly earlier date. What was to be the attitude of England towards the Reformation? It was now nearly ten years since Martin Luther had posted up his famous theses on the church door at Wittenberg, and since he had testified to his faith before the diet of Worms. All Germany was now convulsed with the first throes of the revolt against the papacy, and the echoes of the new theological disputes were being heard in England. King Henry himself in 1521 had deigned to write an abusive pamphlet against Luther, for which he had been awarded the magnificent title of *Fidei Defensor* by that cultured sceptic Pope Leo X. About the same time we begin to read of orders issued by the bishops for the discovery and burning of all Lutheran books—a clear sign that they were reaching England in appreciable quantities. Hitherto it had been only the works of Wycliffe that had merited this attention on the part of inquisitors. In the Wycliffite remnant, often persecuted but never exterminated, there already existed in England the nucleus of a Protestant party. All through the reign of Henry VII. and the early years of Henry VIII. the intermittent burning of "heretics," and their far more frequent recantations, had borne witness to the fact that the sect still lingered on. The Wycliffites were a feeble folk, compelled to subterraneous ways, and destitute of learned leaders or powerful supporters. But they survived to see Luther's day, and to merge themselves in one body with the first English travelling scholars and merchants who brought back from the continent the doctrines of the German Reformation. The origins of a Protestant party, who were not mere Wycliffites, but had been first interested in dogmatic controversy by coming upon the works of Luther, can be traced back to the year 1521 and to the university of Cambridge. There a knot of scholars, some of whom were to perish early at the stake, while others were destined to become the leaders of the English Reformation, came together and encouraged each other to test the received doctrines of contemporary orthodoxy by searching the Scriptures and the works of the Fathers. The sect spread in a few years to London, Oxford and other centres of intellectual life, but for many years its followers were not numerous; like the old Lollardy, Protestantism took root only in certain places and among certain classes—notably the lesser clergy and the merchants of the great towns.

King Henry and those who wished to please him professed as great a hatred and contempt for the new purveyors of German doctrines as for the belated disciples of Wycliffe. But there was another movement, whose origins went back for many centuries, which they were far from discouraging, and were prepared to utilise when it suited their convenience. This was the purely political feeling against the tyranny of the papacy, and the abuses of the national church, which in early ages had given supporters to William the Conqueror and Henry II., which had dictated the statutes of Mortmain and of Praemunire. Little had been heard of the old anti-clerical party in England since the time of Henry IV.; it had apparently been identified in the eyes of the orthodox with that Lollardy with which it had for a time allied itself, and had shared in its discredit. But it had always continued to exist, and in the early years of Henry VIII. had been showing unmistakable signs of vitality. The papacy of the Renaissance was a fair mark for criticism. It was not hard to attack the system under which Rodrigo Borgia wore the tiara, while Girolamo Savonarola went to the stake; or in which Julius II. exploited the name of Christianity to serve his territorial policy in Italy, and Leo X. hawked his indulgences round Europe to raise funds which would enable him to gratify his artistic tastes. At no period had the official hierarchy of the Western Church been more out of touch with common righteousness and piety. Moreover, they were sinning under the eyes of a laity which was far more intelligent and educated, more able to think and judge for itself, less the slave of immemorial tradition, than the old public of the middle ages. In Italy the Renaissance might be purely concerned with things intellectual or artistic, and seem to have little or no touch with things moral. Beyond the Alps it was otherwise; among the Teutonic nations at least the revolt against the scholastic philosophy, the rout of the obscurantists, the eager pursuit of Hellenic culture, had a religious aspect. The same generation which refused to take thrice-translated and thrice-garbled screeds from Aristotle as the sum of human knowledge, and went back to the original Greek, was also studying the Old and New Testaments in their original tongues, and drawing from them conclusions as unfavourable to the intelligence as to the scholarship of the orthodox medieval divines. Such a discovery as that which showed that the "False Decretals," on which so much of the power of the papacy rested, were mere 9th-century forgeries struck deep at the roots of the whole traditional relation between church and state.

The first English scholars of the Renaissance, like Erasmus on the continent, did not see the logical outcome of their own discoveries, nor realize that the campaign against obscurantism would develop into a campaign against Roman orthodoxy. Sir Thomas More, the greatest of them, was actually driven into reaction by the violence of Protestant controversialists, and the fear that the new doctrines would rend the church in twain. He became himself a persecutor, and a writer of abusive pamphlets unworthy of the author of the *Utopia*. But to the younger generation the irreconcilability of modern scholarship and medieval formulae of faith became more and more evident. One after another all the cardinal doctrines were challenged by writers who were generally acute, and almost invariably vituperative. For the controversies of the Reformation were conducted by both sides, from kings and prelates down to gutter pamphleteers, in language of the most unseemly violence.

But, as has been already said, the scholars and theologians had less influence in the beginning of the English Reformation than the mere lay politicians, whose anti-clerical tendencies chanced to fit in with King Henry's convenience when he quarrelled with the papacy. It is well to note that the first attacks of parliament on the church date back to two years before Luther published his famous theses. The contention began in 1515 with the fierce assault by the Commons on the old abuse of benefit of clergy, and the immunity of clerical criminals from due punishment for secular crimes—a question as old as the times of Henry II. and Becket. But the discussion spread in later years from this particular point into a general criticism of the church and its relations to the state, embracing local grievances as well as the questions which turned on the dealings of the papacy with the crown. The old complaints which had been raised against the Church of England in the days of Edward I. or Richard II. had lost none of their force in 1526. The higher clergy were more than ever immersed in affairs of state, "Caesarean" as Wycliffe would have called them. It was only necessary to point to the great cardinal himself, and to ask how far his spiritual duties at York were properly discharged while he was acting as the king's prime minister. The cases of Foxe and Morton were much the same; the former passed for a well-meaning man, yet had been practically absent from his diocese for twenty years. Pluralism, nepotism, simony and all the other ancient abuses were more rampant than ever. The monasteries had ceased to be even the nurseries of literature; their chronicles had run dry, and secular priests or laymen had taken up the pens that the monks had dropped. They were wealthier than ever, yet did little to justify their existence; indeed the spirit of the age was so much set against them that they found it hard to keep up the numbers of their inmates. Truculent pamphleteers like Simon Fish, who wrote *Beggars' Supplication*, were already demanding "that these sturdy loobies should be set abroad into the world, to get wives of their own, and earn their living by the sweat of their brows, according to the commandment of God; so might the king be better obeyed, matrimony be better kept, the gospel better preached, and none should rob the poor of his alms." It must be added that monastic scandals were not rare; though the majority of the houses were decently ordered, yet the unexceptionable testimony of archiepiscopal and episcopal visitations shows that in the years just before the Reformation there was a certain number of them where chastity of life and honesty of administration were equally unknown. But above all things the church was being criticized as an *imperium in imperio*, a privileged body not amenable to ordinary jurisdiction, and subservient to a foreign lord—the pope. And it was true that, much as English churchmen might grumble at papal exactions, they were generally ready as a body to support the pope against the crown; the traditions of the medieval church made it impossible for them to do otherwise. That there would in any case have been a new outbreak of anti-clerical and anti-papal agitation in England, under the influence of the Protestant impulse started by Luther in Germany, is certain. But two special causes gave its particular colour to the opening of the English Reformation; the one was that the king fell out with the papacy on the question of his divorce. The other was that the nation at this moment was chafing bitterly against a clerical minister, whom it (very unjustly) made responsible for the exorbitant taxation which it was enduring, in consequence of the king's useless and unsuccessful foreign wars. The irony of the situation lay in the facts that Henry was, so far as dogmatic views were concerned, a perfectly orthodox prince; he had a considerable knowledge of the old theological literature, as he had shown in his pamphlet against Luther, and though he was ready to repress clerical immunities and privileges that were inconvenient to the crown, he had no sympathy whatever with the doctrinal side of the new revolt against the system of the medieval church. Moreover, Wolsey, whose fall was to synchronize with the commencement of the reforming movement, was if anything more in sympathy with change than was his master. He was an enlightened patron of the new learning, and was inclined to take vigorous measures in hand for the pruning away of the abuses of the church. It is significant that his great college at Oxford—"Cardinal's College" as he designed to call it, "Christ Church" as it is named to-day—was endowed with the revenues of some score of small monasteries which he had suppressed on the ground that they were useless or ill-conducted. His master turned the lesson to account a few years later; but Henry's wholesale destruction of religious houses was carried out not in the interests of learning, but mainly in those of the royal exchequer. (C. W. C. O.)

VII. The Reformation and the Age of Elizabeth
(1528–1603)

Fall of Wolsey.

Wolsey did not fall through any opposition to reform; nor was he opposed to the idea of a divorce. Indeed, both in France and Spain he was credited with the authorship of the project. But he differed from Henry on the question of Catherine's successor. Wolsey desired a French marriage to consummate the breach upon which he was now bent with the emperor; and war, in fact, was precipitated with Spain in 1528. This is said to have been done without Henry's consent; he certainly wished to avoid war with Charles V., and peace was made after six months of passive hostility. Nor did Henry want a French princess; his affections were fixed for the time on Anne Boleyn, and she was the hope of the anti-clerical party. The crisis was brought to a head by the failure of Wolsey's plan to obtain a divorce. Originally it had been suggested that the ecclesiastical courts in England were competent without recourse to Rome. Wolsey deprecated this procedure, and application was made to Clement VII. Wolsey relied upon his French and Italian allies to exert the necessary powers of persuasion; and in 1528 a French army crossed the Alps, marched through Italy and threatened to drive Charles V. out of Naples. Clement was in a position to listen to Henry's prayer; and Campeggio was commissioned with Wolsey to hear the suit and grant the divorce.

Question of the divorce.

No sooner had Campeggio started than the fortunes of war changed. The French were driven out of Naples, and the Imperialists again dominated Rome; the Church, wrote Clement to Campeggio, was completely in the power of Charles V. The cardinal, therefore, must on no account pronounce against Charles's aunt; if he could not persuade Henry and Catherine to agree on a mutual separation, he must simply pass the time and come to no conclusion. Hence it was June 1529 before the court got to work at all, and then its proceedings were only preparatory to an adjournment and revocation of the suit to Rome in August. Clement VII. had, in his own words, made up his mind to live and die an imperialist; the last remnants of the French army in Italy had been routed, and the pope had perforce concluded the treaty of Barcelona, a sort of family compact between himself and Charles, whereby he undertook to protect Charles's aunt, and the emperor to support the Medici dynasty in Florence. This peace was amplified at the treaty of Cambrai (August 1529) into a general European pacification in which England had no voice. So far had it fallen since 1521.

In every direction Wolsey had failed, and his failure involved the triumph of the forces which he had opposed. The fate of the papal system in England was bound up with his personal fortunes. It was he and he alone who had kept parliament at arm's length and the enemies of the church at bay. He had interested the king, and to some extent the nation, in a spirited foreign policy, had diverted their attention from domestic questions, and had staved off that parliamentary attack on the church which had been threatened fifteen years before. Now he was doomed, and both Campeggio and Cardinal du Bellay were able to send their governments accurate outlines of the future policy of Henry VIII. The church was to be robbed of its wealth, its power and its privileges, and the papal jurisdiction was to be abolished. In October Wolsey was deprived of the great seal, and surrendered many of his ecclesiastical preferments, though he was allowed to retain his archbishopric of York which he now visited for the first time. The first lay ministry since Edward the Confessor's time came into office; Sir Thomas More became lord chancellor, and Anne Boleyn's father lord privy seal; the only prominent cleric who remained in office was Stephen Gardiner, who succeeded Wolsey as bishop of Winchester.

Attack on the church in parliament.

Parliament met in November 1529 and passed many acts against clerical exactions, mortuaries, probate dues and pluralities, which evoked a passionate protest from Bishop Fisher: "Now, with the Commons," he cried in the House of Lords, "is nothing but 'Down with the Church.'" During 1530 Henry's agents were busy abroad making that appeal on the divorce to the universities which Cranmer had suggested. In 1531 the clergy in convocation, terrified by the charge of *praemunire* brought against them for recognizing Wolsey's legatine authority, paid Henry a hundred and eighteen thousand pounds and recognized him as supreme head of the church so far as the law of Christ would allow. The details of this surrender were worked out by king and Commons in 1532; but Gardiner and More secured the rejection by the Lords of the bill in which they were embodied, and it was not till 1533, when More had ceased to be chancellor and Gardiner to be secretary, that a parliamentary statute annihilated the independent legislative authority of the church. An act was, however, passed in 1532 empowering the king, if he thought fit, to stop the payment of annates to Rome. Henry suspended his consent in order to induce the pope to grant Cranmer his bulls as archbishop of Canterbury where he succeeded Warham late in 1532. The stratagem was successful, and Henry cast off all disguise. The act of annates was confirmed; another prohibiting appeals to Rome and providing for the appointment of bishops without recourse to the papacy was passed; and Cranmer declared Henry's marriage with Catherine null and void and that with Anne Boleyn, which had taken place about January 25, 1533, valid. Anne was crowned in June, and on the 7th of September the future Queen Elizabeth was born. At length in 1534 Clement VII. concluded the case at Rome, pronouncing in favour of Catherine's marriage, and drawing up a bull of excommunication against Henry and his abettors. But he did not venture to publish it; public opinion in England, while hostile to the divorce, was not in favour of the clergy or the pope, and the rivalry between Charles V. and Francis I. was too bitter to permit of joint, or even isolated, action against Henry. Charles was only too anxious to avoid the duty of carrying out the pope's commands, and a year later he was once more involved in war with France. Henry was able to deal roughly with such manifestations as Elizabeth Barton's visions, and in the autumn of 1534 to obtain from parliament the Act of Supremacy which transferred to him the juridical, though not the spiritual, powers of the pope. No penalties were attached to this act, but another passed in the same session made it treason to attempt to deprive the king of any of his titles, of which supreme head of the church was one, being incorporated in the royal style by letters patent of January 1535. Fisher and More were executed on this charge; they had been imprisoned in the previous year for objecting to take the form of oath to the succession as vested in Anne Boleyn's children which the commissioners prescribed. But their lives could only be forfeit on the supposition that they sought to deprive the king of his royal supremacy. Many of the friars observant of Greenwich and monks of the Charterhouse were involved in a similar fate, but there was no general resistance, and Henry, now inspired or helped by Thomas Cromwell, was able to proceed with the next step in the Reformation, the dissolution of the monasteries.

Henry VIII. marries Anne Boleyn.

The Act of Supremacy.

Dissolution of the monasteries.

It was Cecil's opinion twenty-five years later that, but for the dissolution, the cause of the Reformation could not have succeeded. Such a reason could hardly be avowed, and justification had to be sought in the condition of the monasteries themselves. The action of Wolsey and other bishops before 1529, the report of a commission of cardinals appointed by Paul III. in 1535, the subsequent experience of other, even Catholic, countries give collateral support to the conclusions of the visitors appointed by Cromwell, although they were dictated by a desire not to deal out impartial justice, but to find reasons for a policy already adopted in principle. That they exaggerated the evils of monastic life hardly admits of doubt; but even a Henry VIII. and a Thomas Cromwell would not have dared to attack, or succeeded in destroying, the monasteries had they retained their original purity and influence. As it was their doubtful reputation and financial embarrassments enabled Henry to offer them as a gigantic bribe to the upper classes of the laity, and the Reformation parliament met for its last session early in 1536 to give effect to the reports of the visitors and to the king's and their own desires.

Execution of Queen Anne Boleyn.

But it had barely been dissolved in April when it became necessary to call another. In January the death of Catherine had rejoiced the hearts of Henry and Anne Boleyn, but Anne's happiness was short-lived. Two miscarriages and the failure to produce the requisite male heir linked her in Henry's mind and in misfortune to Catherine; unlike Catherine she was unpopular and not above suspicion. The story of her tragedy is still one of the most horrible and mysterious pages in English history. It is certain that Henry was tired and wanted to get rid of her; but if she were innocent, why were charges brought against her which were not brought against Catherine of Aragon and Anne of Cleves? and why were four other victims sacrificed when one would have been enough? The peers a year before could acquit Lord Dacre; would they have condemned the queen without some show of evidence? and unless there was suspicious evidence, her daughter was inhuman in making no effort subsequently to clear her mother's character. However that may be, Anne was not only condemned and executed, but her marriage was declared invalid and her daughter a bastard. Parliament was required to establish the succession on the new basis of Henry's new queen, Jane Seymour. It also empowered the king to leave the crown by will if he had no legitimate issue; but the illegitimate son, the duke of Richmond, in whose favour this provision is said to have been conceived, died shortly afterwards.

The Pilgrimage of Grace.

Fortunately for Henry, Queen Jane roused no domestic or foreign animosities; Charles V. and Francis I. were at war; and the pope's and Pole's attempt to profit by the Pilgrimage of Grace came too late to produce any effect except the ruin of Pole's family. The two risings of 1536 in Lincolnshire and Yorkshire were provoked partly by the dissolution of the monasteries, partly by the collection of a subsidy and fears of fresh taxation on births, marriages and burials, and partly by the protestantizing Ten Articles of 1536 and Cromwell's *Injunctions*. They were conservative demonstrations in favour of a restoration of the old order by means of a change of ministry, but not a change of dynasty. The Lincolnshire rising was over before the middle of October; the more serious revolt in Yorkshire under Aske lasted through the winter. Henry's lieutenants were compelled to temporize and make concessions. Aske was invited to come to London and hoodwinked by Henry into believing that the king was really bent on restoration and reform. But an impatient outburst of the insurgents and a foolish attempt to seize Hull and Scarborough gave Henry an excuse for repudiating the concessions made in his name. He could afford to do so because England south of the Trent remained stauncher to him than England north of it did to the Pilgrimage. Aske and other leaders were tried and executed, and summary vengeance was wreaked on the northern counties, especially on the monasteries. The one satisfactory outcome was the establishment of the Council of the North, which gave the shires between the Border and the Trent a stronger and more efficient government than they had ever had before.

The "Six Articles."

Fall of Thomas Cromwell.

Probably the Pilgrimage had some effect in moderating Henry's progress. The monasteries did not benefit and in 1538–1539 the greater were involved in the fate which had already overtaken the less. But no further advances were made towards Protestantism after the publication and authorization of the "Great" Bible in English. The Lutheran divines who came to England in 1538 with a project for a theological union were rebuffed; the parliament elected in 1539 was Catholic, and only the reforming bishops in the House of Lords offered any resistance to the Six Articles which reaffirmed the chief points in Catholic doctrine and practice. The alliance between pope, emperor and French king induced Henry to acquiesce in Cromwell's scheme for a political understanding with Cleves and the Schmalkaldic League, which might threaten Charles V.'s position in Germany and the Netherlands, but could not be of much direct advantage to England. Cromwell rashly sought to wed Henry to this policy, proposed Anne of Cleves as a bride for Henry, now once more a widower, and represented the marriage as England's sole protection against a Catholic league. Henry put his neck under the yoke, but soon discovered that there was no necessity; for Charles and Francis were already beginning to quarrel and had no thought of a joint attack on England. The discovery was fatal to Cromwell; after a severe struggle in the council he was abandoned to his enemies, attainted of treason and executed. Anne's marriage was declared null, and Henry found a fifth queen in Catherine Howard, a niece of Norfolk, a protégée of Gardiner, and a friend of the Catholic church.

Nevertheless there was no reversal of what had been done, only a check to the rate of progress. Cranmer remained archbishop and compiled an English Litany, while Catherine Howard soon ceased to be queen; charges of loose conduct, which in her case at any rate were not instigated by the king, were made against her and she was brought to the block; she was succeeded by Catherine Parr, a mild patron of the new learning. The Six Articles were only fitfully put in execution, especially in 1543 and 1546: all the plots against Cranmer failed; and before he died Henry was even considering the advisability of further steps in the religious reformation, apart from mere spoliation like the confiscation of the chantry lands.

Policy in Ireland and Scotland.

But Scotland, Ireland and foreign affairs concerned him most. Something substantial was achieved in Ireland; the papal sovereignty was abolished and Henry received from the Irish parliament the title of king instead of lord of Ireland. The process was begun of converting Irish chieftains into English peers which eventually divorced the Irish people from their natural leaders; and principles of English law and government were spread beyond the Pale. In Scotland Henry was less fortunate. He failed to win over James V. to his anti-papal policy; revived the feudal claim to suzerainty, won the battle of Solway Moss (1542), and then after James's death bribed and threatened the Scots estates into concluding a treaty of marriage between their infant queen and Henry's son. The church in Scotland led by Beaton, and the French party led by James V.'s widow, Mary of Guise, soon reversed this decision, and Hertford's heavy hand was (1544) laid on Edinburgh in revenge. France was at the root of the evil, and Henry was thus induced once more to join Charles V. in war (1543). The joint invasion of 1544 led to the capture of Boulogne, but the emperor made peace in order to deal with the Lutherans and left Henry at war with France. The French attempted to retaliate in 1545, and burnt some villages in the Isle of Wight and on the coast of Sussex. But their expedition was a failure, and peace was made in 1546, by which Henry undertook to restore Boulogne in eight years' time on payment of eight hundred thousand crowns. Scotland was not included in the pacification, and when Henry died (January 28, 1547) he was busy preparing to renew his attempt on Scotland's independence.

Edward VI.

Progress of the Reformation.

He left a council of sixteen to rule during his son's minority. The balance of parties which had existed since Cromwell's fall had been destroyed in the last months of the reign by the attainder of Norfolk and his son Surrey, and the exclusion of Gardiner and Thirlby from the council of regency. Men of the new learning prevailed, and Hertford (later duke of Somerset), as uncle to Edward VI., was made protector of the realm and governor of the king's person. He soon succeeded in removing the trammels imposed upon his authority, and made himself king in everything but name. He used his arbitrary power to modify the despotic system of the Tudors; all treason laws since Edward III., all heresy laws, all restrictions upon the publication of the Scriptures were removed in the first parliament of the reign, and various securities for liberty were enacted. The administration of the sacrament of the altar in both elements was permitted, the Catholic interpretation of the mass was rendered optional, images were removed, and English was introduced into nearly the whole of the church service. In the following session (1548–1549) the first Act of Uniformity authorized the first Book of Common Prayer. It met with strenuous resistance in Devon and in Cornwall, where rebellions added to the thickening troubles of the protector.

Administration of the protector Somerset.

His administration was singularly unsuccessful. In 1547 he won the great but barren victory of Pinkie Cleugh over the Scots, and attempted to push on the marriage and union by a mixture of conciliation and coercion. He made genuine and considerable concessions to Scottish feeling, guaranteeing autonomy and freedom of trade, and suggesting that the two realms should adopt the indifferent style of the empire of Great Britain. But he also seized Haddington in 1548, held by force the greater part of the Lowlands, and, when Mary was transported to France, revived the old feudal claims which he had dropped in 1547. France was, as ever, the backbone of the Scots resistance; men and money poured into Edinburgh to assist Mary of Guise and the French faction. The protector's offer to restore Boulogne could not purchase French acquiescence in the union of England and Scotland; and the bickerings on the borders in France and open fighting in Scotland led the French to declare war on England in August 1549. They were encouraged by dissensions in England. Somerset's own brother, Thomas Seymour, jealous of the protector, intrigued against the government; he sought to secure the hand of Elizabeth, the favour of Edward VI. and the support of the Suffolk line, secretly married Catherine Parr, and abused his office as lord high admiral to make friends with pirates and other enemies of order. Foes of the family, such as Warwick and Southampton, saw in his factious conduct the means of ruining both the brothers. Seymour was brought to the block, and the weak consent of the protector seriously damaged him in the public eye. His notorious sympathy with the peasantry further alienated the official classes and landed gentry, and his campaign against enclosures brought him into conflict with the strongest forces of the time. The remedial measures which he favoured failed; and the rising of Ket in Norfolk and others less important in nearly all the counties of England, made Somerset's position impossible. Bedford and Herbert suppressed the rebellion in the west, Warwick that in Norfolk (July–August 1549). They then combined with the majority of the council and the discontented Catholics to remove the protector from office and imprison him in the Tower (October).

Administration of the duke of Northumberland.

The Catholics hoped for reaction, the restoration of the mass, and the release of Gardiner and Bonner, who had been imprisoned for resistance to the protector's ecclesiastical policy. But Warwick meant to rely on the Protestant extremists; by January 1550 the Catholics had been expelled from the council, and the pace of the Reformation increased instead of diminishing. Peace was made with France by the surrender of Boulogne and abandonment of the policy of union with Scotland (March 1550); and the approach of war between France and the emperor, coupled with the rising of the princes in Germany, relieved Warwick from foreign apprehensions and gave him a free hand at home. Gardiner, Bonner, Heath, Day and Tunstall were one by one deprived of their sees; a new ordinal simplified the ritual of ordination, and a second Act of Uniformity and Book of Common Prayer (1552) repudiated the Catholic interpretation which had been placed on the first and imposed a stricter conformity to the Protestant faith. All impediments to clerical marriage were removed, altars and organs were taken down, old service books destroyed and painted windows broken; it was even proposed to explain away the kneeling at the sacrament. The liberal measures of the protector were repealed, and new treasons were enacted; Somerset himself, who had been released and restored to the council in 1550, became an obstacle in Warwick's path, and was removed by means of a bogus plot, being executed in January 1552; while Warwick had himself made duke of Northumberland, his friend Dorset duke of Suffolk, and Herbert earl of Pembroke.

Establishment of Protestantism.

But his ambition and violence made him deeply unpopular, and the failing health of Edward VI. opened up a serious prospect for Northumberland. He was only safe so long as he controlled the government, and prevented the administration of justice, and the knowledge that not only power but life was at stake drove him into a desperate plot for the retention of both. He could trade upon Edward's precocious hatred of Mary's religion, he could rely upon French fears of her Spanish inclinations, and the success which had attended his schemes in England deluded him into a belief that he could supplant the Tudor with a Dudley dynasty. His son Guilford Dudley was hastily married to Lady Jane Grey, the eldest granddaughter of Henry VIII.'s younger sister Mary. Henry's two daughters, Mary and Elizabeth, the descendants of his elder sister Margaret, and Lady Jane's mother, the duchess of Suffolk, were all to be passed over, and the succession was to be vested in Lady Jane and her heirs male. Edward was persuaded that he could devise the crown by will, the council and the judges were browbeaten into acquiescence, and three days after Edward's death (July 6, 1553), Lady Jane Grey was proclaimed queen in London. Northumberland had miscalculated the temper of the nation, and failed to kidnap Mary. She gathered her forces in Norfolk and Suffolk, Northumberland rode out from London to oppose her, but defection dogged his steps, and even in London Mary was proclaimed queen behind his back by his fellow-conspirators. Mary entered London amid unparalleled popular rejoicings, and Northumberland was sent to a well-deserved death on the scaffold.

Queen Mary. Restoration of the old religion.

Mary was determined from the first to restore papalism as well as Catholicism, but she had to go slowly. The papacy had few friends in England, and even Charles V., on whom Mary chiefly relied for guidance, was not eager to see the papal jurisdiction restored. He wanted England to be first firmly tied to the Habsburg interests by Mary's marriage with Philip. Nor was it generally anticipated that Mary would do more than restore religion as it had been left by her father. She did not attempt anything further in 1553 than the repeal of Edward VI.'s legislation and the accomplishment of the Spanish marriage. The latter project provoked fierce resistance; various risings were planned for the opening months of 1554, and Wyat's nearly proved successful. Only his arrogance and procrastination and Mary's own courage saved her throne. But the failure of this protest enabled Mary to carry through the Spanish marriage, which was consummated in July; and in the ensuing parliament (Oct.-Jan. 1554-1555) all anti-papal legislation was repealed; Pole was received as legate; the realm was reconciled to Rome; and, although the holders of abbey lands were carefully protected against attempts at restitution, the church was empowered to work its will with regard to heresy. The Lollard statutes were revived, and between February 1555 and November 1558 some three hundred Protestants were burnt at the stake. They began with John Rogers and Rowland Taylor, and Bishops Ferrar of St Davids and Hooper of Gloucester. Ridley and Latimer were not burnt until October 1555, and Cranmer not till March 1556. London, Essex, Hertfordshire, East Anglia, Kent and Sussex provided nearly all the victims; only one was burnt north of the Trent, and only one south-west of Wiltshire. But in the Protestant districts neither age nor sex was spared; even the dead were dug up and burnt. The result was to turn the hearts of Mary's people from herself, her church and her creed. Other causes helped to convert their enthusiastic loyalty into bitter hatred. The Spanish marriage was a failure from every point of view. In spite of Mary's repeated delusions, she bore no child, and both parliament and people resisted every attempt to deprive Elizabeth of her right to the succession. Philip did all he could to conciliate English affections, but they would not have Spanish control at any price. They knew that his blandishments were dictated by ulterior designs, and that the absorption of England in the Habsburg empire was his ultimate aim. As it was, the Spanish connexion checked England's aspirations; her adventurers were warned off the Spanish Main, and even trade with the colonies of Philip's ally Portugal was prohibited. They had to content themselves with the Arctic Ocean and Muscovy; and they soon found themselves at war in Philip's interests. Philip himself refused to declare war on Scotland on England's behalf, but he induced Mary to declare war on France on his own (1557). The glory of the war fell to the Spaniards at St Quentin (1557) and Gravelines (1558), but the shame to England by the loss of Calais (Jan. 1558). Ten months later Mary died (Nov. 17), deserted by her husband and broken-hearted at the loss of Calais and her failure to win English hearts back to Rome.

Unpopularity of the Spanish marriage. Philip II.

Accession of Elizabeth. English national struggle with Spain.

The Spanish and Venetian ambassadors in London were shocked at what they regarded as the indecent rejoicings over Elizabeth's accession. The nation, indeed, breathed a new life. Papal control of its ecclesiastical, and Spanish control of its foreign policy ceased, and it had a queen who gloried in being "mere English." There was really no possible rival sovereign, and no possible alternative policy. The English were tugging at the chain and Elizabeth had to follow; her efforts throughout were aimed at checking the pace at which her people wanted to go. She could not have married Philip had she wished to, and she could not have kept her sea-dogs off the Spanish Main. They were willing to take all the risks and relieve her of all responsibility; they filled her coffers with Spanish gold which they plundered as pirates, knowing that they might be hanged if caught; and they fought Elizabeth's enemies in France and in the Netherlands as irregulars, taking their chance of being shot if taken prisoners. While Elizabeth nursed prosperity in peace, her subjects sapped the strength of England's rivals by attacks which were none the less damaging because they escaped the name of war.

It required all Elizabeth's finesse to run with the hare and hunt with the hounds; but she was, as Henry III. of France said, *la plus fine femme du monde*, and she was ably seconded by Cecil who had already proved himself an adept in the art of taking cover. Nevertheless, English policy in their hands was essentially aggressive. It could not be otherwise if England was to emerge from the slough in which Mary had left it. The first step was to assert the principle of England for the English; the queen would have no foreign husband, though she found suitors useful as well as attractive. Spanish counsels were applauded and neglected, and the Spaniards soon departed. Elizabeth was glad of Philip's support at the negotiations for peace at Cateau Cambrésis (1559), but she took care to assert the independence of her diplomacy and of England's interests. At home the church was made once more English. All foreign jurisdiction was repudiated, and under the style "supreme governor" Elizabeth reclaimed nearly all the power which Henry VIII. had exercised as "supreme head." The Act of Uniformity (1559) restored with a few modifications the second prayer-book of

Triumph of the new religion. The Act of Uniformity.

Edward VI. The bishops almost unanimously refused to conform, and a clean sweep was made of the episcopal bench. An eminently safe and scholarly archbishop was found in Matthew Parker, who had not made himself notorious by resistance to authority even under Mary. The lower clergy were more amenable; the two hundred who alone are said to have been ejected should perhaps be multiplied by five; but even so they were not one in seven, and these seven were clergy who had been promoted in Mary's reign, or who had stood the celibate and other tests of 1553–1554. Into the balance must be thrown the hundreds, if not thousands, of zealots who had fled abroad and returned in 1558–1559. The net result was that a few years later the lower house of convocation only rejected by one vote a very puritanical petition against vestments and other "popish dregs."

Elizabeth and Scotland.

The next step was to expand the principle of England for the English into that of Britain for the British, and Knox's reformation in 1559–1560 provided an opportunity for its application. By timely and daring intervention in Scotland Elizabeth procured the expulsion of the French bag and baggage from North Britain, and that French avenue to England was closed for ever. The logic of this plan was not applied to Ireland; there it was to be Ireland for the English for many a generation yet to come; and so Ireland remained Achilles' heel, the vulnerable part of the United Kingdom. The Protestant religion was forced upon the Irish in a foreign tongue and garb and at the point of foreign pikes; and national sentiment supported the ancient faith and the ancient habits in resistance to the Saxon innovations. In other directions the expansion of England, the third stage in the development of Elizabeth's policy, was more successful. The attractions of the Spanish Main converted the seafaring folk of south-west England into hardy Protestants, who could on conscientious as well as other grounds contest a papal allocation of new worlds to Spain and Portugal. Their monopoly was broken up by Hawkins, Drake, Frobisher, Raleigh, and scores of others who recognized no peace beyond the line; and although, as far as actual colonies went, the results of Elizabeth's reign were singularly meagre, the idea had taken root and the ground had been prepared. In every direction English influence penetrated, and Englishmen before 1603 might be found in every quarter of the globe, following Drake's lead into the Pacific, painfully breaking the ice in search of a north-east or a north-west passage, hunting for slaves in the wilds of Africa, journeying in caravans across the steppes of Russia into central Asia, bargaining with the Turks on the shores of the Golden Horn, or with the Greeks in the Levant, laying the foundations of the East India Company, or of the colonies of Virginia and Newfoundland.

Struggle against the Spanish dominion at sea.

Mary, queen of Scots.

This expansion was mainly at the expense of Spain; but at first Spain was regarded as Elizabeth's friend, not France. France had a rival candidate for Elizabeth's throne in Mary Stuart, the wife of the dauphin who soon (1559) became king as Francis II.; and Spanish favour was sought to neutralize this threat. Fortunately for Elizabeth, Francis died in 1560, and the French government passed into the hands of Catherine de' Medici, who had no cause to love her daughter-in-law and the Guises. France, too, was soon paralysed by the wars of religion which Elizabeth judiciously fomented with anything but religious motives. Mary Stuart returned to Scotland with nothing but her brains and her charms on which to rely in her struggle with her people and her rival. She was well equipped in both respects, but human passions spoilt her chance; her heart turned her head. Elizabeth's head was stronger and she had no heart at all. When Mary married Darnley she had the ball at her feet; the pair had the best claims to the English succession and enjoyed the united affections of the Catholics. But they soon ceased to love one another, and could not control their jealousies. There followed rapidly the murders of Rizzio and Darnley, the Bothwell marriage, Mary's defeat, captivity, and flight into England (1568). It was a difficult problem for Elizabeth to solve; to let Mary go to France was presenting a good deal more than a pawn to her enemies; to restore her by force to her Scottish throne might have been heroic, but it certainly was not politics; to hand her over to her Scottish foes was too mean even for Elizabeth; and to keep her in England was to nurse a spark in a powder-magazine. Mary was detained in the hope that the spark might be carefully isolated.

Rebellion of 1569 and excommunication of Elizabeth.

But there was too much inflammable material about. The duke of Norfolk was a Protestant, but his convictions were weaker than his ambition, and he fell a victim to Mary's unseen charms. The Catholic north of England was to rise under the earls of Westmorland and Northumberland, who objected to Elizabeth's seizure of their mines and jurisdictions as well as to her proscription of their faith; and the pope was to assist with a bull of deposition. Norfolk, however, played the coward; the bull came nearly a year too late, and the rebellion of the earls (1569) was easily crushed. But the conspiracies did not end, and Spain began to take a hand. Elizabeth, partly in revenge for the treatment of Hawkins and Drake at San Juan de Ulloa, seized some Spanish treasure on its way to the Netherlands (Dec. 1569). Alva's operations were fatally handicapped by this disaster, but Philip was too much involved in the Netherlands to declare war on England. But his friendship for Elizabeth had received a shock, and henceforth his finger may be traced in most of the plots against her, of which the Ridolfi conspiracy was the first. It cost Norfolk his head and Mary more of her scanty liberty. Elizabeth also began to look to France, and in 1572, by the treaty of Blois, France instead of Spain became England's ally, while Philip constituted himself as Mary's patron. The massacre of St Bartholomew placed a severe strain upon the new alliance, but was not fatal to it. A series of prolonged but hollow marriage negotiations between Elizabeth and first Anjou (afterwards Henry III.) and then Alençon (afterwards duke of Anjou) served to keep up appearances. But the friendship was never warm; Elizabeth's relations with the Huguenots on the one hand and her fear of French designs on the Netherlands on the other prevented much cordiality. But the alliance stood in the way of a Franco-Spanish agreement, limited Elizabeth's sympathy with the French Protestants, and enabled her to give more countenance than she otherwise might have done to the Dutch.

Plots against Elizabeth.

Relations with France and Spain.

The Jesuit missions.

Gradually Philip grew more hostile under provocation; slowly he came to the conclusion that he could never subdue the Dutch or check English attacks on the Spanish Main without a conquest of England. Simultaneously the counter-Reformation began its attacks; the "Jesuit invasion" took place in 1580, and Campion went to the block. A papal and Spanish attempt upon Ireland in the same year was foiled at Smerwick. But more important was Philip's acquisition of the throne of Portugal with its harbours, its colonies and its marine. This for the first time gave him a real command of the sea, and at least doubled the chances of a successful attack upon England. But Philip's mind moved slowly and only on provocation. It took a year or two to satisfy him that Portugal was really his; not until 1583 was the fleet of the pretender Don Antonio destroyed in the Azores. The victor, Santa Cruz, then suggested an armada against England, but the English Catholics could not be brought into line with a Spanish invasion. The various attempts to square James VI. of Scotland had not been successful, and events in the Netherlands and in France disturbed Philip's calculations. But his purpose was now probably fixed. After the murder of William the Silent (1584) Elizabeth sided more openly with the Dutch; the Spanish ambassador Mendoza was expelled from England for his intrigues with Elizabeth's enemies (1586); and on the discovery of Babington's plot Elizabeth yielded to the demand of her parliament and her ministers for Mary's execution (1587); her death removed the only possible centre for a Catholic rebellion in case of a Spanish attack. It also removed Philip's last doubts;

Execution of Mary, queen of Scots, 1587.

The Great Armada, 1588.

Mary had left him her claims to the English throne, and he might, now that she was out of his path, hope to treat England like Portugal. Drake's "singeing of Philip's beard" in Cadiz harbour in 1587 delayed the expedition for a year, and a storm again postponed it in the early summer of 1588. At length the armada sailed in July under the incompetent duke of Medina Sidonia; its object was to secure command of the narrow seas and facilitate the transport of Parma's army from the Netherlands to England. But Philip after his twenty years' experience in the Netherlands can hardly have hoped to conquer a bigger and richer country with scantier means and forces. He relied in fact upon a domestic explosion, and the armada was only to be the torch. This miscalculation made it a hopeless enterprise from the first. Scarcely an English Catholic would have raised a finger in Philip's favour; and when he could not subdue the two provinces of Holland and Zeeland, it is absurd to suppose that he could have simultaneously subdued them and England as well. English armies were not perhaps very efficient, but they were as good as the material with which William of Orange began his task. Philip, however, was never given the opportunity. His armada was severely handled in a week's fighting on its way up the Channel, and was driven off the English ports into the German Ocean; there a south-west gale drove it far from its rendezvous, and completed the havoc which the English ships had begun. A miserable remnant alone escaped destruction in its perilous flight round the north and west of Scotland.

The defeat of the armada was the beginning and not the end of the war; and there were moments between 1588 and 1603 when England was more seriously alarmed than in 1588. The Spaniards seized Calais in 1596; at another time they threatened England from Brest, and the "invisible" armada of 1599 created a greater panic than the "invincible" armada of 1588. It was not till the very end of the reign that what was in some ways the most dangerous of Spanish aggressions was foiled at Kinsale. Nor were the English counter-attacks very happy; the attempt on Portugal in 1589 under Drake and Norris proved a complete failure. The raid on Cadiz under Essex and Raleigh in 1596 was attended with better results, but the "Islands" voyage to the Azores in 1597 was a very partial success. Still it was now a war upon more or less equal terms, and there was little more likelihood that it would end with England's than with Spain's loss of national independence. The subjection of the Netherlands was now almost out of the question, and although Elizabeth's help had not enabled the Protestant cause to win in France, Henry IV. built up a national monarchy which would be quite as effectual a bar to the ambitions of Spain.

Last years of Elizabeth.

Elizabeth had in fact safely piloted England through the struggle to assert its national independence in religion and politics and its claim to a share in the new inheritance which had been opened up for the nations of Europe; and the passionate loyalty which had supported her as the embodiment of England's aspirations somewhat cooled in her declining years. She herself grew more cautious and conservative than ever, and was regarded as an obstacle by the hotheads in war and religion. She sided with the "scribes," Burghley and Sir Robert Cecil, against the men of war, Essex and Raleigh; and she abetted Whitgift's rigorous persecution of the Puritans whose discontent with her *via media* was rancorously expressed in the Martin Marprelate tracts. Essex's folly and failure to crush Hugh O'Neill's rebellion (1599), the most serious effort made in the reign to throw off the English yoke in Ireland, involved him in treason and brought him to the block. Parliament was beginning to quarrel with the royal prerogative, particularly when expressed in the grant of monopolies, and even Mountjoy's success in Ireland (1602-1603) failed to revive popular enthusiasm for the dying queen. Strange as it may seem, the accession of James I. was hailed as heralding a new and gladder age by Shakespeare, and minor writers (March 24, 1603). (A. F. P.)

VIII. THE STUART MONARCHY, THE GREAT REBELLION AND THE RESTORATION (1603-1689)

James I. 1603-1625.

The defeat of the Spanish armada in 1588 had been the final victory gained on behalf of the independence of the English church and state. The fifteen years which followed had been years of successful war; but they had been also years during which the nation had been preparing itself to conform its institutions to the new circumstances in which it found itself in consequence of the great victory. When James arrived from Scotland to occupy the throne of Elizabeth he found a general desire for change. Especially there was a feeling that there might be some relaxation in the ecclesiastical arrangements. Roman Catholics and Puritans alike wished for a modification of the laws which bore hardly on them. James at first relaxed the penalties under which the Roman Catholics suffered, then he grew frightened by the increase of their numbers and reimposed the penalties. The gunpowder plot (1605) was the result, followed by a sharper persecution than ever (see GUNPOWDER PLOT).

The Puritans were invited to a conference with the king at Hampton Court (1604). They no longer asked, as many of them had asked in the beginning of Elizabeth's reign, to substitute the presbyterian discipline for the episcopal government. All they demanded was to be allowed permission, whilst remaining as ministers in the church, to omit the usage of certain ceremonies to which they objected. It was the opinion of Bacon that it would be wise to grant their request. James thought otherwise, and attempted to carry out the Elizabethan conformity more strictly than it had been carried out in his predecessor's reign.

James I. and the Commons.

In 1604 the Commons agreed with Bacon. They declared that they were no Puritans themselves, but that, with such a dearth of able ministers, it was not well to lose the services of any one who was capable of preaching the gospel. By his refusal to entertain their views James placed himself in opposition to the Commons in a matter which touched their deeper feelings. As a necessary consequence every dispute on questions of smaller weight assumed an exaggerated importance. The king had received a scanty revenue with his crown, and he spent freely what little he had. As the Commons offered grudging supplies, the necessity under which he was of filling up the annual deficit led him to an action by which a grave constitutional question was raised.

From the time of Richard II. to the reign of Mary no attempt had been made to raise duties on exports and imports without consent of parliament. But Mary had, under a specious pretext, recommenced to a slight extent the evil practice, and Elizabeth had gone a little further in the same direction. In 1606 a merchant named John Bates (*q.v.*) resisted the payment of an imposition—as duties levied by the sole authority of the crown were then called. The case was argued in the court of exchequer, and was there decided in favour of the crown. Shortly afterwards new impositions were set to the amount of £70,000 a year. When parliament met in 1610 the whole subject was discussed, and it was conclusively shown that, if the barons of the exchequer had been right in any sense, it was only in that narrow technical sense which is of no value at all. A compromise attempted broke down, and the difficulty was left to plague the next generation. The king was always able to assert that the judges were on his side, and it was as yet an acknowledged principle of the constitution that parliament could not change the law without the express consent of the crown, even if, which was not the case in this matter, the Lords had sided with the Commons. James's attempt to obtain further supplies from the Commons by opening a bargain for the surrender of some of his old feudal prerogatives, such as wardship and marriage, which had no longer any real meaning except as a means of obtaining money in an oppressive way, broke down, and early in 1611 he dissolved his first parliament in anger. A second parliament, summoned in 1614, met with the same fate after a session of a few weeks.

The dissolution of this second parliament was followed by a short imprisonment of some of the more active members, and by a demand made through England for a benevolence to make up the deficiency which parliament had neglected to meet. The court represented that, as no compulsion was used, there was nothing illegal in this proceeding. But as the names of those who refused to pay were taken down, it cannot be said that there was no indirect pressure.

Attempted union with Scotland.

The colonisation of Ulster.

The most important result of the breach with the parliament of 1614, however, was the resolution taken by James to seek refuge from his financial and other troubles in a close alliance with the king of Spain. His own accession had done much to improve the position of England in its relation with the continental powers. Scotland was no longer available as a possible enemy to England, and though an attempt to bind the union between the two nations by freedom of commercial intercourse had been wrecked upon the jealousy of the English Commons (1607), a legal decision had granted the status of national subjects to all persons born in Scotland after the king's accession in England. Ireland, too, had been thoroughly overpowered at the end of Elizabeth's reign, and the flight of the earls of Tyrone and Tyrconnel in 1607 had been followed by the settlement of English and Scottish colonists in Ulster, a measure which, in the way in which it was undertaken, sowed the seeds of future evils, but undoubtedly conduced to increase the immediate strength of the English government in Ireland.

The Spanish alliance.

Without fear of danger at home, therefore, James, who as king of Scotland had taken no part in Elizabeth's quarrel with Philip II., not only suspended hostilities immediately on his accession, and signed a peace in the following year, but looked favourably on the project of a Spanish marriage alliance, so that the chief Protestant and the chief Catholic powers might join together to impose peace on Europe, in the place of those hideous religious wars by which the last century had been disfigured. In 1611 circumstances had disgusted him with his new ally, but in 1614 he courted him again, not only on grounds of general policy, but because he hoped that the large portion which would accompany the hand of an infanta would go far to fill the empty treasury.

In this way the Spanish alliance, unpopular in itself, was formed to liberate the king from the shackles imposed on him by the English constitution. Its unpopularity, great from the beginning, became greater when Raleigh's execution (1618) caused the government to appear before the world as truckling to Spain. The obloquy under which James laboured increased when the Thirty Years' War broke out (1618), and when his daughter Elizabeth, whose husband, the elector palatine, was the unhappy claimant to the Bohemian crown (1619), stood forth as the lovely symbol of the deserted Protestantism of Europe. Yet it was not entirely in pity for German Protestants that the heart of Englishmen beat. Men felt that their own security was at stake. The prospect of a Spanish infanta as the bride of the future king of England filled them with suspicious terrors. In Elizabeth's time the danger, if not entirely external, did not come from the government itself. Now the favour shown to the Roman Catholics by the king opened up a source of mischief which was to some extent real, if it was to a still greater extent imaginary. Whether the danger were real or imaginary, the consequence of the distrust resulting from the suspicion was the reawakening of the slumbering demand for fresh persecution of the Roman Catholics, a demand which made a complete reconciliation between the crown and the Lower House a matter of the greatest difficulty.

Parliament and the monopolies.

In 1621 the third parliament of James was summoned to provide money for the war in defence of his son-in-law's inheritance, the Palatinate, which he now proposed to undertake. But it soon appeared that he was not prepared immediately to come to blows, and the Commons, voting a small sum as a token of their loyalty, passed to other matters. Indolent in his temper, James had been in the habit of leaving his patronage in the hands of a confidential favourite, and that position was now filled by George Villiers, marquess and afterwards duke of Buckingham. The natural consequence was that men who paid court to him were promoted, and those who kept at a distance from him had no notice taken of their merits. Further, a system of granting monopolies and other privileges had again sprung up. Many of these grants embodied some scheme which was intended to serve the interests of the public, and many actions which appear startling to us were covered by the extreme protectionist theories then in vogue. But abuses of every kind had clustered round them, and in many cases the profits had gone into the pockets of hangers-on of the court, whilst officials had given their assistance to the grantors even beyond their legal powers. James was driven by the outcry raised to abandon these monopolies, and an act of Parliament in 1624 placed the future grant of protections to new inventions under the safeguard of the judges.

Fall of Bacon.

The attack on the monopolies was followed by charges brought by the Commons before the Lords against persons implicated in carrying them into execution; and subsequently against Lord Chancellor Bacon as guilty of corruption. The sentence passed by the Lords vindicated the right of parliament to punish officials who had enjoyed the favour of the crown, which had fallen into disuse since the accession of the house of York. There was no open contest between parliament and king in this matter. But the initiative of demanding justice had passed from the crown to the Commons. It is impossible to overestimate the effect of these proceedings on the position of parliament. The crown could never again be regarded as the sum of the governmental system.

When the Commons met after the summer adjournment a new constitutional question was raised. The king was at last determined to find troops for the defence of the Palatinate, and asked the Commons for money to pay them. They in turn petitioned the crown to abandon the Spanish alliance, which they regarded as the source of all the mischief. James told them that they had no right to discuss business on which he had not asked their opinion. They declared that they were privileged to discuss any matter relating to the commonwealth which they chose to take in hand, and embodied their opinion in a protest, which they entered on their journals. The king tore the protest out of the book and dissolved parliament.

Then followed a fresh call for a benevolence, this time more sparingly answered than before. A year of fruitless diplomacy failed to save the Palatinate from total loss. The ill-considered journey to Madrid, in which Prince Charles, accompanied by Buckingham, hoped to wring from the Spanish statesmen a promise to restore the Palatinate in compliment for his marriage with the infanta, ended also in total failure. In the autumn of 1623 Charles returned to England without a wife, and without hope of regaining the Palatinate with Spanish aid.

The French alliance.

He came back resolved to take vengeance upon Spain. The parliament elected in 1624 was ready to second him. It voted some supplies on the understanding that, when the king had matured his plans for carrying on the war, it should come together in the autumn to vote the necessary subsidies. It never met again. Charles had promised that, if he married a Roman Catholic, he would grant no toleration to the English Catholics in consideration of the marriage. In the autumn he had engaged himself to marry Henrietta Maria, the sister of the king of France, and had bound himself to grant the very conditions which he had declared to the Commons that he never would concede. Hence it was that he did not venture to recommend his father to summon parliament till the marriage was over. But though there was but little money to dispose of, he and Buckingham, who, now that James was sick and infirm, were the real leaders of the government, could not endure to abstain from the prosecution of the war. Early in 1625 an expedition, under Count Mansfeld, was sent to Holland that it might ultimately cut its way to the Palatinate. Left without pay and without supplies, the men perished by thousands, and when James died in March the new king had to meet his first parliament burthened by a broken promise and a disastrous failure.

Charles I. 1625-1649.

When parliament met (1625) the Commons at first contented themselves with voting a sum of money far too small to carry on the extensive military and naval operations in which Charles had embarked. When the king explained his necessities, they intimated that they had no confidence in Buckingham, and asked that, before they granted further supply, the king would name counsellors whom they could trust to advise him on its employment. Charles at once dissolved parliament. He knew that the demand for ministerial responsibility would in the end involve his own responsibility, and, believing as he did that Buckingham's arrangements had been merely unlucky, he declined to sacrifice the minister whom he trusted.

The Petition of Right.

Charles and Buckingham did their best to win back popularity by strenuous exertion. They attempted to found a great Protestant alliance on the continent, and they sent a great expedition to Cadiz. The Protestant alliance and the expedition to Cadiz ended in equal failure. The second parliament of the reign (1626) impeached Buckingham for crimes against the state. As Charles would not dismiss him simply because the Commons were dissatisfied with him as a minister, they fell back on charging him with criminal designs. Once more Charles dissolved parliament to save Buckingham. Then came fresh enterprises and fresh failures. A fleet under Lord Willoughby (afterwards earl of Lindsey) was almost ruined by a storm. The king of Denmark, trusting to supplies from England which never came, was defeated at Lutter. A new war in addition to the Spanish war, broke out with France. A great expedition to Ré, under Buckingham's command (1627), intended to succour the Huguenots of La Rochelle against their sovereign, ended in disaster. In order to enable himself to meet expenditure on so vast a scale, Charles had levied a forced loan from his subjects. Men of high rank in society who refused to pay were imprisoned. Soldiers were billeted by force in private houses, and military officers executed martial law on civilians. When the imprisoned gentlemen appealed to the king's bench for a writ of *habeas corpus*, it appeared that no cause of committal had been assigned, and the judges therefore refused to liberate them. Still Charles believed it possible to carry on the war, and especially to send relief to La Rochelle, now strictly blockaded by the forces of the French crown. In order to find the means for this object he summoned his third parliament (1628). The Commons at once proceeded to draw a line which should cut off the possibility of a repetition of the injuries of which they complained. Charles was willing to surrender his claims to billet soldiers by force, to order the execution of martial law in time of peace, and to exact forced loans, benevolences, or any kind of taxation, without consent of parliament; but he protested against the demand that he should surrender the right to imprison without showing cause. It was argued on his behalf that in case of a great conspiracy it would be necessary to trust the crown with unusual powers to enable it to preserve the peace. The Commons, who knew that the crown had used the powers which it claimed, not against conspirators, but against the commonwealth itself, refused to listen to the argument, and insisted on the acceptance of the whole Petition of Right, in which they demanded redress for all their grievances. The king at last gave his consent to it, as he could obtain money in no other way. In after times, when any real danger occurred which needed a suspension of the ordinary safeguards of liberty, a remedy was found in the suspension of the law by act of parliament; such a remedy, however, only became possible when king and parliament were on good terms of agreement with one another.

Crown and parliament.

That time was as yet far distant. The House of Commons brought fresh charges against Buckingham, whose murder soon after the prorogation removed one subject of dispute. But when they met again (1629) they had two quarrels left over from the preceding session. About a third part of the king's revenue was derived from customs duties which had for many generations been granted by parliament to each sovereign for life. Charles held that this grant was little more than a matter of form, whilst the Commons held that it was a matter of right. But for the other dispute the difficulty would probably have been got over. The strong Protestantism of Elizabeth's reign had assumed a distinctly Calvinistic form, and the country gentlemen who formed the majority of the House of Commons were resolutely determined that no other theology than that of Calvin should be taught in England. In the last few years a reaction against it had arisen especially in the universities, and those who adopted an unpopular creed, and who at the same time showed tendencies to a more ceremonial form of worship, naturally fell back on the support of the crown. Charles, who might reasonably have exerted himself to secure a fair liberty for all opinions, promoted these unpopular divines to bishoprics and livings, and the divines in turn exalted the royal prerogative above parliamentary rights. He now proposed that both sides should keep silence on the points in dispute. The Commons rejected his scheme, and prepared to call in question the most obnoxious of the clergy. In this irritated temper they took up the question of tonnage and poundage, and instead of confining themselves to the great public question, they called to the bar some custom-house officers who happened to have seized the goods of one of their members. Charles declared that the seizure had taken place by his orders. When they refused to accept the excuse, he dissolved parliament, but not before a tumult took place in the House, and the speaker was forcibly held down in his chair whilst resolutions hostile to the government were put to the vote.

For eleven years no parliament met again. The extreme action of the Lower House was not supported by the people, and the king had the opportunity, if he chose to use it, of putting himself right with the nation after no long delay. But he never understood that power only attends sympathetic leadership. He contented himself with putting himself technically in the right, and with resting his case on the favourable decisions of the judges. Under any circumstances, neither the training nor the position of judges is such as to make them fit to be the final arbiters of political disputes. They are accustomed to declare what the law is, not what it ought to be. These judges, moreover, were not in the position to be impartial. They had been selected by the king, and were liable to be deprived of their office when he saw fit. In the course of Charles's reign two chief justices and one chief baron were dismissed or suspended. Besides the ordinary judges there were the extraordinary tribunals, the court of high commission nominated by the crown to punish ecclesiastical offenders, and the court of star chamber, composed of the privy councillors and the chief justices, and therefore also nominated by the crown, to inflict fine, imprisonment, and even corporal mutilation on lay offenders. Those who rose up in any way against the established order were sharply punished.

Ship-money.

The harsh treatment of individuals only calls forth resistance when constitutional morality has sunk deeply into the popular mind. The ignoring of the feelings and prejudices of large classes has a deeper effect. Charles's foreign policy, and his pretentious claim to the sovereignty of the British seas, demanded the support of a fleet, which might indeed be turned to good purpose in offering a counterpoise to the growing navies of France and Holland. The increasing estrangement between him and the nation made him averse from the natural remedy of a parliament, and he reverted to the absolute practices of the middle ages, in order that he might strain them far beyond the warrant of precedent to levy a tax under the name of ship-money, first on the port towns and then on the whole of England. Payment was resisted by John Hampden, a Buckinghamshire squire; but the judges declared that the king was in the right (1638). Yet the arguments used by Hampden's lawyers sunk deeply into the popular mind, and almost every man in England who was called on to pay the tax looked upon the king as a wrong-doer under the forms of law.

In his ecclesiastical policy Charles was equally out of touch with the feelings of his people. He shared to the full his father's dislike and distrust of the Puritans, and he supported with the

The Church.

whole weight of the crown the attempt of William Laud (*q.v.*), since 1633 archbishop of Canterbury, to enforce conformity to the ritual prescribed by the Prayer Book. At the same time offence was given to the Puritans by an order that every clergyman should read the Declaration of Sports, in which the king directed that no one should be prevented from dancing or shooting at the butts on Sunday afternoon. Many of the clergy were suspended or deprived, many emigrated to Holland or New England, and of those who remained a large part bore the yoke with feelings of ill-concealed dissatisfaction. Suspicion was easily aroused that a deep plot existed, of which Laud was believed to be the centre, for carrying the nation over to the Church of Rome, a suspicion which seemed to be converted into a certainty when it was known that Panzani and Conn, two agents of the pope, had access to Charles, and that in 1637 there was a sudden accession to the number of converts to the Roman Catholic Church amongst the lords and ladies of the court.

Charles and Scotland.

In the summer of 1638 Charles had long ceased to reign in the affections of his subjects. But their traditionary loyalty had not yet failed, and if he had not called on them for fresh exertions, it is possible that the coming revolution would have been long delayed. Men were ready to shout applause in honour of Puritan martyrs like Prynne, Burton and Bastwick, whose ears were cut off in 1637, or in honour of the lawyers who argued such a case as that of Hampden. But no signs of active resistance had yet appeared. Unluckily for Charles, he was likely to stand in need of the active co-operation of Englishmen. He had attempted to force a new Prayer Book upon the Scottish nation. A riot at Edinburgh in 1637 quickly led to national resistance, and when in November 1638 the general assembly at Glasgow set Charles's orders at defiance, he was compelled to choose between tame submission and immediate war. In 1639 he gathered an English force, and marched towards the border. But English laymen, though asked to supply the money which he needed for the support of his army, deliberately kept it in their pockets, and the contributions of the clergy and of official persons were not sufficient to enable him to keep his troops long in the field. The king, therefore, thought it best to agree to terms of pacification. Misunderstandings broke out as to the interpretation of the treaty, and Charles having discovered that the Scots were intriguing with France, fancied that England, in hatred of its ancient foe, would now be ready to rally to his standard. After an interval of eleven years, in April 1640 he once more called a parliament.

The Short Parliament.

The Short Parliament, as it was called, demanded redress of grievances, the abandonment of the claim to levy ship-money, and a complete change in the ecclesiastical system. Charles thought that it would not be worth while even to conquer Scotland on such terms, and dissolved parliament. A fresh war with Scotland followed. Wentworth, now earl of Strafford, became the leading adviser of the king. With all the energy of his disposition he threw himself into Charles's plans, and left no stone unturned to furnish the new expedition with supplies and money. But no skilfulness of a commander can avail when soldiers are determined not to fight.

The Scottish Invasion.

The Scots crossed the Tweed, and Charles's army was well pleased to fly before them. In a short time the whole of Northumberland and Durham were in the hands of the invaders. Charles was obliged to leave these two counties in their hands as a pledge for the payment of their expenses; and he was also obliged to summon parliament to grant him the supplies which he needed for that object.

The Long Parliament.

When the Long Parliament met in November 1640 it was in a position in which no parliament had been before. Though nominally the Houses did not command a single soldier, they had in reality the whole Scottish army at their back. By refusing supplies they would put it out of the king's power to fulfil his engagements to that army, and it would immediately pursue its onward march to claim its rights. Hence there was scarcely anything which the king could venture to deny the Commons. Under Pym's leadership, they began by asking the head of Strafford. Nominally he was accused of a number of acts of oppression in the north of England and in Ireland. His real offence lay in his attempt to make the king absolute, and in the design with which he was credited of intending to bring over an Irish army to crush the liberties of England. If he had been a man of moderate abilities he might have escaped. But the Commons feared his commanding genius too much to let him go free. They began with an impeachment. Difficulties arose, and the impeachment was turned into a bill of attainder. The king abandoned his minister, and the execution of Strafford left Charles without a single man of supreme ability on his side. Then came rapidly a succession of blows at the supports by which the Tudor monarchy had been upheld. The courts of star chamber and high commission and the council of the north were abolished. The raising of tonnage and poundage without a parliamentary grant was declared illegal. The judges who had given obnoxious decisions were called to answer for their fault and were taught that they were responsible to the House of Commons as well as the king. Finally a bill was passed providing that the existing House should not be dissolved without its own consent.

Attainder of Strafford.

It was clearly a revolutionary position which the House had assumed. But it was assumed because it was impossible to expect that a king who had ruled as Charles had ruled could take up a new position as the exponent of the feelings which were represented in the Commons. As long as Charles lived he could not be otherwise than an object of suspicion; and yet if he were dethroned there was no one available to fill his place. There arose therefore two parties in the House, one ready to trust the king, the other disinclined to put any confidence in him at all. The division was the sharper because it coincided with a difference in matters of religion. Scarcely any one wished to see the Laudian ceremonies upheld. But the members who favoured the king, and who formed a considerable minority, wished to see a certain liberty of religious thought, together with a return under a modified Episcopacy to the forms of worship which prevailed before Laud had taken the church in hand. The other side, which had the majority by a few votes, wished to see the Puritan creed prevail in all its strictness, and were favourable to the establishment of the Presbyterian discipline. The king by his unwise action threw power into the hands of his opponents. He listened with tolerable calmness to their Grand Remonstrance, but his attempt to seize the five members whom he accused of high treason made a good understanding impossible. The Scottish army had been paid off some months before, and civil war was the only means of deciding the quarrel.

The civil war.

Presbyterians and Independents.

At first the fortune of war wavered. Edgehill was a drawn battle (1642), and the campaign of 1643, though it was on the whole favourable to the king, gave no decisive results. Before the year was at an end parliament invited a new Scottish army to intervene in England. As an inducement, the Solemn League and Covenant was signed by all Parliamentarian Englishmen, the terms of which were interpreted by the Scots to bind England to submit to Presbyterianism, though the most important clauses had been purposely left vague, so as to afford a loophole of escape. The battle of Marston Moor, with the defeat of the Royalist forces in the north, was the result. But the battle did not improve the position of the Scots. They had been repulsed, and the victory was justly ascribed to the English contingent. The composition of that contingent was such as to have a special political significance. Its leader was Oliver Cromwell. It was formed by men who were fierce Puritan enthusiasts, and who for the very reason that the intensity of their religion separated them from the mass of their countrymen, had learnt to uphold with all the energy of zeal the doctrine that neither church nor state had a right to interfere with the forms of worship which each congregation might select for itself (see Congregationalism and Cromwell, Oliver). The principle advocated by the army, and opposed by the Scots and the majority of the House of Commons, was liberty of sectarian association. Some years earlier, under the dominion of Laud, another principle had been proclaimed by Chillingworth and Hales, that of liberty of thought within the unity of the church. Both these movements conduced to the ultimate establishment of toleration, but for the present the Independents were to have their way.

The second civil war.

Execution of the king.

The Presbyterian leaders, Essex and Manchester, were not successful leaders. The army was remodelled after Cromwell's pattern, and the king was finally crushed at Naseby (1645). The next year (1646) he surrendered to the Scots. Then followed two years of fruitless negotiation, in which after the Scots abandoned the king to the English parliament, the army took him out of the hands of the parliament, whilst each in turn tried to find some basis of arrangement on which he might reign without ruling. Such a basis could not be found, and when Charles stirred up a fresh civil war and a Scottish invasion (1648) the leaders of the army vowed that, if victory was theirs, they would bring him to justice. To do this it was necessary to drive out a large number of the members of the House of Commons by what was known as Pride's Purge, and to obtain from the mutilated Commons the dismissal of the House of Lords, and the establishment of a high court of justice, before which the king was brought to trial and sentenced to death. He was beheaded on a scaffold outside the windows of Whitehall (1649).[1]

The Commonwealth.

Cromwell's protectorate.

The government set up was a government by the committees of a council of state nominally supporting themselves on the House of Commons, though the members who still retained their places were so few that the council of state was sufficiently numerous to form a majority in the House. During eleven years the nation passed through many vicissitudes in its forms of government. These forms take no place in the gradual development of English institutions, and have never been referred to as affording precedents to be followed. To the student of political science, however, they have a special interest of their own, as they show that when men had shaken themselves loose from the chain of habit and prejudice, and had set themselves to build up a political shelter under which to dwell, they were irresistibly attracted by that which was permanent in the old constitutional forms of which the special development had of late years been so disastrous. After Cromwell had suppressed resistance in Ireland (1649), had conquered Scotland (1650), and had overthrown the son of the late king, the future Charles II., at Worcester (1651), the value of government by an assembly was tested and found wanting. After Cromwell had expelled the remains of the Long Parliament (1653), and had set up another assembly of nominated members, that second experiment was found equally wanting. It was necessary to have recourse to one head of the executive government, controlling and directing its actions. Cromwell occupied this position as lord protector. He did all that was in his power to do to prevent his authority from degenerating into tyranny. He summoned two parliaments, of only one House, and with the consent of the second parliament he erected a second House, so that he might have some means of checking the Lower House without constantly coming into personal collision with its authority. As far as form went, the constitution in 1658, so far as it differed from the Stuart constitution, differed for the better. But it suffered from one fatal defect. It was based on the rule of the sword. The only substitute for traditional authority is the clearly expressed expression of the national will, and it is impossible to doubt that if the national will had been expressed it would have swept away Cromwell and all his system. The majority of the upper and middle classes, which had united together against Laud, was now reunited against Cromwell. The Puritans themselves were but a minority, and of that minority considerable numbers disliked the free liberty accorded to the sects. Whilst the worship of the Church of England was proscribed, every illiterate or frenzied enthusiast was allowed to harangue at his pleasure. Those who cared little for religion felt insulted when they saw a government with which they had no sympathy ruling by means of an army which they dreaded and detested. Cromwell did his best to avert a social revolution, and to direct the energies of his supporters into the channels of merely political change. But he could not prevent, and it cannot be said that he wished to prevent, the rise of men of ability from positions of social inferiority. The nation had striven against the arbitrary government of the king; but it was not prepared to shake off the predominance of that widely spreading aristocracy which, under the name of country gentlemen, had rooted itself too deeply to be easily passed by. Cromwell's rule was covered with military glory, and there can be no doubt that he honestly applied himself to solve domestic difficulties as well. But he reaped the reward of those who strive for something better than the generation in which they live is able to appreciate. His own faults and errors were remembered against him. He tried in vain to establish constitutional government and religious toleration (see CROMWELL, OLIVER). When he died (1658) there remained branded on the national mind two strong impressions which it took more than a century to obliterate—the dread of the domination of a standing army, and abhorrence of the very name of religious zeal.

The anarchy.

The eighteen months which followed deepened the impression thus formed. The army had appeared a hard master when it lent its strength to a wise and sagacious rule. It was worse when it undertook to rule in its own name, to set up and pull down parliaments and governments. The only choice left to the nation seemed to be one between military tyranny and military anarchy. Therefore it was that when Monk advanced from Scotland and declared for a free parliament, there was little doubt that the new parliament would recall the exiled king, and seek to build again on the old foundations.

The Restoration.

The Restoration was effected by a coalition between the Cavaliers, or followers of Charles I., and the Presbyterians who had originally opposed him. It was only after the nature of a great reaction that the latter should for a time be swamped by the former. The Long Parliament of the Restoration met in 1661, and the Act of Uniformity entirely excluded all idea of reform in the Puritan direction, and ordered the expulsion from their benefices of all clergymen who refused to express approval of the whole of the Book of Common Prayer (1662). A previous statute, the Corporation Act (1661), ordered that all members of corporations should renounce the Covenant and the doctrine that subjects might in any case rightfully use force against their king, and should receive the sacrament after the forms of the Church of England. The object for which Laud had striven, the compulsory imposition of uniformity, thus became part of the law of the land.

Herein lay the novelty of the system of the Restoration. The system of Laud and the system of Cromwell had both been imposed by a minority which had possessed itself of the powers of government. The new uniformity was imposed by parliament, and parliament had the nation behind it. For the first time, therefore, all those who objected to the established religion sought, not to alter its forms to suit themselves, but to gain permission to worship in separate congregations. Ultimately, the dissenters, as they began to be called, would obtain their object. As soon as it became clear to the mass of the nation that the dissenters were in a decided minority, there would be no reason to fear the utmost they could do even if the present liberty of worship and teaching were conceded to them. For the present, however, they were feared out of all proportion to their numbers. They counted amongst them the old soldiers of the Protectorate, and though that army had been dissolved, it always seemed possible that it might spring to arms once more. A bitter experience had taught men that a hundred of Oliver's Ironsides might easily chase a thousand Cavaliers; and as long as this danger was believed to exist, every effort would be made to keep dissent from spreading. Hence the Conventicle Act (1664) imposed penalties on those taking part in religious meetings in private houses, and the Five Mile Act (1665) forbade an expelled clergyman to come within five miles of a corporate borough, the very place where he was most likely to secure adherence, unless he would swear his adhesion to the doctrine of non-resistance.

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[1] The events of the reign of Charles I. are treated in greater detail in the articles CHARLES I., King of Great Britain and Ireland; STRAFFORD; HAMPDEN; PYM; GREAT REBELLION; CROMWELL, &c.

Doctrine of non-resistance.

The doctrine of non-resistance was evidently that by which, at this time, the loyal subject was distinguished from those whom he stigmatized as disloyal. Yet even the most loyal found that, if it was wrong to take up arms against the king, it might be right to oppose him in other ways. Even the Cavaliers did not wish to see Charles II. an absolute sovereign. They wished to reconstruct the system which had been violently interrupted by the events of the autumn of 1641, and to found government on the co-operation between king and parliament, without defining to themselves what was to be done if the king's conduct became insufferable. Openly, indeed, Charles II. did not force them to reconsider their position. He did not thrust members of the Commons into prison, or issue writs for ship-money. He laid no claim to taxation which had not been granted by parliament. But he was extravagant and self-indulgent, and he wanted more money than they were willing to supply. A war with the Dutch broke out, and there were strong suspicions that Charles applied money voted for the fleet to the maintenance of a vicious and luxurious court. Against the vice and luxury, indeed, little objection was likely to be brought. The over-haste of the Puritans to drill England into ways of morality and virtue had thrown at least the upper classes into a slough of revelry and baseness. But if the vice did not appear objectionable the expense did, and a new chapter in the financial history of the government was opened when the Commons, having previously gained control over taxation, proceeded to vindicate their right to control expenditure.

The first Dutch war.

The Commons aim at control over expenditure.

As far, indeed, as taxation was concerned, the Long Parliament had not left its successor much to do. The abolition of feudal tenures and purveyance had long been demanded, and the conclusion of an arrangement which had been mooted in the reign of James I. is only notable as affording one instance out of many of the tendency of a single class to shift burdens off its own shoulders. The predominant landowners preferred the grant of an excise, which would be taken out of all pockets, to a land-tax which would exclusively be felt by those who were relieved by the abolition of the tenures. The question of expenditure was constantly telling on the relations between the king and the House of Commons. After the Puritan army had been disbanded, the king resolved to keep on foot a petty force of 5000 men, and he had much difficulty in providing for it out of a revenue which had not been intended by those who voted it to be used for such a purpose. Then came the Dutch war, bringing with it a suspicion that some at least of the money given for paying sailors and fitting out ships was employed by Charles on very different objects. The Commons accordingly, in 1665, succeeded in enforcing, on precedents derived from the reigns of Richard II. and Henry IV., the right of appropriating the supplies granted to special objects; and with more difficulty they obtained, in 1666, the appointment of a commission empowered to investigate irregularities in the issue of moneys. Such measures were the complement of the control over taxation which they had previously gained, and as far as their power of supervision went, it constituted them and not the king the directors of the course of government. If this result was not immediately felt, it was because the king had a large certain revenue voted to him for life, so that, for the present at least, it was only his extraordinary expenses which could be brought under parliamentary control. Nor did even the renewal of parliamentary impeachment, which ended in the banishment of Lord Chancellor Clarendon (1667), bring on any direct collision with the king. If the Commons wished to be rid of him because he upheld the prerogative, the king was equally desirous to be rid of him because he looked coldly on the looseness of the royal morals.

Charles II. and Louis XIV.

The great motive power of the later politics of the reign was to be found beyond the Channel. To the men of the days of Charles II., Louis XIV. of France was what Philip II. of Spain had been to the men of the days of Elizabeth. Gradually, in foreign policy, the commercial emulation with the Dutch, which found vent in one war in the time of the Commonwealth, and in two wars in the time of Charles II., gave way to a dread, rising into hatred, of the arrogant potentate who, at the head of the mightiest army in Europe, treated with contempt all rights which came into collision with his own wishes. Louis XIV., moreover, though prepared to quarrel with the pope in the matter of his own authority over the Gallican Church, was a bigoted upholder of Catholic orthodoxy, and Protestants saw in his political ambitions a menace to their religion. In the case of England there seemed a special danger to Protestantism; for whatever religious sympathies Charles II. possessed were with the Roman Catholic faith, and in his annoyance at the interference of the Commons with his expenditure he was not ashamed to stoop to become the pensioner of the French king. In 1670 the secret treaty of Dover was signed. Charles was to receive from Louis £200,000 a year and the aid of 6000 French troops to enable him to declare himself a convert, and to obtain special advantages for his religion, whilst he was also to place the forces of England at Louis's disposal for his purposes of aggression on the continent of Europe.

Second Dutch war, and declaration of indulgence.

Charles had no difficulty in stirring up the commercial jealousy of England so as to bring about a second Dutch war (1672). The next year, unwilling to face the dangers of his larger plan, he issued a declaration of indulgence, which, by a single act of the prerogative, suspended all penal laws against Roman Catholics and dissenters alike. To the country gentlemen who constituted the cavalier parliament, and who had long been drifting into opposition to the crown, this was intolerable. The predominance of the Church of England was the prime article of their political creed; they dreaded the Roman Catholics; they hated and despised the dissenters. Under any circumstances an indulgence would have been most distasteful to them. But the growing belief that the whole scheme was merely intended to serve the purposes of the Roman Catholics converted their dislike into deadly opposition. Yet the parliament resolved to base its opposition upon constitutional grounds. The right claimed by the king to suspend the laws was questioned, and his claim to special authority in ecclesiastical matters was treated with contempt. The king gave way and withdrew his declaration. But no solemn act of parliament declared it to be illegal, and in due course of time it would be heard of again.

The Test Act.

The Commons followed up their blow by passing the Test Act, making the reception of the sacrament according to the forms of the Church of England, and the renunciation of the doctrine of transubstantiation, a necessary qualification for office. At once it appeared what a hold the members of the obnoxious church had had upon the administration of the state. The lord high admiral, the lord treasurer, and a secretary of state refused to take the test. The lord high admiral was the heir to the throne, the king's brother, the duke of York.

Danby's ministry.

Charles, as usual, bent before the storm. In Danby (see Leeds, 1st Duke of) he found a minister whose views answered precisely to the views of the existing House of Commons. Like the Commons, Danby wished to silence both Roman Catholics and dissenters. Like the Commons, too, he wished to embark on a foreign policy hostile to France. But he served a master who regarded Louis less as a possible adversary than as a possible paymaster. Sometimes Danby was allowed to do as he liked, and the marriage of the duke of York's eldest daughter Mary to her cousin the prince of Orange was the most lasting result of his administration. More often he was obliged to follow where Charles led, and Charles was constantly ready to sell the neutrality of England for large sums of French gold. At last one of these negotiations was detected, and Danby, who was supposed to be the author instead of the unwilling instrument of the intrigue, was impeached. In order to save his minister, Charles dissolved parliament (1678). He could not have chosen a more unlucky time for his own quiet.

The Popish plot.

The strong feeling against the Roman Catholics had been quickened into a flame by a great imposture. The inventors of the so-called popish plot charged the leading English Roman Catholics with a design to murder the king. Judges and juries alike were maddened with excitement, and listened greedily to the lies which poured forth from the lips of profligate informers. Innocent blood was shed in abundance.

The Exclusion Bill.

The excitement had its root in the uneasy feeling caused by the knowledge that the heir to the throne was a Roman Catholic. Three parliaments were summoned and dissolved. In each parliament the main question at issue between the Commons and the crown was the Exclusion Bill, by which the Commons sought to deprive the duke of York of his inheritance; and it was notorious that the leaders of the movement wished the crown to descend to the king's illegitimate son, the duke of Monmouth.

Whigs and Tories.

The principles by which the Commons were guided in these parliaments were very different from those which had prevailed in the first parliament of the Restoration. Those principles, to which that party adhered which about this time became known as the Tory party, had been formed under the influence of the terror caused by militant Puritanism. In the state the Tory inherited the ideas of Clarendon, and, without being at all ready to abandon the claims of parliaments, nevertheless somewhat inconsistently spoke of the king as ruling by a divine and indefeasible title, and wielding a power which it was both impious and unconstitutional to resist by force. In the church he inherited the ideas of Laud, and saw in the maintenance of the Act of Uniformity the safeguard of religion. But the hold of these opinions on the nation had been weakened with the cessation of the causes which had produced them. In 1680 twenty years had passed since the Puritan army had been disbanded. Many of Cromwell's soldiers had died, and most of them were growing old. The dissenters had shown no signs of engaging in plots or conspiracies. They were known to be only a comparatively small minority of the population, and though they had been cruelly persecuted, they had suffered without a thought of resistance. Dread of the dissenters, therefore, had become a mere chimaera, which only those could entertain whose minds were influenced by prejudice. On the other hand, dread of the Roman Catholics was a living force. Unless the law were altered a Roman Catholic would be on the throne, wielding all the resources of the prerogative, and probably supported by all the resources of the king of France. Hence the leading principle of the Whigs, as the predominant party was now called, was in the state to seek for the highest national authority in parliament rather than in the king, and in the church to adopt the rational theology of Chillingworth and Hales, whilst looking to the dissenters as allies against the Roman Catholics, who were the enemies of both.

Tory reaction.

Events were to show that it was a wise provision which led the Whigs to seek to exclude the duke of York from the throne. But their plan suffered under two faults, the conjunction of which was ruinous to them for the time. In the first place, their choice of Monmouth as the heir was infelicitous. Not only was he under the stain of illegitimacy, but his succession excluded the future succession of Mary, whose husband, the prince of Orange, was the hope of Protestant Europe. In the second place, drastic remedies are never generally acceptable when the evil to be remedied is still in the future. When, in the third of the short parliaments held at Oxford the Whigs rode armed into the city, the nation decided that the future danger of a Roman Catholic succession was incomparably less than the immediate danger of another civil war. Loyal addresses poured in to the king. For the four remaining years of his reign he ruled without summoning any parliament. Whigs were brought before prejudiced juries and partial judges. Their blood flowed on the scaffold. The charter of the city of London was confiscated. The reign of the Tories was unquestioned. Yet it was not quite what the reign of the Cavaliers had been in 1660. The violence of the Restoration had been directed primarily against Puritanism, and only against certain forms of government so far as they allowed Puritans to gain the upper hand. The violence of the Tories was directed against rebellion and disorder, and only against dissenters so far as they were believed to be the fomenters of disorder. Religious hatred had less part in the action of the ruling party, and even from its worst actions a wise man might have predicted that the day of toleration was not so far off as it seemed.

James II., 1685-1688.

The accession of James II. (1685) put the views of the opponents of the Exclusion Bill to the test. A new parliament was elected, almost entirely composed of decided Tories. A rebellion in Scotland, headed by the earl of Argyll, and a rebellion in England, headed by the duke of Monmouth, were easily suppressed. But the inherent difficulties of the king's position were not thereby overcome. It would have been hard, in days in which religious questions occupied so large a space in the field of politics, for a Roman Catholic sovereign to rule successfully over a Protestant nation. James set himself to make it, in his case, impossible. It may be that he did not consciously present to himself any object other than fair treatment for his co-religionists. On the one hand, however, he alienated even reasonable opponents by offering no guarantees that equality so gained would not be converted into superiority by the aid of his own military force and of the assistance of the French king; whilst on the other hand he relied, even more strongly than his father had done, on the technical legality which exalted the prerogative in defiance of the spirit of the law. He began by making use of the necessity of resisting Monmouth to increase his army, under the pretext of the danger of a repetition of the late rebellion; and in the regiments thus levied he appointed many Roman Catholic officers who had refused to comply with the Test Act. Rather than submit to the gentlest remonstrance, he prorogued parliament, and proceeded to obtain from the court of king's bench a judgment in favour of his right to dispense with all penalties due by law, in the same way that his grandfather had appealed to the judges in the matter of the post-nati. But not only was the question put by James II. of far wider import than the question put by James I., but he deprived the court to which he applied of all moral authority by previously turning out of office the judges who were likely to disagree with him, and by appointing new ones who were likely to agree with him. A court of high commission of doubtful legality was subsequently erected (1686) to deprive or suspend clergymen who made themselves obnoxious to the court, whilst James appointed Roman Catholics to the headship of certain colleges at Oxford. The legal support given him by judges of his own selection was fortified by the military support of an army collected at Hounslow Heath; and a Roman Catholic, the earl of Tyrconnel, was sent as lord-deputy to Ireland (1687) to organize a Roman Catholic army on which the king might fall back if his English forces proved insufficient for his purpose.

James's declaration of indulgence.

Thus fortified, James issued a declaration of indulgence (1687) granting full religious liberty to all his subjects. The belief, that the grant of liberty to all religions was only intended to serve as a cloak for the ascendancy of one, was so strong that the measure roused the opposition of all those who objected to see the king's will substituted for the law, even if they wished to see the Protestant dissenters tolerated. In spite of this opposition, the king thought it possible to obtain a parliamentary sanction for his declaration. The parliament to which he intended to appeal was, however, to be as different a body from the parliament which met in the first year of his reign as the bench of judges which had approved of the dispensing power had been different from the bench which existed at his accession. A large number of the borough members were in those days returned by the corporations, and the corporations were accordingly changed. But so thoroughly was the spirit of the country roused, that many even of the new corporations were set against James's declaration, and he had therefore to abandon for a time the hope of seeing it accepted even by a packed House of Commons. All, however, that he could do to give it force he did. He ordered the clergy to read it in all pulpits (1688). Seven bishops, who presented a petition asking him to relieve the clergy from the burthen of proclaiming what they believed to be illegal, were brought to trial for publishing a seditious libel. Their acquittal by a jury was the first serious blow to the system adopted by the king.

Trial of the seven bishops.

Another event which seemed likely to consolidate his power was in reality the signal of his ruin. The queen bore him a son. There was thus no longer a strong probability that the king would be succeeded at no great distance of time by a Protestant heir. Popular incredulity expressed itself in the assertion that, as James had attempted to gain his ends by means of a packed bench of judges and a packed House of Commons, he had now capped the series of falsifications by the production of a supposititious heir. The leaders of both parties combined to invite the prince of Orange to come to the rescue of the religion and laws of England. He landed on the 5th of November at Brixham. Before he could reach London every class of English society had declared in his favour. James was deserted even by his army. He fled to France, and a convention parliament, summoned without the royal writ, declared that his flight was equivalent to abdication, and offered the crown in joint sovereignty to William and Mary (1689).

Revolution of 1688.

IX. The Revolution and the Age of Anne (1689–1714)

The Revolution, as it was called, was more than a mere change of sovereigns. It finally transferred the ultimate decision in the state from the king to parliament. What parliament had been in the 15th century with the House of Lords predominating, that parliament was to be again in the end of the 17th century with the House of Commons predominating. That House of Commons was far from resting on a wide basis of popular suffrage. The county voters were the freeholders; but in the towns, with some important exceptions, the electors were the richer inhabitants who formed the corporations of the boroughs, or a body of select householders more or less under the control of some neighbouring landowner. A House so chosen was an aristocratic body, but it was aristocratic in a far wider sense than the House of Lords was aristocratic. The trading and legal classes found their representation there by the side of the great owners of land. The House drew its strength from its position as a true representative of the effective strength of the nation in its social and economical organization.

William III. and Mary II., 1689.

Such was the body which firmly grasped the control over every branch of the administration. Limiting in the Bill of Rights the powers assumed by the crown, the Commons declared that the king could not keep a standing army in time of peace without consent of parliament; and they made that consent effectual, as far as legislation could go, by passing a Mutiny Act year by year for twelve months only, so as to prevent the crown from exercising military discipline without their authority. Behind these legal contrivances stood the fact that the army was organized in the same way as the nation was organized, being officered by gentlemen who had no desire to overthrow a constitution through which the class from which they sprung controlled the government. Strengthened by the cessation of any fear of military violence, the Commons placed the crown in financial dependence on themselves by granting a large part of the revenue only for a limited term of years, and by putting strictly in force their right of appropriating that revenue to special branches of expenditure.

Such a revolution might have ended in the substitution of the despotism of a class for the despotism of a man. Many causes combined to prevent this result. The landowners, who formed the majority of the House, were not elected directly, as was the case with the nobility of the French states-general, by their own class, but by electors who, though generally loyal to them, would have broken off from them if they had attempted to make themselves masters of their fellow citizens. No less important was the almost absolute independence of the judges, begun at the beginning of the reign, by the grant of office to them during good behaviour instead of during the king's pleasure, and finally secured by the clause in the Act of Settlement in 1701, which protected them against dismissal except on the joint address of both Houses of Parliament. Such an improvement, however, finds its full counterpart in another great step already taken. The more representative a government becomes, the more necessary it is for the well-being of the nation that the expression of individual thought should be free in every direction. If it is not so, the government is inclined to proscribe unpopular opinion, and to forget that new opinions by which the greatest benefits are likely to be conferred are certain at first to be entertained by a very few, and are quite certain to be unpopular as soon as they come into collision with the opinions of the majority. In the middle ages the benefits of the liberation of thought from state control had been secured by the antagonism between church and state. The Tudor sovereigns had rightfully asserted the principle that in a well-ordered nation only one supreme power can be allowed to exist; but in so doing they had enslaved religion. It was fortunate that, just at the moment when parliamentary control was established over the state, circumstances should have arisen which made the majority ready to restore to the individual conscience that supremacy over religion which the medieval ecclesiastics had claimed for the corporation of the universal church. Dissenters had, in the main, stood shoulder to shoulder with churchmen in rejecting the suspicious benefits of James, and both gratitude and policy forbade the thought of replacing them under the heavy yoke which had been imposed on them at the Restoration. The exact mode in which relief should be afforded was still an open question. The idea prevalent with the more liberal minds amongst the clergy was that of comprehension—that is to say, of so modifying the prayers and ceremonies of the church as to enable the dissenters cheerfully to enter in. The scheme was one which had approved itself to minds of the highest order—to Sir Thomas More, to Bacon, to Hales and to Jeremy Taylor. It is one which, as long as beliefs are not very divergent, keeps up a sense of brotherhood overruling the diversity of opinion. It broke down, as it always will break down in practice, whenever the difference of belief is so strongly felt as to seek earnestly to embody itself in diversity of outward practice. The greater part of the clergy of the church felt that to surrender their accustomed formularies was to surrender somewhat of the belief which those formularies signified, while the dissenting clergy were equally reluctant to adopt the common prayer book even in a modified form. Hence the Toleration Act, which guaranteed the right of separate assemblies for worship outside the pale of the church, though it embodied the principles of Cromwell and Milton, and not those of Chillingworth and Hales, was carried without difficulty, whilst the proposed scheme of comprehension never had a chance of success (1689). The choice was one which posterity can heartily approve. However wide the limits of toleration be drawn, there will always be those who will be left outside. By religious liberty those inside gain as much as those who are without. From the moment of the passing of the Toleration Act, no Protestant in England performed any act of worship except by his own free and deliberate choice. The literary spokesman of the new system was Locke. His *Letters concerning Toleration* laid down the principle which had been maintained by Cromwell, with a wider application than was possible in days when the state was in the hands of a mere minority only able to maintain itself in power by constant and suspicious vigilance.

Causes in favour of liberty.

The Toleration Act.

One measure remained to place the dissenters in the position of full membership of the state. The Test Act excluded them from office. But the memory of the high-handed proceedings of Puritan rulers was still too recent to allow Englishmen to run the risk of a reimposition of their yoke, and this feeling, fanciful as it was, was sufficient to keep the Test Act in force for years to come.

Liberty of the press.

The complement of the Toleration Act was the abolition of the censorship of the press (1695). The ideas of the author of the *Areopagitica* had at last prevailed. The attempt to fix certain opinions on the nation which were pleasing to those in power was abandoned by king and parliament alike. The nation, or at least so much of it as cared to read books or pamphlets on political subjects, was acknowledged to be the supreme judge, which must therefore be allowed to listen to what counsellors it pleased.

This new position of the nation made itself felt in various ways. It was William's merit that, fond as he was of power, he recognized the fact that he could not rule except so far as he carried the goodwill of the nation with him. No doubt he was helped to an intelligent perception of the new situation by the fact that, as a foreigner, he cared far more for carrying on war successfully against France than for influencing the domestic legislation of a country which was not his own, and by the knowledge that the conduct of the struggle which lasted till he was able to treat with France on equal terms at Ryswick (1697) was fairly trusted to his hands. Nevertheless these years of war called for the united action of a national government, and in seeking to gain this support for himself, he hit upon an expedient which opened a new era in constitutional politics.

Beginning of cabinet government.

The supremacy of the House of Commons would have been an evil of no common magnitude, if it had made government impossible. Yet this was precisely what it threatened to do. Sometimes the dominant party in the House pressed with unscrupulous rancour upon its opponents. Sometimes the majority shifted from side to side as the House was influenced by passing gusts of passion or sympathy, so that, as it was said at the time, no man could foretell one day what the House would be pleased to do on the next. Against the first of these dangers William was to a great extent able to guard by the exercise of his right of dissolution, so as to appeal to the constituencies, which did not always share in the the passions of their representatives. But the second danger could not be met in this way. The only cure for waywardness is responsibility, and not only was this precisely what the Commons had not learned to feel, but it was that which it was impossible to make them feel directly. A body composed of several hundred members cannot carry on government with the requisite steadiness of action and clearness of insight. Such work can only fitly be entrusted to a few and whenever difficult circumstances arise it is necessary that the action of those few be kept in harmony by the predominance of one. The scheme on which William hit, by the advice of the earl of Sunderland, was that which has since been known as cabinet government. He selected as his ministers the leading members of the two Houses who had the confidence of the majority of the House of Commons. In this way, the majority felt an interest in supporting the men who embodied their own opinions, and fell in turn under the influence of those who held them with greater prudence or ability than fell to the lot of the average members of the House. All that William doubtless intended was to acquire a ready instrument to enable him to carry on the war with success. In reality he had refounded, on a new basis, the government of England. His own personal qualities were such that he was able to dominate over any set of ministers; but the time would come when there would be a sovereign of inferior powers. Then the body of ministers would step into his place. The old rude arrangements of the middle ages had provided by frequent depositions that an inefficient sovereign should cease to rule, and those arrangements had been imitated in the cases of Charles I. and James II. Still the claim to rule had, at least from the time of Henry III., been derived from hereditary descent, and the interruption, however frequently it might occur, had been regarded as something abnormal, only to be applied where there was an absolute necessity to prevent the wielder of executive authority from setting at defiance the determined purpose of the nation. After the Revolution not only had the king's title been so changed as to make him more directly than ever dependent on the nation, but he now called into existence a body which derived its own strength from its conformity with the wishes of the representatives of the nation.

For the moment it seemed to be but a temporary expedient. When the war came to an end, the Whig party which had sustained William in his struggle with France split up. The dominant feeling of the House of Commons was no longer the desire to support the crown against a foreign enemy, but to make government as cheap as possible, leaving future dangers to the chances of the future. William had not so understood the new invention of a united ministry as binding him to take into his service a united ministry of men whom he regarded as fools and knaves. He allowed the Commons to reduce the army to a skeleton, to question his actions, and to treat him as if he were a cipher. But it was only by slow degrees that he was brought to acknowledge the necessity of choosing his ministers from amongst the men who had done these things.

The Spanish succession.

The time came when he needed again the support of the nation. The death of Charles II., the heirless king of the huge Spanish monarchy, had long been expected. Since the peace of Ryswick, William and Louis XIV. had come to terms by two successive partition treaties for a division of those vast territories in such a way that the whole of them should not fall into the hands of a near relation either of the king of France or of the emperor, the head of the house of Austria. When the king of Spain actually died in 1700, William seemed to have no authority in England whatever; and Louis was therefore encouraged to break his engagements, and to accept the whole of the Spanish inheritance for his grandson, who became Philip V. of Spain. William saw clearly that such predominance of France in Europe would lead to the development of pretensions unbearable to other states. But the House of Commons did not see it, even when the Dutch garrisons were driven by French troops out of the posts in the Spanish Netherlands which they had occupied for many years (1701).

The Act of Settlement.

William had prudently done all that he could to conciliate the Tory majority. In the preceding year (1700) he had given office to a Tory ministry, and he now (1701) gave his assent to the Act of Settlement, which secured the succession of the crown to the electress Sophia of Hanover, daughter of James I.'s daughter Elizabeth, to the exclusion of all Roman Catholic claimants, though it imposed several fresh restrictions on the prerogative. William was indeed wise in keeping his feelings under control. The country sympathized with him more than the Commons did, and when the House imprisoned the gentlemen deputed by the freeholders of Kent to present a petition asking that its loyal addresses might be turned into bills of supply, it simply advertised its weakness to the whole country.

The Grand Alliance.

The reception of this Kentish petition was but a foretaste of the discrepancy between the Commons and the nation, which was to prove the marked feature of the middle of the century now opening. For the present the House was ready to give way. It requested the king to enter into alliance with the Dutch. William went yet further in the direction in which he was urged. He formed an alliance with the emperor, as well as with the Netherlands, to prevent the union of the crowns of France and Spain, and to compel France to evacuate the Netherlands. An unexpected event came to give him all the strength he needed. James II. died, and Louis acknowledged his son as the rightful king of England. Englishmen of both parties were stung to indignation by the insult. William dissolved parliament, and the new House of Commons, Tory as it was by a small majority, was eager to support the king. It voted men and money according to his wishes. England was to be the soul of the Grand Alliance against France. But before a blow was struck William was thrown from his horse. He died on the 8th of March 1702. "The man," as Burke said of him, “ was dead, but the Grand Alliance survived in which King William lived and reigned.”

Queen Anne, 1702-1714.

Upon the accession of Anne, war was at once begun. The Grand Alliance became, as William would have wished, a league to wrest the whole of the Spanish dominions from Philip, in favour of the Austrian archduke Charles. It found a chief of supreme military and diplomatic genius in the duke of Marlborough. His victory at Blenheim (1704) drove the French out of Germany. His victory of Ramillies (1706) drove them out of the Netherlands. In Spain, Gibraltar was captured by Rooke (1704) and Barcelona by Peterborough (1705). Prince Eugene relieved Turin from a French siege, and followed up the blow by driving the besiegers out of Italy.

Union with Scotland.

The influence of Marlborough at home was the result partly of the prestige of his victories, partly of the dominating influence of his strong-minded duchess (“ Mrs Freeman ”) over the queen (see Anne, queen of England). The duke cared little for home politics in themselves; but he had his own ends, both public and private, to serve, and at first gave his support to the Tories, whose church policy was regarded with favour by the queen. Their efforts were directed towards the restriction of the Toleration Act within narrow limits. Many dissenters had evaded the Test Act by partaking of the communion in a church, though they subsequently attended their own chapels. An Occasional Conformity Bill, imposing penalties on those who adopted this practice, twice passed the Commons (1702, 1703), but was rejected by the House of Lords, in which the Whig element predominated. The church was served in a nobler manner in 1704 by the abandonment of first-fruits and tenths by the queen for the purpose of raising the pittances of the poorer clergy (see Queen Anne’s Bounty). In 1707 a piece of legislation of the highest value was carried to a successful end. The Act of Union, passed in the parliaments of England and Scotland, joined the legislatures of the two kingdoms and the nations themselves in an indissoluble bond.

United Whig ministry.

The ministry in office at the time of the passing of the Act of Union had suffered important changes since the commencement of the reign. The Tories had never been as earnest in the prosecution of the war as the Whigs; and Marlborough, who cared above all things for the furtherance of the war, gradually replaced Tories by Whigs in the ministry. His intention was doubtless to conciliate both parties by admitting them both to a share of power; but the Whigs were determined to have all or none, and in 1708 a purely Whig ministry was formed to support the war as the first purely Whig ministry had supported it in the reign of William. The years of its power were the years of the victories of Oudenarde (1708) and of Malplaquet (1709), bringing with them the entire ruin of the military power of Louis XIV.

Such successes, if they were not embraced in the spirit of moderation, boded no good to the Whigs. It was known that even before the last battle Louis had been ready to abandon the cause of his grandson, and that his offers had been rejected because he would not consent to join the allies in turning him out of Spain. A belief spread in England that Marlborough wished the endless prolongation of the war for his own selfish ends. Spain was far away, and, if the Netherlands were safe, enough had been done for the interests of England. The Whigs were charged with refusing to make peace when an honourable and satisfactory peace was not beyond their reach.

Tory ministry.

As soon as the demand for a vigorous prosecution of the war relaxed, the Whigs could but rely on their domestic policy, in which they were strongest in the eyes of posterity but weakest in the eyes of contemporaries. It was known that they looked for the principle on which the queen’s throne rested to the national act of the Revolution, rather than to the birth of the sovereign as the daughter of James II., whilst popular feeling preferred, however inconsistently, to attach itself to some fragment of hereditary right. What was of greater consequence was, that it was known that they were the friends of the dissenters, and that their leaders, if they could have had their way, would not only have maintained the Toleration Act, but would also have repealed the Test Act. In 1709 a sermon preached by Dr Sacheverell (*q.v.*) denounced toleration and the right of resistance in tones worthy of the first days of the Restoration. Foolish as the sermon was, it was but the reflection of folly which was widely spread amongst the rude and less educated classes. The Whig leaders unwisely took up the challenge and impeached Sacheverell. The Lords condemned the man, but they condemned him to an easy sentence. His trial was the signal for riot. Dissenting chapels were sacked to the cry of High Church and Sacheverell. The queen, who had personal reasons for disliking the Whigs, dismissed them from office (1710), and a Tory House of Commons was elected amidst the excitement to support the Tory ministry of Harley and St John.

Peace of Utrecht.

Occasional Conformity Act and the Schism Act.

After some hesitation the new ministry made peace with France, and the treaty of Utrecht (1713), stipulating for the permanent separation of the crowns of France and Spain, and assigning Milan, Naples and the Spanish Netherlands to the Austrian claimant, accomplished all that could reasonably be desired, though the abandonment to the vengeance of the Spanish government of her Catalan allies, and the base desertion of her continental confederates on the very field of action, brought dishonour on the good name of England. The Commons gladly welcomed the cessation of the war. The approval of the Lords had been secured by the creation of twelve Tory peers. In home politics the new ministry was in danger of being carried away by its more violent supporters. St John, now Viscount Bolingbroke, with unscrupulous audacity placed himself at their head. The Occasional Conformity Bill was at last carried (1711). To it was added the Schism Act (1714), forbidding dissenters to keep schools or engage in tuition. Bolingbroke went still farther. He engaged in an intrigue for bringing over the Pretender to succeed the queen upon her death. This wild conduct alienated the moderate Tories, who, much as they wished to see the throne occupied by the heir of the ancient line, could not bring themselves to consent to its occupation by a Roman Catholic prince. Such men, therefore, when Anne died (1714) joined the Whigs in proclaiming the elector of Hanover king as George I.

X. The Hanoverian Kings (1714–1793)

Accession of the House of Hanover.

Repeal of Occasional Conformity Act and Schism Act.

The accession of George I. brought with it the predominance of the Whigs. They had on their side the royal power, the greater part of the aristocracy, the dissenters and the higher trading and commercial classes. The Tories appealed to the dislike of dissenters prevalent amongst the country gentlemen and the country clergy, and to the jealousy felt by the agricultural classes towards those who enriched themselves by trade. Such a feeling, if it was aroused by irritating legislation, might very probably turn to the advantage of the exiled house, especially as the majority of Englishmen were to be found on the Tory side. It was therefore advisable that government should content itself with as little action as possible, in order to give time for old habits to wear themselves out. The landing of the Pretender in Scotland (1715), and the defeat of a portion of his army which had advanced to Preston—a defeat which was the consequence of the apathy of his English supporters, and which was followed by the complete suppression of the rebellion—gave increased strength to the Whig government. But they were reluctant to face an immediate dissolution, and the Septennial Act was passed (1716) to extend to seven years the duration of parliaments, which had been fixed at three years by the Triennial Act of William and Mary. Under General Stanhope an effort was made to draw legislation in a more liberal direction. The Occasional Conformity Act and the Schism Act were repealed (1719); but the majorities on the side of the government were unusually small, and Stanhope, who would willingly have repealed the

Test Act so far as it related to dissenters, was compelled to abandon the project as entirely impracticable. The Peerage Bill, introduced at the same time to limit the royal power of creating peers, was happily thrown out in the Commons. It was proposed, partly from a desire to guard the Lords against such a sudden increase of their numbers as had been forced on them when the treaty of Utrecht was under discussion, and partly to secure the Whigs in office against any change in the royal councils in a succeeding reign. It was in fact conceived by men who valued the immediate victory of their principles more than they trusted to the general good sense of the nation. The Lords were at this time, as a matter of fact, not merely wealthier but wiser than the Commons; and it is no wonder that, in days when the Commons, by passing the Septennial Act, had shown their distrust of their own constituents, the peers should show, by the Peerage Bill, their distrust of that House which was elected by those constituencies. Nevertheless, the remedy was worse than the disease, for it would have established a close oligarchy, bound sooner or later to come into conflict with the will of the nation, and only to be overthrown by a violent alteration of the constitution.

Walpole's ministry.

The excitement following on the bursting of the South Sea Bubble (*q.v.*), and the death or ruin of the leading ministers, brought Sir Robert Walpole to the front (1721). As a man of business when men of business were few in the House of Commons, he was eminently fit to manage the affairs of the country. But he owed his long continuance in office especially to his sagacity. He clearly saw, what Stanhope had failed to see, that the mass of the nation was not fitted as yet to interest itself wisely in affairs of government, and that therefore the rule must be kept in the hands of the upper classes. But he was too sensible to adopt the coarse expedient which had commended itself to Stanhope, and he preferred humouring the masses to contradicting them.

The struggle of the preceding century had left its mark in every direction on the national development. Out of the reaction against Puritanism had come a widely-spread relaxation of morals, and also, as far as the educated class was concerned, an eagerness for the discussion of all social and religious problems. The fierce excitement of political life had quickened thought, and the most anciently received doctrines were held of little worth until they were brought to the test of reason. It was a time when the pen was more powerful than the sword, when a secretary of state would treat with condescension a witty pamphleteer, and when such a pamphleteer might hope, not in vain, to become a secretary of state.

It was in this world of reason and literature that the Whigs of the Peerage Bill moved. Walpole perceived that there was another world which understood none of these things. With cynical insight he discovered that a great government cannot rest on a clique, however distinguished. If the mass of the nation was not conscious of political wants, it was conscious of material wants. The merchant needed protection for his trade; the voters gladly welcomed election days as bringing guineas to their pockets. Members of parliament were ready to sell their votes for places, for pensions, for actual money. The system was not new, as Danby is credited with the discovery that a vote in the House of Commons might be purchased. But with Walpole it reached its height.

Such a system was possible because the House of Commons was not really accountable to its constituents. The votes of its members were not published, and still less were their speeches made known. Such a silence could only be maintained around the House when there was little interest in its proceedings. The great questions of religion and taxation which had agitated the country under the Stuarts were now fairly settled. To reawaken those questions in any shape would be dangerous. Walpole took good care never to repeat the mistake of the Sacheverell trial. When on one occasion he was led into the proposal of an unpopular excise he at once drew back. England in his days was growing rich. Englishmen were bluff and independent, in their ways often coarse and unmannerly. Their life was the life depicted on the canvas of Hogarth and the pages of Fielding. All high imagination, all devotion to the public weal, seemed laid asleep. But the political instinct was not dead, and it would one day express itself for better ends than an agitation against an excise bill or an outcry for a popular war. A government could no longer employ its powers for direct oppression. In his own house and in his own conscience, every Englishman, as far as the government was concerned, was the master of his destiny. By and by the idea would dawn on the nation that anarchy is as productive of evil as tyranny, and that a government which omits to regulate or control allows the strong to oppress the weak, and the rich to oppress the poor.

George II. 1727-1760.

Walpole's administration lasted long enough to give room for some feeble expression of this feeling. When George I. was succeeded by George II. (1727), Walpole remained in power. His eagerness for the possession of that power which he desired to use for his country's good, together with the incapacity of two kings born and bred in a foreign country to take a leading part in English affairs, completed the change which had been effected when William first entrusted the conduct of government to a united cabinet. There was now for the first time a prime minister in England, a person who was himself a subject imposing harmonious action on the cabinet. The change was so gradually and silently effected that it is difficult to realize its full importance. So far, indeed, as it only came about through the incapacity of the first two kings of the house of Hanover, it might be undone, and was in fact to a great extent undone by a more active successor. But so far as it was the result of general tendencies, it could never be obliterated. In the ministries in which Somers and Montagu on the one hand and Harley and St John on the other had taken part, there was no prime minister except so far as one member of the administration dominated over his colleagues by the force of character and intelligence. In the reign of George III., even North and Addington were universally acknowledged by that title, though they had little claim to the independence of action of a Walpole or a Pitt.

The change was, in fact, one of the most important of those by which the English constitution has been altered from an hereditary monarchy with a parliamentary regulative agency to a parliamentary government with an hereditary regulative agency. In Walpole's time the forms of the constitution had become, in all essential particulars, what they are now. What was wanting was a national force behind them to set them to their proper work.

The Opposition.

The growing opposition which finally drove Walpole from power was not entirely without a nobler element than could be furnished by personal rivalry, or ignorant distrust of commercial and financial success. It was well that complaints that a great country ought not to be governed by patronage and bribery should be raised, although, as subsequent experience showed, the causes which rendered corruption inevitable were not to be removed by the expulsion of Walpole from office. But for one error, indeed, it is probable that Walpole's rule would have been still further prolonged.

War with Spain.

In 1739 a popular excitement arose for a declaration of war against Spain. Walpole believed that war to be certainly unjust, and likely to be disastrous. He had, however, been so accustomed to give way to popular pressure that he did not perceive the difference between a wise and timely determination to leave a right action undone in the face of insuperable difficulties, and an unwise and cowardly determination to do that which he believed to be wrong and imprudent. If he had now resigned rather than demean himself by acting against his conscience, it is by no means unlikely that he would have been recalled to power before many years were over. As it was, the failures of the war recoiled on his own head, and in 1742 his long ministry came to an end.

After a short interval a successor was found in Henry Pelham. All the ordinary arts of corruption which Walpole had practised were continued, and to them were added arts of corruption which Walpole had disdained to practise. He at least understood that there were certain principles in accordance with which he wished to conduct public affairs, and he had driven colleague after colleague out of office rather than allow them to distract his method of government. Pelham and his brother, the Thomas Pelham, duke of Newcastle, had no principles of government whatever. They offered place to every man of parliamentary skill or influence. There was no opposition, because the ministers never attempted to do anything which would arouse opposition, and because they were ready to do anything called for by any one who had power enough to make himself dangerous; and in 1743 they embarked on a useless war with France in order to please the king, who saw in every commotion on the continent of Europe some danger to his beloved Hanover.

Ministry of Henry Pelham.

The Rebellion of 1745.

At most times in the history of England such a ministry would have been driven from office by the outcry of an offended people. In the days of the Pelhams, government was regarded as lying too far outside the all-important private interests of the community to make it worth while to make any effort to rescue it from the degradation into which it had fallen; yet the Pelhams had not been long in power before this serene belief that the country could get on very well without a government in any real sense of the word was put to the test. In 1745 Charles Edward, the son of the Pretender, landed in Scotland. He was followed by many of the Highland clans, always ready to draw the sword against the constituted authorities of the Lowlands; and even in the Lowlands, and especially in Edinburgh, he found adherents, who still felt the sting inflicted by the suppression of the national independence of Scotland. The British army was in as chaotic a condition as the British government, and Charles Edward inflicted a complete defeat on a force which met him at Prestonpans. Before the end of the year the victor, at the head of 5000 men, had advanced to Derby. But he found no support in England, and the mere numbers brought against him compelled him to retreat, to find defeat at Culloden in the following year (1746). The war on the continent had been waged with indifferent success. The victory of Dettingen (1743) and the glorious defeat of Fontenoy (1745) had achieved no objects worthy of English intervention, and the peace of Aix-la-Chapelle put an end in 1748 to hostilities which should never have been begun. The government pursued its inglorious career as long as Henry Pelham lived. He had at least some share in the financial ability of Walpole, and it was not till he died in 1754 that the real difficulties of a system which was based on the avoidance of difficulties had fairly to be faced.

Moral and religious atmosphere.

Wesley and Whitefield.

The change which was needed was not any mere re-adjustment of the political machine. Those who cared for religion or morality had forgotten that man is an imaginative and emotional being. Defenders of Christianity and of deism alike appealed to the reason alone. Enthusiasm was treated as a folly or a crime, and earnestness of every kind was branded with the name of enthusiasm. The higher order of minds dwelt with preference upon the beneficent wisdom of the Creator. The lower order of minds treated religion as a kind of life assurance against the inconvenience of eternal death. Upon such a system as this human nature was certain to revenge itself. The preaching of Wesley and Whitefield appealed direct to the emotions, with its doctrine of "conversion," and called upon each individual not to understand, or to admire, or to act, but vividly to realize the love and mercy of God. In all this there was nothing new. What was new was that Wesley added an organization, Methodism (*q.v.*), in which each of his followers unfolded to one another the secrets of their heart, and became accountable to his fellows. Large as the numbers of the Methodists ultimately became, their influence is not to be measured by their numbers. The double want of the age, the want of spiritual earnestness and the want of organized coherence, would find satisfaction in many ways which would have seemed strange to Wesley, but which were, nevertheless, a continuance of the work which he began.

Ministry of Newcastle.

Ministry of Pitt and Newcastle.

As far as government was concerned, when Henry Pelham died (1754) the lowest depth of baseness seemed to have been reached. The duke of Newcastle, who succeeded his brother, looked on the work of corruption with absolute pleasure, and regarded genius and ability as an awkward interruption of that happy arrangement which made men subservient to flattery and money. Whilst he was in the very act of trying to drive from office all men who were possessed of any sort of ideas, he was surprised by a great war. In America, the French settlers in Canada and the English settlers on the Atlantic coast were falling to blows for the possession of the vast territories drained by the Ohio and its tributaries. In India, Frenchmen and Englishmen had striven during the last war for authority over the native states round Pondicherry and Madras, and the conflict threatened to break out anew. When war began in earnest, and the reality of danger came home to Englishmen by the capture of Minorca (1756), there arose a demand for a more capable government than any which Newcastle could offer. Terrified by the storm of obloquy which he aroused, he fled from office. A government was formed, of which the soul was William Pitt. Pitt was, in some sort, to the political life of Englishmen what Wesley was to their religious life. He brought no new political ideas into their minds, but he ruled them by the force of his character and the example of his purity. His weapons were trust and confidence. He appealed to the patriotism of his fellow-countrymen, to their imaginative love for the national greatness, and he did not appeal in vain. He perceived instinctively that a large number, even of those who took greedily the bribes of Walpole and the Pelhams, took them, not because they loved money better than their country, but because they had no conception that their country had any need of them at all. It was a truth, but it was not the whole truth. The great Whig families rallied under Newcastle and drove Pitt from office (1757). But if Pitt could not govern without Newcastle's corruption, neither could Newcastle govern without Pitt's energy. At last a compromise was effected, and Newcastle undertook the work of bribing, whilst Pitt undertook the work of governing (see Chatham, William Pitt, 1st Earl of).

The Seven Years' War.

The war which had already broken out, the Seven Years' War (1756–1763), was not confined to England alone. By the side of the duel between France and England, a war was going on upon the continent of Europe, in which Austria—with its allies, France, Russia and the German princes—had fallen upon the new kingdom of Prussia and its sovereign Frederick II. England and Prussia therefore necessarily formed an alliance. Different as the two governments were, they were both alike in recognizing, in part at least, the conditions of progress. Even in Pitt's day England, however imperfectly, rested its strength on the popular will. Even in Frederick's day Prussia was ruled by administrators selected for their special knowledge. Neither France nor Austria had any conception of the necessity of fulfilling these requirements. Hence the strength of England and of Prussia. The war seemed to be a mere struggle for territory. There was no feeling in either Pitt or Frederick, such as there was in the men who contended half a century later against Napoleon, that they were fighting the battles of the civilized world. There was something repulsive as well in the enthusiastic nationalism of Pitt as in the cynical nationalism of Frederick. Pitt's sole object was to exalt England to a position in which she would fear no rival. But in so doing he exalted that which, in spite of all that had happened, best deserved to be exalted. The habits of individual energy fused together by the inspiration of patriotism conquered Canada. The unintelligent over-regulation of the French government could not maintain the colonies which had been founded in happier times. In 1758 Louisburg was taken, and the mouth of the St Lawrence guarded against France. In 1759 Quebec fell before Wolfe, who died at the moment of victory. In the same year the naval victories of Lagos and Quiberon Bay established the supremacy of the British at sea. The battle of Plassey (1757) had laid Bengal at the feet of Clive; and Coote's victory at Wandiwash (1760) led to the final ruin of the relics of French authority in southern India. When George II. died (1760) England was the first maritime and colonial power in the world (see SEVEN YEARS' WAR; CANADA: *History*; INDIA: *History*).

George III., 1760-1820.

In George III. the king once more became an important factor in English politics. From his childhood he had been trained by his mother and his instructors to regard the breaking down of the power of the great families as the task of his life. In this he was walking in the same direction as Pitt. If the two men could have worked together, England might have been spared many misfortunes. Unhappily, the king could not understand Pitt's higher qualities, his bold confidence in the popular feeling, and his contempt for corruption and intrigue. And yet the king's authority was indispensable to Pitt, if he was to carry on his conflict against the great families with success. When the war came to an end, as it must come to an end sooner or later, Pitt's special predominance, derived as it was from his power of breathing a martial spirit into the fleets and armies of England, would come to an end too. Only the king, with his hold upon the traditional instincts of loyalty and the force of his still unimpaired prerogative, could, in ordinary times, hold head against the wealthy and influential aristocracy. Unfortunately, George III. was not wise enough to deal with the difficulty in a high-minded fashion. With a well-intentioned but narrow mind, he had nothing in him to strike the imagination of his subjects. He met influence with influence, corruption with corruption, intrigue with intrigue. Unhappily, too, his earliest relations with Pitt involved a dispute on a point on which he was right and Pitt was wrong. In 1761 Pitt resigned office, because neither the king nor the cabinet were willing to declare war against Spain in the midst of the war with France. As the war with Spain was inevitable, and as, when it broke out in the following year (1762), it was followed by triumphs for which Pitt had prepared the way, the prescience of the great war-minister appeared to be fully established. But it was his love of war, not his skill in carrying it on, which was really in question. He would be satisfied with nothing short of the absolute ruin of France. He would have given England that dangerous position of supremacy which was gained for France by Louis XIV. in the 17th century, and by Napoleon in the 19th century. He would have made his country still more haughty and arrogant than it was, till other nations rose against it, as they have three times risen against France, rather than submit to the intolerable yoke. It was a happy thing for England that peace was signed (1763).

Pitt's resignation.

Bute and Grenville.

Even as it was, a spirit of contemptuous disregard of the rights of others had been roused, which would not be easily allayed. The king's premature attempt to secure a prime minister of his own choosing in Lord Bute (1761) came to an end through the minister's incapacity (1763). George Grenville, who followed him, kept the king in leading strings in reliance upon his parliamentary majority. Something, no doubt, had been accomplished by the incorruptibility of Pitt. The practice of bribing members of parliament by actual presents in money came to an end, though the practice of bribing them by place and pension long continued. The arrogance which Pitt displayed towards foreign nations was displayed by Grenville towards classes of the population of the British dominions. It was enough for him to establish a right. He never put himself in the position of those who were to suffer by its being put in force.

The American colonies.

The first to suffer from Grenville's conception of his duty were the American colonies. The mercantile system, which had sprung up in Spain in the 16th century, held that colonies were to be entirely prohibited from trading, except with the mother country. Every European country had adopted this view, and the acquisition of fresh colonial dominions by England, at the peace of 1763, had been made not so much through lust of empire as through love of trade. Of all English colonies, the American were the most populous and important. Their proximity to the Spanish colonies in the West Indies had naturally led to a contraband trade. To this trade Grenville put a stop, as far as lay in his power. Obnoxious as this measure was in America, the colonists had acknowledged the principle on which it was founded too long to make it easy to resist it. Another step of Grenville's met with more open opposition. Even with all the experience of the century which followed, the relations between a mother country and her colonies are not easy to arrange. If the burthen of defence is to be borne in common, it can hardly be left to the mother country to declare war, and to exact the necessary taxation, without the consent of the colonies. If, on the other hand, it is to be borne by the mother country alone, she may well complain that she is left to bear more than her due share of the weight. The latter alternative forced itself upon the attention of Grenville. The British parliament, he held, was the supreme legislature, and, as such, was entitled to raise taxes in America to support the military forces needed for the defence of America. The act (1765) imposing a stamp tax on the American colonies was the result.

The Rockingham ministry.

As might have been expected, the Americans resisted. For them, the question was precisely that which Hampden had fought out in the case of ship-money. As far as they were concerned, the British parliament had stepped into the position of Charles I. If Grenville had remained in office he would probably have persisted in his resolution. He was driven from his post by the king's resolve no longer to submit to his insolence, and a new ministry was formed under the marquess of Rockingham, composed of some of those leaders of the Whig aristocracy who had not followed the Grenville ministry. They were well-intentioned, but weak, and without political ability; and the king regarded them with distrust, only qualified by his abhorrence of the ministry which they superseded.

The Declaratory Act and repeal of Stamp Act.

As soon as the bad news came from America, the ministry was placed between two recommendations. Grenville, on the one hand, advised that the tax should be enforced. Pitt, on the other, declared that the British parliament had absolutely no right to tax America, though he held that it had the right to regulate, or in other words to tax, the commerce of America for the benefit of the British merchant and manufacturer. Between the two the government took a middle course. It obtained from parliament a total repeal of the Stamp Act, but it also passed a Declaratory Act, claiming for the British parliament the supreme power over the colonies in matters of taxation, as well as in matters of legislation.

Burke's political theory.

It is possible that the course thus adopted was chosen simply because it was a middle course. But it was probably suggested by Edmund Burke, who was then Lord Rockingham's private secretary, but who for some time to come was to furnish thought to the party to which he attached himself. Burke carried into the world of theory those politics of expediency of which Walpole had been the practical originator. He held that questions of abstract right had no place in politics. It was therefore as absurd to argue with Pitt that England had a right to regulate commerce, as it was to argue with Grenville that England had a right to levy taxes. All that could be said was, that it was expedient in a widespread empire that the power of final decision should be lodged somewhere, and that it was also expedient not to use that power in such a way as to irritate those whom it was the truest wisdom to conciliate.

Arguments of Pitt and Burke.

The weak side of this view was the weak side of all Burke's political philosophy. Like all great innovators, he was intensely conservative where he was not an advocate of change. With new views on every subject relating to the exercise of power, he shrank even from entertaining the slightest question relating to the distribution of power. He recommended to the British parliament the most self-denying wisdom, but he could not see that in its relation to the colonies the British parliament was so constituted as to make it entirely unprepared to be either wise or self-denying. It is true that if he had thought out the matter in this direction, he would have been led further than he or any other man in England or America was at that time prepared to go. If the British parliament was unfit to legislate for America, and if, as was undoubtedly the case, it was impossible to create a representative body which was fit to legislate, it would follow that the American colonies could only be fairly governed as practically independent states, though they might possibly remain, like the great colonies of our own day, in a position of alliance rather than of dependence. It was because the issues opened led to changes so far greater than the wisest statesman then perceived, that Pitt's solution, logically untenable as it was, was preferable to Burke's. Pitt would have given bad reasons for going a step in the right direction. Burke gave excellent reasons why those who were certain to go wrong should have the power to go right.

Ministry of Lord Chatham.

Scarcely were the measures relating to America passed when the king turned out the ministry. The new ministry was formed by Pitt, who was created earl of Chatham (1766), on the principle of bringing together men who had shaken themselves loose from any of the different Whig cliques. Whatever chance the plan had of succeeding was at an end when Chatham's mind temporarily gave way under stress of disease (1767). Charles Townshend, a brilliant, headstrong man, led parliament in the way which had been prepared by the Declaratory Act, and laid duties on tea and other articles of commerce entering the ports of America.

Wilkes and "The North Briton."

It was impossible that the position thus claimed by the British parliament towards America should affect America alone. The habit of obtaining money otherwise than by the consent of those who are required to pay it would be certain to make parliament careless of the feelings and interests of that great majority of the population at home, which was unrepresented in parliament. The resistance of America to the taxation imposed was therefore not without benefit to the people of the mother country. Already there were signs of a readiness in parliament to treat even the constituencies with contempt. In 1763, in the days of the Grenville ministry, John Wilkes, a profligate and scurrilous writer, had been arrested on a general warrant—that is to say, a warrant in which the name of no individual was mentioned—as the author of an alleged libel on the king, contained in No. 45 of *The North Briton*. He was a member of parliament, and as such was declared by Chief Justice Pratt to be privileged against arrest. In 1768 he was elected member for Middlesex. The House of Commons expelled him. He was again elected, and again expelled. The third time, the Commons gave the seat to which Wilkes was a third time chosen to Colonel Luttrell, who was far down in the poll. Wilkes thus became the representative of a great constitutional principle, the principle that the electors have a right to choose their representatives without restriction, save by the regulations of the law.

For the present the contention of the American colonists and of the defenders of Wilkes at home was confined within the compass of the law. Yet in both cases it might easily pass beyond that compass, and might rest itself upon an appeal to the duty of governments to modify the law, and to enlarge the basis of their authority, when law and authority have become too narrow.

Lord North's ministry.

As regards America, though Townshend died, the government persisted in his policy. As resistance grew stronger in America, the king urged the use of compulsion. If he had not the wisdom of the country on his side, he had its prejudices. The arrogant spirit of Englishmen made them comtemptuous towards the colonists, and the desire to thrust taxation upon others than themselves made the new colonial legislation popular. In 1770 the king made Lord North prime minister. He had won the object on which he had set his heart. A new Tory party had sprung up, not distinguished, like the Tories of Queen Anne's reign, by a special ecclesiastical policy, but by their acceptance of the king's claim to nominate ministers, and so to predominate in the ministry himself.

Unhappily the opposition, united in the desire to conciliate America, was divided on questions of home policy. Chatham would have met the new danger by parliamentary reform, giving increased voting power to the freeholders of the counties. Burke from principle, and his noble patrons mainly from lower motives, were opposed to any such change. As Burke had wished the British parliament to be supreme over the colonies, in confidence that this supremacy would not be abused, so he wished the great landowning connexion resting on the rotten boroughs to rule over the unrepresented people, in confidence that this power would not be abused. Amid these distractions the king had an easy game to play. He had all the patronage of the government in his hands, and beyond the circle which was influenced by gifts of patronage, he could appeal to the ignorance and self-seeking of the nation, with which, though he knew it not, he was himself in the closest sympathy.

The American War of Independence.

No wonder resistance grew more vigorous in America. In 1773 the inhabitants of Boston threw ship-loads of tea into the harbour rather than pay the obnoxious duty. In 1774 the Boston Port Bill deprived Boston of its commercial rights, whilst the Massachusetts Government Bill took away from that colony the ordinary political liberties of Englishmen. The first skirmish of the inevitable war was fought at Lexington in 1775. In 1776 the thirteen colonies united in the continental congress issued their Declaration of Independence. England put forth all its strength to beat down resistance; but the task, which seemed easy at a distance, proved impossible. It might have been so even had the war been conducted on the British side with greater military skill and with more insight into the conditions of the struggle, which was essentially a civil contest between men of the same race. But the initial difficulties of the vast field of operations were greatly increased by the want of skill of the British leaders in adapting themselves to new conditions, while even loyalist sentiment was shocked by the employment of German mercenaries and Red Indian savages against men of English blood. Even so, the issue of the struggle was for long doubtful, and there were moments when it might have ended by a policy of wise concession; but the Americans, though reduced at times to desperate straits, had the advantage of fighting in their own country, and above all they found in George Washington a leader after the model of the English country gentleman who had upheld the standard of liberty against the Stuarts, and worthy of the great cause for which they fought. In 1777 a British army under Burgoyne capitulated at Saratoga; and early in 1778 France, eager to revenge the disasters of the Seven Years' War, formed an alliance with the revolted colonies as free and independent states, and was soon joined by Spain.

Chatham, who was ready to make any concession to America short of independence, and especially of independence at the dictation of France, died in 1778. The war was continued for some years with varying results; but in 1781 the capitulation of a second British army under Cornwallis at Yorktown was a decisive blow, which brought home to the minds of the dullest the assurance that the conquest of America was an impossibility.

Before this event happened there had been a great change in public feeling in England. The increasing weight of taxation gave rise in 1780 to a great meeting of the freeholders of Yorkshire, which in turn gave the signal for a general agitation for the reduction of unnecessary expense in the government. To this desire Burke gave expression in his bill for economical reform, though he was unable to carry it in the teeth of interested opposition. The movement in favour of economy was necessarily also a movement in favour of peace; and when the surrender of Yorktown was known (1782), Lord North at once resigned office.

The second Rockingham ministry.

The new ministry formed under Lord Rockingham comprised not only his own immediate followers, of whom the most prominent was Charles Fox, but the followers of Chatham, of whom Lord Shelburne was the acknowledged leader. A treaty of peace acknowledging the independence of the United States of America was at once set on foot; and the negotiation with France was rendered easy by the defeat of a French fleet by Rodney, and by the failure of the combined forces of France and Spain to take Gibraltar.

The coalition.

Already the ministry on which such great hopes had been placed had broken up. Rockingham died in July 1782. The two sections of which the government was composed had different aims. The Rockingham section, which now looked up to Fox, rested on aristocratic connexion and influence; the Shelburne section was anxious to gain popular support by active reforms, and to gain over the king to their side. Judging by past experience, the combination might well seem hopeless, and honourable men like Fox might easily regard it with suspicion. But Fox's allies took good care that their name should not be associated with the idea of improvement. They pruned Burke's Economical Reform Bill till it left as many abuses as it suppressed; and though the bill prohibited the grant of pensions above £300, they hastily gave away pensions of much larger value to their own friends before the bill had received the royal assent. They also opposed a bill for parliamentary reform brought in by young William Pitt. When the king chose Shelburne as prime minister, they refused to follow him, and put forward the incompetent duke of Portland as their candidate for the office. The struggle was thus renewed on the old ground of the king's right to select his ministers. But while the king now put forward a minister notoriously able and competent to the task, his opponents put forward a man whose only claim to office was the possession of large estates. They forced their way back to power by means as unscrupulous as their claim to it was unjustifiable. They formed a coalition with Lord North, whose politics and character they had denounced for years. The coalition, as soon as the peace with America and France had been signed (1783), drove Shelburne from office. The duke of Portland became the nominal head of the government, Fox and North its real leaders.

The India Bill.

Such a ministry could not afford to make a single blunder. The king detested it, and the assumption by the Whig houses of a right to nominate the head of the government without reference to the national interests, could never be popular. The blunder was soon committed. Burke, hating wrong and injustice with a bitter hatred, had descried in the government of British India by the East India Company a disgrace to the English name. For many of the actions of that government no honourable man can think of uttering a word of defence. The helpless natives were oppressed and robbed by the company and its servants in every possible way. Burke drew up a bill, which was adopted by the coalition government, for taking all authority in India out of the hands of the company, and even placing the company's management of its own commercial affairs under control. The governing and controlling body was naturally to be a council appointed at home. The question of the nomination of this council at once drew the whole question within the domain of party politics. The whole patronage of India would be in its hands, and, as parliament was then constituted, the balance of parties might be more seriously affected by the distribution of that patronage than it would be now. When, therefore, it was understood that the government bill meant the council to be named in the bill for four years, or, in other words, to be named by the coalition ministry, it was generally regarded as an unblushing attempt to turn a measure for the good government of India into a measure for securing the ministry in office. The bill of course passed the Commons. When it came before the Lords, it was thrown out in consequence of a message from the king, that he would regard any one who voted for it as his enemy.

Ministry of the younger Pitt.

The contest had thus become one between the influence of the crown and the influence of the great houses. Constitutional historians, who treat the question as one of merely theoretical politics, leave out of consideration this essential element of the situation, and forget that, if it was wrong for the king to influence the Lords by his message, it was equally wrong for the ministry to acquire for themselves fresh patronage with which to influence the Commons. But there was now, what there had not been in the time of Walpole and the Pelhams, a public opinion ready to throw its weight on one side or the other. The county members still formed the most independent portion of the representation, and there were many possessors of rotten boroughs, who were ready to agree with the county members rather than with the great landowners. In choosing Pitt, the young son of Chatham, for his prime minister, as soon as he had dismissed the coalition, George III. gave assurance that he wished his counsels to be directed by integrity and ability. After a struggle of many weeks, parliament was dissolved (1784), and the new House of Commons was prepared to support the king's minister by a large majority.

As far as names go, the change effected placed the new Tory party in office for an almost uninterrupted period of forty-six years. It so happened, however, that after the first eight years of that period had passed by, circumstances occurred which effected so great a change in the composition and character of that party as to render any statement to this effect entirely illusive. During eight years, however, Pitt's ministry was not merely a Tory ministry resting on the choice of the king, but a Liberal ministry resting on national support and upon advanced political knowledge.

Material progress.

The nation which Pitt had behind him was very different from the populace which had assailed Walpole's Excise Bill, or had shouted for Wilkes and liberty. At the beginning of the century the intellect of thoughtful Englishmen had applied itself to speculative problems of religion and philosophy. In the middle of the century it applied itself to practical problems affecting the employment of industry. In 1776 Adam Smith published the *Wealth of Nations*. Already in 1762 the work of Brindley, the Bridgewater canal, the first joint of a network of inland water communication, was opened. In 1767 Hargreaves produced the spinning-jenny; Arkwright's spinning machine was exhibited in 1768; Crompton's mule was finished in 1779; Cartwright hit upon the idea of the power-loom in 1784, though it was not brought into profitable use till 1801. The Staffordshire potteries had been flourishing under Wedgwood since 1763, and the improved steam-engine was brought into shape by Watt in 1768. During these years the duke of Bedford, Coke of Norfolk, and Robert Bakewell were busy in the improvement of stock and agriculture.

The increase of wealth and prosperity caused by these changes went far to produce a large class of the population entirely outside the associations of the landowning class, but with sufficient intelligence to appreciate the advantages of a government carried on without regard to the personal interests and rivalries of the aristocracy. The mode in which that increase of wealth was effected was even more decisive on the ultimate destinies of the country. The substitution of the organization of hereditary monarchy for the organization of wealth and station would ultimately have led to evils as great as those which it superseded. It was only tolerable as a stepping-stone to the organization of intelligence. The larger the numbers admitted to influence the affairs of state, the more necessary is it that they respect the powers of intellect. It would be foolish to institute a comparison between an Arkwright or a Crompton and a Locke or a Newton. But it is certain that for one man who could appreciate the importance of the treatise *On the Human Understanding* or the theory of gravitation, there were thousands who could understand the value of the water-frame, or the power-loom. The habit of looking with reverence upon mental power was fostered in no slight measure by the industrial development of the second half of the 18th century.

Pitt's India Bill.

The supremacy of intelligence in the political world was, for the time, represented in Pitt. In 1784 he passed an India Bill, which left the commerce and all except the highest patronage of India in the hands of the East India Company, but which erected a department of the home government, named the board of control, to compel the company to carry out such political measures as the government saw fit. A bill for parliamentary reform was, however, thrown out by the opposition of his own supporters in parliament, whilst outside parliament there was no general desire for a change in a system which for the present produced such excellent fruits

Still more excellent was his plan of legislation for Ireland. Irishmen had taken advantage of the weakness of England during the American War to enforce upon the ministry of the day, in 1780 and 1782, an abandonment of all claim on the part of the English government and the English judges to interfere in any way with Irish affairs. From 1782, therefore, there were two independent legislatures within the British Isles—the one sitting at Westminster and the other sitting in Dublin. With these political changes Fox professed himself to be content. Pitt, whose mind was open to wider considerations, proposed to throw open commerce to both nations by removing all the restrictions placed on the trade of Ireland with England and with the rest of the world. The opposition of the English parliament was only removed by concessions continuing some important restrictions upon Irish exports, and by giving the English parliament the right of initiation in all measures relating to the regulation of the trade which was to be common to both nations. The Irish parliament took umbrage at the superiority claimed by England, and threw out the measure as an insult, though, even as it stood, it was undeniably in favour of Ireland. The lesson of the incompatibility of two coordinate legislatures was not thrown away upon Pitt.

In 1786 the commercial treaty with France opened that country to English trade, and was the first result of the theories laid down by Adam Smith ten years previously. The first attack upon the horrors of the slave-trade was made in 1788; and in the same year, in the debates on the Regency Bill caused by the king's insanity, Pitt defended against Fox the right of parliament to make provision for the exercise of the powers of the crown when the wearer was permanently or temporarily disabled from exercising his authority.

When the king recovered, he went to St Paul's to return thanks on the 23rd of April 1789. The enthusiasm with which he was greeted showed how completely he had the nation on his side. All the hopes of liberal reformers were now with him. All the hopes of moral and religious men were on his side as well. The seed sown by Wesley had grown to be a great tree. A spirit of thoughtfulness in religious matters and of moral energy was growing in the nation, and the king was endeared to his subjects, as much by his domestic virtues as by his support of the great minister who acted in his name. The happy prospect was soon to be overclouded. On the 4th of May, eleven days after the appearance of George III. at St Paul's, the French states-general met at Versailles.

The French Revolution: English feeling.

By the great mass of intelligent Englishmen the change was greeted with enthusiasm. It is seldom that one nation understands the tendencies and difficulties of another; and the mere fact that power was being transferred from an absolute monarch to a representative assembly led superficial observers to imagine that they were witnessing a mere repetition of the victory of the English parliament over the Stuart kings. In fact, that which was passing in France was of a totally different nature from the English struggle of the 17th century. In England, the conflict had been carried on for the purpose of limiting the power of the king. In France, it was begun in order to sweep away an aristocracy in church and state which had become barbarously oppressive. The French Revolution was not, therefore, a conflict for the reform of the political organization of the state, but one for the reorganization of the whole structure of society; and in proportion as it turned away from the path which English ignorance had marked out for it, Englishmen turned away from it in disgust. As they did not understand the aims of the French Revolutionists, they were unable to make that excuse for even so much of their conduct as admits of excuse. Three men, Fox, Burke and Pitt, however, represented three varieties of opinion into which the nation was very unequally divided.

Fox, generous and trustful towards the movements of large masses of men, had very little intellectual grasp of the questions at issue in France. He treated the struggle as one simply for the establishment of free institutions; and when at last the crimes of the leaders became patent to the world, he contented himself with lamenting the unfortunate fact, and fell back on the argument that though England could not sympathize with the French tyrants, there was no reason why she should go to war with them.

Burke, on the other hand, while he failed to understand the full tendency of the Revolution for good as well as for evil, understood it far better than any Englishman of that day understood it. He saw that its main aim was equality, not liberty, and that not only would the French nation be ready, in pursuit of equality, to welcome any tyranny which would serve its purpose, but would be the more prone to acts of tyranny over individuals. This would arise from the remodelling of institutions, with the object of giving immediate effect to the will of the masses, which was especially liable to be counterfeited by designing and unscrupulous agitators. There is no doubt that in all this Burke was in the right, as he was in his denunciation of the mischief certain to follow when a nation tries to start afresh, and to blot out all past progress in the light of simple reason, which is often most fallible when it believes itself to be most infallible. Where he went wrong was in his ignorance of the special circumstances of the French nation, and his consequent blindness to the fact that the historical method of gradual progress was impossible where institutions had become so utterly bad as they were in France, and that consequently the system of starting afresh, to which he reasonably objected, was to the French a matter not of choice but of necessity. Nor did he see that the passion for equality, like every great passion, justified itself, and that the problem was, not how to obtain liberty in defiance of it, but how so to guide it as to obtain liberty by it and through it.

Burke did not content himself with pointing out speculatively the evils which he foreboded for the French. He perceived clearly that the effect of the new French principles could no more be confined to French territory than the principles of Protestantism in the 16th century could be confined to Saxony. He knew well that the appeal to abstract reason and the hatred of aristocracy would spread over Europe like a flood, and, as he was in the habit of considering whatever was most opposed to the object of his dislike to be wholly excellent, he called for a crusade of all established governments against the anarchical principles of dissolution which had broken loose in France.

Pitt occupied ground apart from either Fox or Burke. He had neither Fox's sympathy for popular movements, nor Burke's intellectual appreciation of the immediate tendencies of the Revolution. Hence, whilst he pronounced against any active interference with France, he was an advocate of peace, not because he saw more than Fox or Burke, but because he saw less. He fancied that France would be so totally occupied with its own troubles that it would cease for a long time to be dangerous to other nations.

Beginning of the revolutionary wars.

This view was soon to be stultified by the effect of the coalition against France in 1792 of Prussia and Austria. The proclamation of the allies calling on the French to restore the royal authority was answered by a passionate outburst of defiance. The king himself was suspected of complicity with the invaders of his country, and the rising of the 10th of August was followed by the proclamation of the republic and by the awful "September massacres" of helpless prisoners, guilty of no crime but noble birth, and therefore presumably of attachment to the old régime, and treason towards the new. This passionate attachment to the Revolution, which in France displayed itself in a carnival of insane suspicion and cruelty, inspired on the frontiers an astonishing patriotic resistance. Before the end of the year the invasion was repulsed, and the ragged armies of the Revolution had overrun Savoy and the Austrian Netherlands, and were threatening the aristocratic Dutch republic

Very few governments in Europe were so rooted in the affections of their people as to be able to look without terror on the challenge thus thrown out to them. The English government was one of those very few. No mere despotism was here exercised by the king. No broad impassable line here divided the aristocracy from the people. The work of former generations of Englishmen had been too well done to call for that breach of historical continuity which was a dire necessity in France. There was much need of reform. There was no need of a revolution. The whole of the upper and middle classes, with few exceptions, clung together in a fierce spirit of resistance; and the mass of the lower classes, especially in the country, were too well off to wish for change. The spirit of resistance to revolution quickly developed into a spirit of resistance to reform, and those who continued to advocate changes, more or less after the French model, were treated as the enemies of mankind. A fierce hatred of France and of all that attached itself to France became the predominating spirit of the nation.

Change of feeling in England.

Division of the Whig party.

Such a change in the national mind could not but affect the constitution of the Whig party. The reasoning of Burke would, in itself, have done little to effect its disruption. But the great landowners, who contributed so strong an element in it, composed the very class which had most to fear from the principles of the Revolution. The old questions which had divided them from the king and Pitt in 1783 had dwindled into nothing before the appalling question of the immediate present. They made themselves the leaders of the war party, and they knew that that party comprised almost the whole of the parliamentary classes.

What could Pitt do but surrender? The whole of the intellectual basis of his foreign policy was swept away when it became evident that the continental war would bring with it an accession of French territory. He did not abandon his opinions. His opinions rather abandoned him. A wider intelligence might have held that, let France gain what territorial aggrandizement it might upon the continent of Europe, it was impossible to resist such changes until the opponents of France had so purified themselves as to obtain a hold upon the moral feelings of mankind. Pitt could not take this view; perhaps no man in his day could be fairly expected to take it. He did not indeed declare war against France; but he sought to set a limit to her conquests in the winter, though he had not sought to set a limit to the conquests of the allied sovereigns in the preceding summer. He treated with supercilious contempt the National Convention, which had dethroned the king and proclaimed a republic. Above all, he took up a declaration by the Convention, that they would give help to all peoples struggling for liberty against their respective governments, as a challenge to England. The horror caused in England by the trial and execution of Louis XVI. completed the estrangement between the two countries, and though the declaration of war came from France (1793), it had been in great part brought about by the bearing of England and its government. (S. R. G.)

XI. The Revolutionary Epoch, the Reaction, and the Triumph of Reform (1793–1837)

The government and the "revolutionary" agitation.

In appearance the great Whig landowners gave their support to Pitt, and in 1794 some of their leaders, the duke of Portland, Lord Fitzwilliam, and Windham, entered the cabinet to serve under him. In reality it was Pitt who had surrendered. The ministry and the party by which it was supported might call themselves Tory still; but the great reforming policy of 1784 was at an end, and the government, unconscious of its own strength, conceived its main function to be at all costs to preserve the constitution, which it believed to be in danger of being overwhelmed by the rising tide of revolutionary feeling. That this belief was idle it is now easy enough to see; at the time this was not so obvious. Thomas Paine's *Rights of Man*, published in 1791, a brilliant and bitter attack on the British constitution from the Jacobin point of view, sold by tens of thousands. Revolutionary societies with high-sounding names were established, of which the most conspicuous were the Revolution Society, the Society for Constitutional Information, the London Corresponding Society, and the Friends of the People. Of these, indeed, only the two last were directly due to the example of France. The Revolution Society, founded to commemorate the revolution of 1688, had long carried on a respectable existence under the patronage of cabinet ministers; the Society for Constitutional Information, of which Pitt himself had been a member, was founded in 1780 to advocate parliamentary reform; both had, however, developed under the influence of the events in France in a revolutionary direction. The London Corresponding Society, composed mainly of working-men, was the direct outcome of the excitement caused by the developments of the French Revolution. Its leaders were obscure and usually illiterate men, who delighted to propound their theories for the universal reformation of society and the state in rhetoric of which the characteristic phrases were borrowed from the tribune of the Jacobin Club. Later generations have learned by repeated experience that the eloquence of Hyde Park orators is not the voice of England; there were some even then—among those not immediately responsible for keeping order—who urged the government "to trust the people";[1] but with the object-lesson of France before them it is not altogether surprising that ministers refused to believe in the harmlessness of societies, which not only kept up a fraternal correspondence with the National Convention and the Jacobin Club, but, by attempting to establish throughout the country a network of affiliated clubs, were apparently aiming at setting up in Great Britain the Jacobin idea of popular control.

The danger, of course, was absurdly exaggerated; as indeed was proved by the very popularity of the repressive measures to which the government thought it necessary to resort, and which gave to the vapourings of a few knots of agitators the dignity of a widespread conspiracy for the overthrow of the constitution. On the 1st of December 1792 a proclamation was issued calling out the militia on the ground that a dangerous spirit of tumult and disorder had been excited by evil-disposed persons, acting in concert with persons in foreign parts, and this statement was repeated in the king's speech at the opening of parliament on the 13th. In spite of the protests of Sheridan and other members of the opposition, a campaign of press and other prosecutions now began which threatened to extinguish the most cherished right of Englishmen—liberty of speech. The country was flooded with government spies and informers, whose efforts were seconded by such voluntary societies as the Association for preserving Liberty and Property against Republicans and Levellers, founded by John Reeves, the historian of English law. No one was safe from these zealous and too often credulous defenders of the established order; and a few indiscreet words spoken in a coffee house were enough to bring imprisonment and ruin, as in the case of John Frost, a respectable attorney, condemned for sedition in March 1793. In Scotland the panic, and the consequent cruelty, were worse than in England. The meeting at Edinburgh of a "convention of delegates of the associated friends of the people," at which some foolish and exaggerated language was used, was followed by the trial of Thomas Muir, a talented young advocate whose brilliant defence did not save him from a sentence of fourteen years' transportation (August 30, 1793), while seven years' transportation was the punishment of the Rev. T. Fyshe Palmer for circulating an address from "a society of the friends of liberty to their fellow-citizens" in favour of a reform of the House of Commons. These sentences and the proceedings which led up to them, though attacked with bitter eloquence by Sheridan and Fox, were confirmed by a large majority in parliament.

It was not, however, till late in the session of 1794 that ministers laid before parliament any evidence of seditious practices. In May certain leaders of democratic societies were arrested and their papers seized, and on the 13th a king's message directed the books of certain corresponding societies to be laid before both Houses. The committee of the House of Commons at once reported that there was evidence of a conspiracy to supersede the House of Commons by a national convention, and Pitt proposed and carried a bill suspending the Habeas Corpus Act. This was followed by further reports of the committees of both Houses, presenting evidence of the secret manufacture of arms and of other proceedings calculated to endanger the public peace. A series of state prosecutions followed. The trials of Robert Watt and David Downie for high treason (August and September 1794) actually revealed a treasonable plot on the part of a few obscure individuals at Edinburgh, who were found in the possession of no less than fifty-seven pikes of home manufacture, wherewith to overthrow the British government. The execution of Watt gave to this trial a note of tragedy which was absent from that of certain members of the Corresponding Society, accused of conspiring to murder the king by means of a poisoned arrow shot from an air-gun. The ridicule that greeted the revelation of the "Pop-gun Plot" marked the beginning of a reaction that found a more serious expression in the trials of Thomas Hardy, John Horne Tooke and John Thelwall (October and November 1794). The prisoners were accused of high treason, their chief offence consisting in their attempt to assemble a general convention of the people, ostensibly for the purpose of obtaining parliamentary reform, but really—as the prosecution urged—for subverting the constitution. This latter charge, though proved to the satisfaction of the committees of both Houses of Parliament, broke down under the cross-examination of the government witnesses by the counsel for the defence, and could indeed only have been substantiated by a dangerous stretching of the doctrine of constructive treason. Happily the jury refused to convict, and its verdict saved the nation from the disgrace of meting out the extreme penalty of high treason to an attempt to hold a public meeting for the redress of grievances.

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[1] The position of the Corresponding Society was greatly strengthened by the establishment of the Friends of the People by Erskine and Grey.

The common sense of a British jury had preserved, in spite of parliament and ministry, that free right of meeting which was to be one of the strongest instruments of future reform. The government, however, saw little reason in the events of the following months for reversing their coercive policy. The year 1795 was one of great suffering and great popular unrest; for the effect of the war upon industry was now beginning to be felt, and the distress had been aggravated by two bad harvests. The sudden determination of those in power, who had hitherto advocated reform, to stereotype the existing system, closed the avenues of hope to those who had expected an improvement of their lot from constitutional changes, and the disaffected temper of the populace that resulted was taken advantage of by the London Corresponding Society, emboldened by its triumph in the courts, to organize open and really dangerous demonstrations, such as the vast mass meeting at Copenhagen House on the 26th of October. On the 29th of October the king, on his way to open parliament, was attacked by an angry mob shouting, "Give us bread," "No Pitt," "No war," "No famine,"; and the glass panels of his state coach were smashed to pieces.

The result of these demonstrations was the introduction in the House of Lords, on the 4th of November, of the Treasonable Practices Bill, the main principle of which was that it modified the law of treason by dispensing with the necessity for the proof of an overt act in order to secure conviction; and in the House of Commons, on the 10th, of the Seditious Meetings Bill, which seriously limited the right of public meeting, making all meetings of over fifty persons, as well as all political debates and lectures, subject to the previous consent and active supervision of the magistrates. In spite of the strenuous resistance of the opposition, led by Fox, and of numerous meetings of protest held outside the walls of parliament, both bills passed into law by enormous majorities. The inevitable result followed. The London Corresponding Society and other political clubs, deprived of the right of public meeting, became secret societies pledged to the overthrow of the existing system by any means. United Englishmen and United Scotsmen plotted with United Irishmen for a French invasion, and sedition was fomented in the army and the navy. Their baneful activities were exposed in the inquiries that followed the Irish rebellion of 1798, and the result was the Corresponding Societies Bill, introduced by Pitt on the 19th of April 1799, which completed the series of repressive measures and practically suspended the popular constitution of England. The right of public meeting, of free speech, of the free press had alike ceased for the time to exist.

The Revolutionary War.

The justification of the government in all this was the life and death struggle in which Great Britain was engaged with the power of republican France in Europe. Yet Pitt's conduct of the war, so far as the continent was concerned, had hitherto led to nothing but failure after failure. In 1794, in spite of the presence of an English army under the duke of York, the Austrian Netherlands had been finally conquered and annexed to the French republic; in 1795 the Dutch republic was affiliated to that of France, and the peace of Basel between Prussia and the French republic left Austria to continue the war alone with the aid of British subsidies. On the sea Great Britain had been more successful, Howe's victory of the 1st of June 1794 being the first of the long series of defeats inflicted on the French navy, while in 1795 a beginning was made of the vast expansion of the British Empire by the capture of Ceylon and the Cape of Good Hope from the Dutch (see French Revolutionary Wars). The war, however, had become so expensive, and its results were evidently so small, that there was a growing feeling in England in favour of peace, especially as the Reign of Terror had come to an end in 1794, and a regular government, the Directory, had been appointed in 1795. At last Pitt was forced to yield to the popular clamour, and in 1796 Lord Malmesbury was sent to France to treat for peace. The negotiation, however, was at once broken off by his demand that France should abandon the Netherlands.

Hoche's expedition to Ireland.

The French government, assured now of the assistance of Spain and Holland, and freed of the danger from La Vendée, now determined to attempt the invasion of Ireland. On the 16th of December a fleet of 17 battle-ships, 13 frigates and 15 smaller vessels set sail from Brest, carrying an expeditionary force of some 13,000 men under General Hoche. The British fleet, under Lord Bridport, was wintering at Spithead; and before it could put to sea the French had slipped past. Before it reached the coast of Ireland, however, the French fleet had already suffered serious losses, owing partly to the attacks of British frigate detachments, partly to the bad seamanship of the French crews and the rottenness of the ships. Only a part of the fleet succeeded in reaching Bantry Bay on the 20th of December, and of these a large number were scattered by a storm on the 23rd. Hoche himself, with the French admiral, had been driven far to the westward in an effort to avoid capture; the attempt of Grouchy, in his absence, to land a force was defeated by the weather, and by the end of the month the whole expedition was in full retreat for Brest. A French diversion on the coast of Pembroke was even less successful; a force of 1500 men, under Colonel Tate, an American adventurer, landed in Cardigan Bay on the 22nd of February 1797, but was at once surrounded by the local militia and surrendered without a blow.

Mutinies at Spithead and the Nore.

A more serious attempt was now made to renew the enterprise by means of a junction of the French, Spanish and Dutch fleets. The victory of Jervis over the Spanish fleet at St Vincent on the 14th of February postponed the imminence of the danger; but this again became acute owing to the general disaffection in the fleet, which in April and May found vent in the serious mutinies at Spithead and the Nore. The mutiny at Spithead, which was due solely to the intolerable conditions under which the seamen served at the time, was ended on the 17th of May by concessions: an increase of pay, the removal of officers who had abused their power of discipline, and the promise of a general free pardon. More serious was the outbreak at the Nore. The disaffection had spread practically to the whole of Admiral Duncan's fleet, and by the beginning of June the mutineers were blockading the Thames with no less than 26 vessels. The demands of the seamen were more extensive than at Spithead; their resistance was better organized; and they were suspected, though without reason, of harbouring revolutionary designs. The return of the Channel fleet to its duty emboldened the admiralty to refuse any concessions, and the vigorous measures of repression taken proved effective. One by one the mutinous crews surrendered; and the arrest of the ringleader, Richard Parker, on board the "Sandwich," on the 14th of June, brought the affair to an end.[1] The seamen regained their reputation, and those who had been imprisoned their liberty, by Duncan's victory over the Dutch fleet at Camperdown (October 11), by which the immediate danger was averted. Though the French attempt at a concerted invasion had failed, however, the Directory did not abandon the enterprise, and commissioned Bonaparte to draw up fresh plans.

Battle of Camperdown.

At the close of the year 1797 the position of Great Britain was indeed sufficiently alarming. On the 18th of April, during the very crisis of the mutiny at Spithead, Austria had signed with Bonaparte the humiliating terms of the preliminary peace of Leoben, which six months later were embodied in the treaty of Campo Formio (October 17). On the 10th of August Portugal had concluded a treaty with the French Republic; and Great Britain was left without an ally in Europe. The mutiny at the Nore, the threat of rebellion in Ireland, the alarming fall in consols, argued strongly against continuing the war single-handed, and in July Lord Malmesbury had been sent to Lille to open fresh negotiations with the plenipotentiaries of France. The negotiations broke down on the refusal of England to restore the Cape of Good Hope to the Dutch. But though forced, in spite of misgivings, to continue the struggle, the British government in one very important respect was now in a far better position to do so. For though Great Britain was now isolated and her policy in Europe advertised as a failure, the temper of the British people was less inclined to peace in 1798 than it had been three years before. The early enthusiasm of the disfranchised classes for French principles had cooled with the later developments of the Revolution; the attempted invasions had roused the national spirit; and in the public imagination the sinister figure of Bonaparte, the rapacious conqueror, was beginning to loom large to the exclusion of lesser issues. Henceforth, in spite of press prosecutions and trials for political libel, the government was supported by public opinion in its vigorous prosecution of the war.

The Act of Union with Ireland.

If the danger of French invasion was a reality, it was so mainly owing to the deplorable condition of Ireland, where the natural disaffection of the Roman Catholic majority of the population—deprived of political and many social rights, and exposed to the insults and oppression of a Protestant minority corrupted by centuries of ascendancy—invited the intervention of a foreign enemy. The full measure of the intolerable conditions prevailing in the country was revealed by the horrors of the rebellion of 1798, and after this had been suppressed Pitt decided that the only way to deal with the situation was to establish a union between Great Britain and Ireland, similar to that which had proved so successful in the case of England and Scotland. He saw that to establish peace in Ireland the Roman Catholics would have to be enfranchised; he realized that to enfranchise them in a separated Ireland would be to subject the proud Protestant minority to an impossible domination, and to establish not peace but war. The Union, then, was in his view the necessary preliminary to Catholic emancipation, which was at the same time the reward held out to the majority of the Irish people for the surrender of their national quasi-independence. It was a bribe little likely to appeal to the Protestant minority which constituted the Irish parliament, and to them other inducements had to be offered if the scheme was to be carried through. These inducements were not all corrupt. Those members who stood out were, indeed, bought by a lavish distribution of money and coronets; but the advantages to Ireland which might reasonably be expected from the Union were many and obvious; and if all the promises held out by the promoters of the measure have even now not been realized, the fault is not theirs. The Act of Union was placed on the statute-book in 1800; Catholic emancipation was to have been accomplished in the following session, the first of the united parliament. But Pitt's policy broke on the stubborn obstinacy of George III., who believed himself bound by his coronation oath to resist any concession to the enemies of the Established Church. The disadvantage of the possession of too strait a conscience in politics was never more dismally illustrated. To the Irish people it was the first breach of faith in connexion with the Union, and threw them into opposition to a settlement into which they believed themselves to have been drawn under false pretences. Pitt, realizing this, had no option but to resign.

Resignation of Pitt.

Bonaparte breaks up the coalition.

The resignation of the great minister who had so long held the reins of power coincided with a critical situation in Europe. The isolation of Bonaparte in Egypt, as the result of Nelson's victory of the Nile (1798), had enabled the allies to recover some of the ground lost to France. But this had merely increased Bonaparte's prestige, and on his return in 1799 he found no difficulty in making himself master of France by the *coup d'état* of the 18th Brumaire. The campaign of Marengo followed (1800) and the peace of Lunéville, which not only once more isolated Great Britain, but raised up against her new enemies, to the list of whom she added by using her command of the sea to enforce the right of search in order to seize enemies' goods in neutral vessels. Russia joined with Sweden and Denmark, all hitherto friendly powers, in resistance to this claim.

Addington ministry.

Such was the position when Addington became prime minister. He was a man of weak character and narrow intellect, whose main claim to succeed Pitt was that he shared to the full the Protestant prejudices of king and people. His tenure of power was, indeed, marked by British successes abroad; by Nelson's victory at Copenhagen, which broke up the northern alliance, and by Abercromby's victory at Alexandria, which forced the French to evacuate Egypt; but these had been prepared by the previous administration. Addington's real work was the peace of Amiens (1802), an experimental peace, as the king called it, to see if the First Consul could be contented to restrain himself within the very wide limits by which his authority in Europe was still circumscribed.

The peace of Amiens.

Renewal of the war.

In a few months Great Britain was made aware that the experiment would not succeed. Interference and annexation became the standing policy of the new French government; and Britain, discovering how little intention Bonaparte had of carrying out the spirit of the treaty, refused to abandon Malta, as she had engaged to do by the terms of peace. The war began again, no longer a war against revolutionary principles and their propaganda, but against the boundless ambitions of a military conqueror. This time the British nation was all but unanimous in resistance. This time its resistance would be sooner or later supported by all that was healthy in Europe. The news that Bonaparte was making preparations on a vast scale for the invasion of England roused a stubborn spirit of resistance in the country. Volunteers were enrolled, and the coast was dotted with Martello towers, many of which yet remain as monuments of the time when the "army of England" was encamped on the heights near Boulogne within sight of the English cliffs. To meet so great a crisis Addington was not the man. He had been ceaselessly assailed, in and out of parliament, by the trenchant criticism, and often unmannerly wit, of "Pitt's friends," among whom George Canning was now conspicuous. Pitt himself had remained silent; but in view of the seriousness of the crisis and of a threatened illness of the king, which would have necessitated a regency and—in view of the prince of Wales's dislike for him—his own permanent exclusion from office, he now put himself forward once more. The government majorities in the House now rapidly dwindled; on the 26th of April 1804, Addington resigned; and Pitt, after his attempt to form a national coalition ministry had broken

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[1] A vivid account of the mutiny and its causes is given in Captain Marryat's *King's Own*.

Pitt returns to office.

down on the king's refusal to admit Fox, became head of a government constructed on a narrow Tory basis. Of the members of the late government Lord Eldon, the duke of Portland, Lord Westmorland, Lord Castlereagh and Lord Hawkesbury retained office, the latter surrendering the foreign office to Lord Harrowby and going to the home office. Dundas, now Lord Melville, became first lord of the admiralty, and the cabinet further included Lord Camden, Lord Mulgrave and the duke of Montrose. Canning, Huskisson and Perceval were given subordinate offices.

Battle of Trafalgar.

Austerlitz.

Save for the commanding personality of Pitt, the new government was scarcely stronger than that which it had replaced. It had to face the same Whig opposition, led by Fox, who scoffed at the French peril, and reinforced by Addington and his friends; and the whole burden of meeting this opposition fell upon Pitt; for Castlereagh, the only other member of the cabinet in the House of Commons, was of little use in debate. Nevertheless, fresh vigour was infused into the conduct of the war. The Additional Forces Act, passed in the teeth of a strenuous opposition, introduced the principle of a modified system of compulsion to supplement the deficiencies of the army and reserve, while the navy was largely increased. Abroad, Pitt's whole energies were directed to forming a fresh coalition against Bonaparte, who, on the 14th of May 1804, had proclaimed himself emperor of the French; but it was a year before Russia signed with Great Britain the treaty of St Petersburg (April 11, 1805), and the accession to the coalition of Austria, Sweden and Naples was not obtained till the following September. In the following month (October 21) Nelson's crowning victory at Trafalgar over the allied fleets of France and Spain relieved England of the dread of invasion. It served, however, to precipitate the crisis on the continent of Europe; the great army assembled at Boulogne was turned eastwards; by the capitulation of Ulm (October 19) Austria lost a large part of her forces; and the last news that reached Pitt on his death-bed was that of the ruin of all his hopes by the crushing victory of Napoleon over the Russians and Austrians at Austerlitz (December 2).

Death of Pitt.

"Ministry of all the Talents."

Abolition of the slave-trade.

Pitt died on the 23rd of January, and the refusal of Lord Hawkesbury to assume the premiership forced the king to summon Lord Grenville, and to agree to the inclusion of Fox in the cabinet as secretary for foreign affairs. Several members of Pitt's administration were admitted to this "Ministry of all the Talents," including Addington (now Lord Sidmouth), who had rejoined the ministry in December 1804 and again resigned, owing to a disagreement with Pitt as to the charges against Lord Melville (*q.v.*) in July 1805. The new ministry remained in office for a year, a disastrous year which saw the culmination of Napoleon's power: the crushing of Prussia in the campaign of Jena, the formation of the Confederation of the Rhine and the end of the Holy Roman Empire. In the conduct of the war the British government had displayed little skill, frittering away its forces on distant expeditions, instead of concentrating them in support of Prussia or Russia, and the chief title to fame of the Ministry of all the Talents is that it secured the passing of the bill for the abolition of the slave-trade (March 25, 1807).

Catholic question.

The death of Fox (September 13, 1806) deprived the ministry of its strongest member, and in the following March it fell on the old question of concessions to the Roman Catholics. True to his principles, Fox had done his best to negotiate terms of peace with Napoleon; but the breakdown of the attempt had persuaded even the Whigs that an arrangement was impossible, and in view of this fact Grenville thought it his duty to advise the king that the disabilities of Roman Catholics and dissenters in the matter of serving in the army and navy should be removed, in order that all sections of the nation might be united in face of the enemy. The situation, moreover, was in the highest degree anomalous; for by an act passed in 1793 Roman Catholics might hold commissions in the army in Ireland up to the rank of colonel, and this right had not been extended to England, though by the Act of Union the armies had become one. The king, however, was not to be moved from his position; and he was supported in this attitude not only by public opinion, but by a section of the ministry itself, of which Sidmouth made himself the mouthpiece. The demand of George III. that ministers should undertake never again to approach him on the subject of concessions to the Catholics was rejected by Grenville, rightly, as unconstitutional, and on the 18th of March 1807 he resigned.

Portland ministry.

The continental system.

The Orders in Council.

War with America.

The new ministry, under the nominal headship of the valetudinarian duke of Portland, included Perceval as chancellor of the exchequer, Canning as foreign secretary and Castlereagh as secretary for war and the colonies. It had given the undertaking demanded by the king; those of its members who, like Canning, were in favour of Catholic emancipation, arguing that, in view of greater and more pressing questions, it was useless to insist in a matter which could never be settled so long as the old king lived. Of more importance to Great Britain, for the time being, than any constitutional issues, was the life-and-death struggle with Napoleon, which had now entered on a new phase. Defeated at sea, but master now of the greater part of the continent of Europe, the French emperor planned to bring Great Britain to terms by ruining her commerce with the vast territories under his influence. In November 1806 he issued from Berlin the famous decree prohibiting the importation of British goods and excluding from the harbours under his control even neutral ships that had touched at British ports. The British government replied by the famous Orders in Council of 1807, which declared all vessels trading with France liable to seizure, and that all such vessels clearing from France must touch at a British port to pay customs duties. To this Napoleon responded with the Milan decree (December 17), forbidding neutrals to trade in any articles imported from the British dominions. The effects of these measures were destined to be far-reaching. The Revolution had made war on princes and privilege, and the common people had in general gained wherever the Napoleonic régime had been substituted for their effete despotisms; but the "Continental System" was felt as an oppression in every humble household, suddenly deprived of the little imported luxuries, such as sugar and coffee, which custom had made necessaries; and from this time date the beginnings of that popular revolt against Napoleon that was to culminate in the War of Liberation. Great Britain, too, was to suffer from her own retaliatory policy. The Americans had taken advantage of the war to draw into their own hands a large part of the British carrying trade, a process greatly encouraged by the establishment of the Continental System. This brought them into conflict with the British acting under the Orders in Council, and the consequent ill-feeling culminated in the war of 1812.

Treaty of Tilsit.

French invasion of Spain and Portugal.

It was not only the completion of the Continental System, however, that made the year 1807 a fateful one for Great Britain. On the 7th of July the young emperor Alexander I. of Russia, fascinated by Napoleon's genius and bribed by the offer of a partition of the world, concluded the treaty of Tilsit, which not only brought Russia into the Continental System, but substituted for a coalition against France a formidable coalition against England. A scheme for wresting from the British the command of the sea was only defeated by Canning's action in ordering the English fleet to capture the Danish navy, though Denmark was still nominally a friendly power (see CANNING, GEORGE). Meanwhile, in order to complete the ring fence round Europe against British commerce, Napoleon had ordered Junot to invade Portugal; Lisbon was occupied by the French, and the Portuguese royal family migrated to Brazil. In the following year Napoleon seized the royal family of Spain, and gave the crown, which Charles VI. resigned on behalf of himself and his heir, to his brother Joseph, king of Naples. The revolt of the Spanish people that followed was the first of the national uprisings against his rule by which Napoleon was destined to be overthrown. In England it was greeted with immense popular enthusiasm, and the government, without realizing the full import of the step it was taking, sent an expedition to the Peninsula. It disembarked, under the command of Sir Arthur Wellesley, at Figueras on the 1st of August. It was the beginning of the Peninsular War, which was destined not to end until, in 1814, the British troops crossed the Pyrenees into France, while the Allies were pressing over the Rhine. The political and military events on the continent of Europe do not, however, belong strictly to English history, though they profoundly affected its development, and they are dealt with elsewhere (see EUROPE: *History*; NAPOLEON; NAPOLEONIC CAMPAIGNS; PENINSULAR WAR; WATERLOO CAMPAIGN).

Peninsular War.

Walcheren expedition.

Cabinet crisis.

The war, while it lasted, was of course the main preoccupation of British ministers and of the British people. It entailed enormous sacrifices, which led to corresponding discontents; and differences as to its conduct produced frequent friction within the government itself. A cabinet crisis was the result of the outcome of the unfortunate Walcheren expedition of 1809. It had been Castlereagh's conception and, had it been as well executed as it was conceived, it might have dealt a fatal blow at Napoleon's hopes of recovering his power at sea, by destroying his great naval establishments at Antwerp. It failed, and it became the subject of angry dispute between Canning and Castlereagh, a dispute embittered by personal rivalry and the friction due to the ill-defined relations of the foreign secretary to the secretary for war; the quarrel culminated in a duel, and in the resignation of both ministers (see LONDONDERRY, 2ND MARQUESS OF, and CANNING, GEORGE). The duke of Portland resigned at the same time, and in the reconstruction of the ministry, under Perceval as premier, Lord Wellesley became foreign secretary, while Lord Liverpool, with Palmerston as his under-secretary, succeeded Castlereagh at the war office. The most conspicuous member of this government was Wellesley, whose main object in taking office was to second his brother's efforts in the Peninsula. In this he was, however, only partially successful, owing to the incapacity of his colleagues to realize the unique importance of the operations in Spain. In November 1810 the old king's mind gave way, and on the 11th of February 1811, an act of parliament bestowed the regency, under certain restrictions, upon the prince of Wales. The prince had been on intimate terms with the Whig leaders, and it was assumed that his accession to power would mean a change of government. He had, however, been offended by their attitude on the question of the restriction of his authority as regent, and he continued Perceval in office. A year later, the king's insanity being proved incurable, the regency was definitively established (February 1812). Lord Wellesley took advantage of the reconstruction of the cabinet to resign a position in which he had not been given a free hand, and his post of foreign secretary was offered to Canning. Canning, however, refused to serve with Castlereagh as minister of war, and the latter received the foreign office, which he was to hold till his death in 1822. A month later, on the 11th of May, Perceval was assassinated in the lobby of the House of Commons, and Lord Liverpool became the head of a government that was to last till 1827.

Perceval ministry.

The regency.

Liverpool ministry.

The period covered by the Liverpool administration was a fateful one in the history of Europe. The year 1812 saw Napoleon's invasion of Russia, and the disastrous retreat from Moscow. In the following year Wellington's victory at Vitoria signalled the ruin of the French cause in Spain; while Prussia threw off the yoke of France, and Austria, realizing after cautious delay her chance of retrieving the humiliations of 1809, joined the alliance, and in concert with Russia and the other German powers overthrew Napoleon at Leipzig. The invasion of France followed in 1814, the abdication of Napoleon, the restoration of the Bourbons and the assembling of the congress of Vienna. The following year saw the return of Napoleon from Elba, the close of the congress of Vienna, and the campaign that ended with the battle of Waterloo. The succeeding period, after so much storm and stress, might seem dull and unprofitable; but it witnessed the instructive experiment of the government of Europe by a concert of the great powers, and the first victory of the new principle of nationality in the insurrection of the Greeks. The share taken by Great Britain in all this, for which Castlereagh pre-eminently must take the praise or blame, is outlined in the article on the history of Europe (*q.v.*). Here it must suffice to point out how closely the development of foreign affairs was interwoven with that of home politics. The great war, so long as it lasted, was the supreme affair of moment; the supreme interest when it was over was to prevent its recurrence. For above all the world needed peace, in order to recover from the exhaustion of the revolutionary epoch; and this peace, bought at so great a cost, could be preserved only by the honest co-operation of Great Britain in the great international alliance based on "the treaties." This explains Castlereagh's policy at home and abroad. He was grossly attacked by the Opposition in parliament and by irresponsible critics, of the type of Byron, outside; historians, bred in the atmosphere of mid-Victorian Liberalism, have re-echoed the cry against him and the government of which he was the most distinguished member; but history has largely justified his attitude. He was no friend of arbitrary government; but he judged it better that "oppressed nationalities" and "persecuted Liberals" should suffer than that Europe should be again plunged into war. He was hated in his day as the arch-opponent of reform, yet the triumph of the reform movement would have been impossible but for the peace his policy secured.

Foreign policy of Castlereagh.

Character of the Tory party.

To say this is not to say that the attitude of the Tory government towards the great issues of home politics was wholly, or even mainly, inspired by a far-sighted wisdom. It had departed widely from the Toryism of Pitt's younger years, which had sought to base itself on popular support, as opposed to the aristocratic exclusiveness of the Whigs. It conceived itself as the trustee of a system of government which, however theoretically imperfect, alone of the governments of Europe had survived the storms of the Revolution intact. To tamper with a constitution that had so proved its quality seemed not so much a sacrilege as a folly. The rigid conservatism that resulted from this attitude served, indeed, a useful purpose in giving weight to Castlereagh's counsels in the European concert; for Metternich at least, wholly occupied with "propping up mouldering institutions," could not have worked harmoniously with a minister suspected of an itch for reform. At home, however, it undoubtedly tended to provoke that very revolution which it was intended to prevent. This was due not so much to the notorious corruption of the representative system as to the fact that it represented social and economic conditions that were rapidly passing away.

Parliament and the industrial revolution.

Both Houses of Parliament were in the main assemblies of aristocrats and landowners; but agriculture was ceasing to be the characteristic industry of the country and the old semi-feudal relations of life were in process of rapid dissolution. The invention of machinery and the concentration of the working population in manufacturing centres had all but destroyed the old village industries, and great populations were growing up outside the traditional restraints of the old system of class dependence. The distress inevitable in connexion with such an industrial revolution was increased by the immense burden of the war and by the high protective policy of the parliament, which restricted trade and deliberately increased the price of food in the interests of the agricultural classes. Between 1811 and 1814 bands of so-called "Luddites," starving operatives out of work, scoured the country, smashing machinery—the immediate cause of their misfortunes—and committing every sort of outrage. The fault of the government lay, not in taking vigorous measures for the suppression of these disorders, but in remaining obstinately blind to the true causes that had produced them.

Corn Laws and Enclosure Acts.

Repressive legislation.

Ministers saw in the Luddite organization only another conspiracy against the state; and, so far from seeking means for removing the grievances that underlay popular disaffection, the activity of parliament, inspired by the narrowest class interests, only tended to increase them. The price of food, already raised by the war, was still further increased by successive Corn Laws, and the artificial value thus given to arable land led to the passing of Enclosure Bills, under which the country people were deprived of their common rights with very inadequate compensation, and life in the village communities was made more and more difficult. In the circumstances it is not surprising that the spirit of unrest grew apace. In 1815 the passing of a new Corn Law, forbidding the importation of corn so long as the price for home-grown wheat was under 80s. the quarter, led to riots in London. An attack made on the prince regent at the opening of parliament on the 28th of January 1817 led to an inquiry, which revealed the existence of an elaborate organization for the overthrow of the existing order. The repressive measures of 1795 and 1799 were now revived and extended, and a bill suspending the Habeas Corpus Act for a year was passed through both Houses by a large majority. On the 27th of March Lord Sidmouth opened the government campaign against the press by issuing a circular to the lords-lieutenants, directing them to instruct the justices of the peace to issue warrants for the arrest of any person charged on oath with publishing blasphemous or seditious libels. The legality of this suggestion was more than doubtful, but it was none the less acted on, and a series of press prosecutions followed, some—as in the case of the bookseller William Hone—on grounds so trivial that juries refused to convict. William Cobbett, the most influential of the reform leaders, in order to avoid arbitrary imprisonment, "deprived of pen, ink and paper," suspended the *Political Register* and sailed for America. A disturbance that was almost an armed insurrection, which broke out in Derbyshire in June of this year, seemed to justify the severity of the government; it was suppressed without great difficulty, and three of the ringleaders were executed.

Agitation for reform.

The "Manchester Massacre."

It was, however, in 1819 that the conflict between the government and the new popular forces culminated. Distress was acute; and in the manufacturing towns mass meetings were held to discuss a remedy, which, under the guidance of political agitators, was discovered in universal suffrage and annual parliaments. The right to return members to parliament was claimed for all communities; and since this right was unconstitutionally withheld, unrepresented towns were invited to exercise it in anticipation of its formal concession. At Birmingham, accordingly, Sir Charles Wolseley was duly elected "legislatorial attorney and representative" of the town. Manchester followed suit; but the meeting arranged for the 9th of August was declared illegal by the magistrates, on the strength of a royal proclamation against seditious meetings issued on the 30th of July. Another meeting was accordingly summoned for the undoubtedly legal purpose of petitioning parliament in favour of reform. On the appointed day (August 16) thousands poured in from the surrounding districts. These men had been previously drilled, for the purpose, as their own leaders asserted, of enabling the vast assemblage to be conducted in an orderly manner; for the purpose, as the magistrates suspected, of preparing them for an armed insurrection. An attempt was made by a party of yeomanry to arrest a popular agitator, Henry Hunt; the angry mob surged round the horsemen, who found themselves powerless; the Riot Act was read, and the 15th Hussars charged the crowd with drawn swords. The meeting rapidly broke up, but not before six had been killed and many injured. The "Manchester Massacre" gave an immense impetus to the movement in favour of reform. The employment of soldiers to suppress liberty of speech stirred up the resentment of Englishmen as nothing else could have done, and this resentment was increased by the conviction that the government was engaged with the "Holy Alliance" in an unholy conspiracy against liberty everywhere. The true tendency of Castlereagh's foreign policy was not understood, nor had he any of the popular arts which would have enabled Canning to carry public opinion with him in cases where a frank explanation was impossible. The Liberals could see no more than that he appeared to be committed to international engagements, the logical outcome of which might be—as an orator of the Opposition put it—that Cossacks would be encamped in Hyde Park for the purpose of overawing the House of Commons.

The "Six Acts."

The dangerous agitation that gave expression to this state of feeling was met by the government in the session of November 1819 by the passing of the famous Six Acts. The first of these deprived the defendant of the right of traversing, but directed that he should be brought to trial within a year; the second increased the penalties for seditious libel; the third imposed the newspaper stamp duty on all pamphlets and the like containing news; the fourth (Seditious Meetings Act) once more greatly curtailed the liberty of public meetings; the fifth forbade the training of persons in the use of arms; the sixth empowered magistrates to search for and seize arms.

Accession of George IV.

The apparent necessity for the passing of these exceptional measures was increased by the imminent death of the old king, the tragic close of whose long reign had won for him a measure of popular sympathy which was wholly lacking in the case of the prince regent. On the 23rd of February 1820 George III. died, and the regent became king as George IV. This was the signal for an outburst of popular discontent with the existing order of a far more ominous character than any that had preceded it. The king was generally loathed, not so much for his vices—which would have been, in this case as in others, condoned in a more popular monarch—but for the notorious meanness and selfishness of his character. Of these qualities he took the occasion of his accession to make a fresh display. He had long been separated from his wife, Caroline of Brunswick; he now refused her the title of queen consort, forbade the mention of her name in the liturgy, and persuaded the government to promote an inquiry in parliament into her conduct, with a view to a divorce. Whatever grounds there may have been for this action, popular sympathy was wholly with Queen Caroline, who became the centre round which all the forces of discontent rallied. The failure of the Bill of Pains and Penalties against the queen, which was dropped after it had passed its third reading in the Lords by a majority of only seven, was greeted as a great popular triumph. The part played by the government in this unsavoury affair had discredited them even in the eyes of the classes whose fear of revolution had hitherto made them supporters of the established system; and the movement for reform received a new stimulus.

Beginnings of reform.

The Tory government itself realized the necessity for some concessions to the growing public sentiment. In 1821 a small advance was made. The reform bill (equal electoral districts) introduced by Lambton (afterwards Lord Durham) was thrown out; but the corrupt borough of Grampound in Cornwall was disfranchised and the seats transferred to the county of York. Even more significant was the change in the cabinet, which was strengthened by the admission of some of the more conservative section of the Opposition, Lord Sidmouth retiring and Robert Peel becoming home secretary. A bill for the removal of Catholic disabilities, too, was carried in the Commons, though rejected in the Lords; and the appointment of Lord Wellesley, an advocate of the Catholic claims, to the lord-lieutenancy of Ireland marked yet another stage in the settlement of a question which, more than anything else at that time, kept Ireland and Irishmen in a state of chronic discontent and agitation.

It is not without significance that this modification of the policy of the Tory government at home coincided with a modification of its relations with the European powers. The tendency of Metternich's system had long been growing distasteful to Castlereagh, who had consistently protested against the attempt to constitute the Grand Alliance general police of Europe and had specially protested against the Carlsbad Decrees (*q.v.*). The first steps towards the inevitable breach with the reactionary powers had already been taken before Castlereagh's tragic death on the eve of the congress of Verona brought George Canning into office as the executor of his policy With Canning, foe of the Revolution and all its works though he was, the old liberal Toryism of Pitt's younger days seemed once more to emerge. It might have emerged in any case; but Canning, with his brilliant popular gifts and his frank appeal to popular support, gave it a revivifying stimulus which it would never have received from an aristocrat of the type of Castlereagh.

George Canning.

Changed tendency of British policy.

The new spirit was most conspicuous in foreign affairs; in the protest of Great Britain against the action of the continental powers at Verona (see VERONA, CONGRESS OF), in the recognition of the South American republics, and later in the sympathetic attitude of the government towards the insurrection in Greece. This policy had been foreshadowed in the instructions drawn up by Castlereagh for his own guidance at Verona; but Canning succeeded in giving it a popular and national colour and thus removing from the government all suspicion of sympathy with the reactionary spirit of the "Holy Alliance." In home affairs, too, the government made tentative advances in a Liberal direction. In January 1823 Vansittart was succeeded as chancellor of the exchequer by Robinson (afterwards Lord Goderich), and Huskisson became president of the Board of Trade. The term of office of the latter was marked by the first tentative efforts to modify the high protective system by which British trade was hampered, especially by the Reciprocity of Duties Act (1823), a modification of the Navigation Acts, by which British and foreign shipping were placed on an equal footing, while the right to impose restrictive duties on ships of powers refusing to reciprocate was retained. In spite, however, of the improvement in trade that ultimately resulted from these measures, there was great depression; in 1825 there was a financial crisis that caused widespread ruin, and in 1826 the misery of the labouring poor led to renewed riots and machinery smashing. It became increasingly clear that a drastic alteration in the existing system was absolutely inevitable. As to this necessity, however, the ministry was in fact hopelessly divided. The government was one of compromise, in which even so burning a question as Catholic emancipation had been left open. Among its members were some—like the lord chancellor Eldon, the duke of Wellington, and the premier, Lord Liverpool, himself—whose Toryism was of the type crystallized under the influence of the Revolution, adamant against change. Such progressive measures as it had passed had been passed in the teeth of its own nominal supporters, even of its own members. In 1826 Lord Palmerston, himself a member of the government, wrote: "On the Catholic question, on the principles of commerce, on the corn laws, on the settlement of the currency, on the laws relating to trade in money, on colonial slavery, on the game laws . . . ; on all these questions, and everything like them, the government will find support from the Whigs and resistance from their self-denominated friends." It was, in fact, only the personal influence of Liverpool that held the ministry together, and when, on the 17th of February 1827, he was seized with an apoplectic fit, a crisis was inevitable.

Catholic Emancipation and Corn Laws.

The crisis, indeed, arose before the nominal expiration of the Liverpool administration. Two questions were, in the view of Canning and his supporters, of supreme importance—Catholic emancipation and the reform of the Corn Laws. The first of these had assumed a new urgency since the formation in 1823 of the Catholic Association, which under the brilliant leadership of Daniel O'Connell established in Ireland a national organization that threatened the very basis of the government. In March 1826 Sir Francis Burdett had brought in a Catholic Relief Bill, which, passed in the Commons, was thrown out by the Lords. A year later Burdett's motion that the affairs of Ireland required immediate attention, though supported by Canning, was rejected in the Commons. A bill modifying the Corn Laws, introduced by Canning and Huskisson, passed the House of Commons on the 12th of April 1827, but was rejected by the Lords.

Canning ministry.

Wellington ministry.

Catholic emancipation passed.

Revolution of 1830.

Meanwhile (April 10) Canning had become prime minister, his appointment being followed by the resignation of all the most conspicuous members of the Liverpool administration: Wellington, Eldon, Melville, Bathurst, Westmorland and Peel, the latter of whom resigned on account of his opposition to Catholic emancipation. The new government had perforce to rely on the Whigs, who took their seats on the government side of the House, Lord Lansdowne being included in the cabinet. Before this coalition could be completed, however, Canning died (August 8). The short-lived Goderich administration followed; and in January 1828 the king, weary of the effort to arrange a coalition, summoned the duke of Wellington to office as head of a purely Tory cabinet. Yet the logic of facts was too strong even for the stubborn spirit of the Iron Duke. In May 1828, on the initiative of Lord John Russell, the Test and Corporation Acts were repealed; in the same session a Corn Bill, differing but little from those that Wellington had hitherto opposed, was passed; and finally, after a strenuous agitation which culminated in the election of O'Connell for Clare, and in spite of the obstinate resistance of King George IV., the Catholic Emancipation Bill was passed (April 10, 1829) by a large majority. On the 26th of June 1830 the king died, exactly a month before the outbreak of the revolution in Paris that hurled Charles X. from the throne and led to the establishment of the Liberal Monarchy under Louis Philippe; a revolution that was to exert a strong influence on the movement for reform in England.

William IV.

Whig ministry under Lord Grey.

The great Reform Bill.

King William IV. ascended the throne at a critical moment in the history of the English constitution. Everywhere misery and discontent were apparent, manifesting themselves in riots against machinery, in rick-burning on a large scale, and in the formation of trades unions which tended to develop into organized armies of sedition. All the elements of violent revolution were present. Nor was there anything in the character of the new king greatly calculated to restore the damaged prestige of the crown; for, if he lacked the evil qualities that had caused George IV. to be loathed as well as despised, he lacked also the sense of personal dignity that had been the saving grace of George, while he shared the conservative and Protestant prejudices of his predecessors. Reform was now inevitable. The Wellington ministry, hated by the Liberals, denounced even by the Tories as traitorous for the few concessions made, resigned on the 16th of November; and the Whigs at last came into office under Lord Grey, the ministry also including a few of the more Liberal Tories. Lord Durham, perhaps the most influential leader of the reform movement, became privy seal, Althorp chancellor of the exchequer, Palmerston foreign secretary, Melbourne home secretary, Goderich colonial secretary. Lord John Russell, as paymaster-general, and Stanley (afterwards Lord Derby), as secretary for Ireland, held office outside the cabinet. With the actual House of Commons, however, the government was powerless to effect its purpose. Though it succeeded in carrying the second reading of the Reform Bill (March 21, 1831), it was defeated in committee, and appealed to the country. The result was a great governmental majority, and the bill passed the Commons in September. Its rejection by the Lords on the 8th of October was the signal for dangerous rioting; and in spite of the opposition of the king, the bill was once more passed by the Commons (December 12). A violent agitation marked the recess. On the 14th of April 1832 the bill was read a second time in the Lords, but on the 7th of May was again rejected, whereupon the government resigned. The attempt of Wellington, at the king's instance, to form a ministry failed; of all the Tory obstructionists he alone had the courage to face the popular rage. On the 15th Lord Grey was in office again; the demand was made for a sufficient creation of peers to swamp the House of Lords; the king, now thoroughly alarmed, used his influence to persuade the peers to yield, and on the 4th of June the great Reform Bill became law. Thus was England spared the crisis of a bloody revolution, and proof given to the world that her ancient constitution was sufficiently elastic to expand with the needs of the times.

The effect of the Reform Bill, which abolished fifty-six "rotten" boroughs, and by reducing the representation of others set free 143 seats, which were in part conferred on the new industrial centres, was to transfer a large share of political power from the landed aristocracy to the middle classes. Yet the opposition of the Tories had not been wholly inspired by the desire to maintain the political predominance of a class. Canning, who had the best reason for knowing, defended the unreformed system on the ground that its very anomalies opened a variety of paths by which talent could make its way into parliament, and thus produced an assembly far more widely representative than could be expected from a more uniform and logical system. This argument, which the effect of progressive extensions of the franchise on the intellectual level of parliament has certainly not tended to weaken, was however far outweighed—as Canning himself would have come to see—by the advantage of reconciling with the old constitution the new forces which were destined during the century to transform the social organization of the country. Nor, in spite of the drastic character of the Reform Bill, did it in effect constitute a revolution. The 143 seats set free were divided equally between the towns and the counties; and in the counties the landowning aristocracy was still supreme. In the towns the new £10 household franchise secured a democratic constituency; in the counties the inclusion of tenants at will (of £50 annual rent), as well as of copyholders and leaseholders, only tended to increase the influence of the landlords. There was as yet no secret ballot to set the voter free.

The result was apparent in the course of the next few years. The first reformed parliament, which met on the 29th of January 1833, consisted in the main of Whigs, with a sprinkling of Radicals and a compact body of Liberal Tories under Sir Robert Peel. Its great work was the act emancipating the slaves in the British colonies (August 30). Other burning questions were the condition of Ireland, the scandal of the established church there, the misery of the poor in England. In all these matters the House showed little enough of the revolutionary temper; so little, indeed, that in March Lord Durham resigned. To the Whig leaders the church was all but as sacrosanct as to the Tories, the very foundation of the constitution, not to be touched save at imminent risk to the state; the most they would adventure was to remedy a few of the more glaring abuses of an establishment imposed on an unwilling population. As for O'Connell's agitation for the repeal of the Union, that met with but scant sympathy in parliament; on the 27th of May 1834 his repeal motion was rejected by a large majority.

Melbourne ministry.

In July the Grey ministry resigned, and on the 16th Lord Melbourne became prime minister. His short tenure of office is memorable for the passing of the bill for the reform of the Poor Law (August). The reckless system of outdoor relief, which had pauperized whole neighbourhoods, was abolished, and the system of unions and workhouses established (see Poor Law). An attempt to divert some of the revenues of the Irish Church led in the autumn to serious differences of opinion in the cabinet; the king, as tenacious as his father of the exact obligations of his coronation oath, dismissed the ministry, and called the Tories to office under Sir Robert Peel and the duke of Wellington. Thus, within three years of the passing of the Reform Bill, the party which had most strenuously opposed it was again in office. Scarcely less striking testimony to the constitutional temper of the English was given by the new attitude of the party under the new conditions.

The "Conservative" party.

In the "Tamworth manifesto" of January 1835 Peel proclaimed the principles which were henceforth to guide the party, no longer Tory, but "Conservative." The Reform Bill and its consequences were frankly accepted; further reforms were promised, especially in the matter of the municipal corporations and of the disabilities of the dissenters. The new parliament, however, which met on the 19th of February, was not favourable to the ministry, which fell on the 8th of April. Lord Melbourne once more came into office, and the Municipal Corporations Act of the 7th of September was the work of a Liberal government. This was the last measure of first-rate importance passed before the death of King William, which occurred on the 20th of June 1837

It is impossible to exaggerate the importance, not only for England but for the world at large, of the epoch which culminated in the passing of the Reform Bill of 1832. All Europe, whether Liberal or reactionary, was watching the constitutional struggle with strained attention, the principles of monarchy and of constitutional liberty were alike at stake. To foreign observers it seemed impossible that the British monarchy could survive. Baron Brunnow, the Russian ambassador in London, sent home to the emperor Nicholas I. the most pessimistic reports. According to Brunnow, King William, by using his influence to secure the passage of the Reform Bill, had "cast his crown into the gutter"; the throne might endure for his lifetime, but the next heir was a young and inexperienced girl, and, even were the princess Victoria ever to mount the throne—which was unlikely—she would be speedily swept off it again by the rising tide of republicanism. The course of the next reign was destined speedily to convince even Nicholas I. of the baselessness of these fears, and to present to all Europe the exemplar of a progressive state, in which the principles of traditional authority and democratic liberty combined for the common good. (W. A. P.)

XII. The Reign of Victoria (1837–1901)

Queen Victoria's accession.

The death of William IV., on the 20th of June 1837, placed on the throne of England a young princess, who was destined to reign for a longer period than any of her predecessors. The new queen, the only daughter of the duke of Kent, the fourth son of George III., had just attained her majority Educated in comparative seclusion, her character and her person were unfamiliar to her future subjects, who were a little weary of the extravagances and eccentricities of her immediate predecessors. Her accession gave them a new interest in the house of Hanover. And their loyalty, which would in any case have been excited by the accession of a young and inexperienced girl to the throne of the greatest empire in the world, was stimulated by her conduct and appearance. She displayed from the first a dignity and good sense which won the affection of the multitude who merely saw her in public, and the confidence of the advisers who were admitted into her presence.

The ministry experienced immediate benefit from the change. The Whigs, who had governed England since 1830, under Lord Grey and Lord Melbourne, were suffering from the reaction which is the inevitable consequence of revolution. The country which, in half-a-dozen years, had seen a radical reform of parliament, a no less radical reform of municipal corporations, the abolition of slavery, and the reconstruction of the poor laws, was longing for a period of political repose. The alliance, or understanding, between the Whigs and the Irish was increasing the distrust of the English people in the ministry, and Lord Melbourne's government, in the first half of 1837, seemed doomed to perish. The accession of the queen gave it a new lease of power. The election, indeed, which followed her accession did not materially alter the composition of the House of Commons. But the popularity of the queen was extended to her government. Taper's suggestion in *Coningsby* that the Conservatives should go to the country with the cry, "Our young queen and our old institutions," expressed, in an epigram, a prevalent idea. But the institution which derived most immediate benefit from the new sovereign was the old Whig ministry.

The difficulties of the ministry, nevertheless, were great. In the preceding years it had carried most of the reforms which were demanded in Great Britain; but it had failed to

Lord Melbourne's difficulties.

obtain the assent of the House of Lords to its Irish measures. It had desired (1) to follow up the reform of English corporations by a corresponding reform of Irish municipalities; (2) to convert the tithes, payable to the Irish Church, into a rent charge, and to appropriate its surplus revenues to other purposes; (3) to deal with the chronic distress of the Irish people by extending to Ireland the principles of the English poor law In the year which succeeded the accession of the queen it accomplished two of these objects. It passed an Irish poor law and a measure commuting tithes in Ireland into a rent charge. The first of these measures was carried in opposition to the views of the Irish, who thought that it imposed an intolerable burden on Irish property The second was only carried on the government consenting to drop the appropriation clause, on which Lord Melbourne's administration had virtually been founded.

It was not, however, in domestic politics alone that the ministry was hampered. In the months which immediately followed the queen's accession news reached England of disturbances, or even insurrection in Canada. The rising was easily put down; but the condition of the colony was so grave that the ministry decided to suspend the constitution of lower Canada for three years, and to send out Lord Durham with almost dictatorial powers. Lord Durham's conduct was, unfortunately, marked by indiscretions which led to his resignation; but before leaving the colony he drew up a report on its condition and on its future, which practically became a text-book for his successors, and has influenced the government of British colonies ever since. Nor was Canada the only great colony which was seething with discontent. In Jamaica the planters, who had sullenly accepted the abolition of slavery, were irritated by the passage of an act of parliament intended to remedy some grave abuses in the management of the prisons of the island. The colonial House of Assembly denounced this act as a violation of its rights, and determined to desist from its legislative functions. The governor dissolved the assembly, but the new house, elected in its place, reaffirmed the decision of its predecessor; and the British ministry, in face of the crisis, asked parliament in 1839 for authority to suspend the constitution of the island for five years. The bill introduced for this purpose placed the Whig ministry in a position of some embarrassment. The advocates of popular government, they were inviting parliament, for a second time, to suspend representative institutions in an important colony. Supported by only small and dwindling majorities, they saw that it was hopeless to carry the measure, and they decided on placing their resignations in the queen's hands. The queen naturally sent for Sir Robert Peel, who undertook to form a government. In the course of the negotiations, however, he stated that it would be necessary to make certain changes in the household, which contained some great ladies closely connected with the leaders of the Whig party. The queen shrank from separating herself from ladies who had surrounded her since she came to the throne, and Sir Robert thereupon declined the task of forming a ministry. Technically he was justified in adopting this course, but people generally felt that there was some hardship in compelling a young queen to separate herself from her companions and friends, and they consequently approved the decision of Lord Melbourne to support the queen in her refusal, and to resume office. The Whigs returned to place, but they could not be said to return to power. They did not even venture to renew the original Jamaica Bill. They substituted for it a modified proposal which they were unable to carry They were obviously indebted for office to the favour of the queen, and not to the support of parliament.

The bedchamber question.

Yet the session of 1839 was not without important results. After a long struggle, in which ministers narrowly escaped defeat in the Commons, and in the course of which they suffered severe rebuffs in the Lords, they succeeded in laying the foundation of the English system of national education. In the same session they were forced against their will to adopt a reform, which had been recommended by Rowland Hill, and to confer on the nation the benefit of a uniform penny postage. No member of the cabinet foresaw the consequences of this reform. The postmaster-general, Lord Lichfield, in opposing it, declared that, if the revenue of his office was to be maintained, the correspondence of the country, on which postage was paid, must be increased from 42,000,000 to 480,000,000 letters a year, and he contended that there were neither people to write, nor machinery to deal with, so prodigious a mass of letters. He would have been astonished to hear that, before the end of the century, his office had to deal with more than 3,000,000,000 postal packets a year, and that the net profit which it paid into the exchequer was to be more than double what it received in 1839.

Penny postage.

In 1840 the ministry was not much more successful than it had proved in 1839. After years of conflict it succeeded indeed in placing on the statute book a measure dealing with Irish municipalities. But its success was purchased by concessions to the Lords, which deprived the measure of much of its original merit. The closing years of the Whig administration were largely occupied with the financial difficulties of the country. The first three years of the queen's reign were memorable for a constantly deficient revenue. The deficit amounted to £1,400,000 in 1837, to £400,000 in 1838, and to £1,457,000 in 1839. Baring, the chancellor of the exchequer, endeavoured to terminate this deficiency by a general increase of taxation, but this device proved a disastrous failure. The deficit rose to £1,842,000 in 1840. It was obvious that the old expedient of increasing taxation had failed, and that some new method had to be substituted for it. This new method Baring tried to discover in altering the differential duties on timber and sugar, and substituting a fixed duty of 8s. per quarter for the sliding duties hitherto payable on wheat. By these alterations he expected to secure a large increase of revenue, and at the same time to maintain a sufficient degree of protection for colonial produce. The Conservatives, who believed in protection, at once attacked the proposed alteration of the sugar duties. They were reinforced by many Liberals, who cared very little for protection, but a great deal about the abolition of slavery, and consequently objected to reducing the duties on foreign or slave-grown sugar. This combination of interests proved too strong for Baring and his proposal was rejected. As ministers, however, did not resign on their defeat, Sir Robert Peel followed up his victory by moving a vote of want of confidence, and this motion was carried in an exceptionally full house by 312 votes to 311.

Fiscal policy.

Before abandoning the struggle, the Whigs decided on appealing from the House of Commons to the country. The general election which ensued largely increased the strength of the Conservative party. On the meeting of the new parliament in August 1841, votes of want of confidence in the government were proposed and carried in both houses; the Whigs were compelled to resign office, and the queen again charged Sir Robert Peel with the task of forming a government. If the queen had remained unmarried, it is possible that the friction which had arisen in 1839 might have recurred in 1841. In February 1840, however, Her Majesty had married her cousin, Prince Albert of Saxe-Coburg-Gotha. She was, therefore, no longer dependent on the Whig ladies, to whose presence in her court she had attached so much importance in 1839. By the management of the prince—who later in the reign was known as the prince consort—the great ladies of the household voluntarily tendered their resignations; and every obstacle to the formation of the new government was in this way removed.

Sir R. Peel forms a ministry.

Thus the Whigs retired from the offices which, except for a brief interval in 1834–1835, they had held for eleven years. During the earlier years of their administration they had succeeded in carrying many memorable reforms: during the later years their weakness in the House of Commons had prevented their passing any considerable measures. But, if they had failed in this respect, Lord Melbourne had rendered conspicuous service to the queen. Enjoying her full confidence, consulted by her on every occasion, he had always used his influence for the public was suppressed by Austria with Russian assistance, and after its suppression many leading Hungarians took refuge in Turkish territory. Austria and Russia addressed demands to the Porte for their surrender. Lord Palmerston determined to support the Porte in its refusal to give up these exiles, and actually sent the British fleet to the Dardanelles with this object. His success raised the credit of Great Britain and his own reputation. The presence of the British fleet, however, at the Dardanelles suggested to him the possibility of settling another long-standing controversy. For years British subjects settled in Greece had raised complaints against the Greek government. In particular Don Pacifico, a Jew, but a native of Gibraltar, complained that, at a riot, in which his house had been attacked, he had lost jewels, furniture and papers which he alleged to be worth more than £30,000. As Lord Palmerston was unable by correspondence to induce the Greek government to settle claims of this character, he determined to enforce them; and by his orders a large number of Greek vessels were seized and detained by the British fleet. The French government tendered its good offices to compose the dispute, and an arrangement was actually arrived at between Lord Palmerston and the French minister in London. Unfortunately, before its terms reached Greece, the British minister at Athens had ordered the resumption of hostilities, and had compelled the Greek government to submit to more humiliating conditions. News of this settlement excited the strongest feelings both in Paris and London. In Paris, Prince Louis Napoleon, who had acceded to the presidency of the French republic, decided on recalling his representative from the British court. In London the Lords passed a vote of censure on Lord Palmerston's proceedings; and the Commons only sustained the minister by adopting a resolution approving in general terms the principles on which the foreign policy of the country had been conducted.

Don Pacifico.

In pursuing the vigorous policy which characterized his tenure of the foreign office, Lord Palmerston frequently omitted to consult his colleagues in the cabinet, the prime minister, or the queen. In the course of 1849 Her Majesty formally complained to Lord John Russell that important despatches were sent off without her knowledge; and an arrangement was made under which Lord Palmerston undertook to submit every despatch to the queen through the prime minister. In 1850, after the Don Pacifico debate, the queen repeated these commands in a much stronger memorandum. But Lord Palmerston, though all confidence between himself and the court was destroyed, continued in office. In the autumn of 1851 the queen was much annoyed at hearing that he had received a deputation at the foreign office, which had waited on him to express sympathy with the Hungarian refugees, and to denounce the conduct of "the despots and tyrants" of Russia and Austria, and that he had, in his reply, expressed his gratification at the demonstration. If the queen had had her way, Lord Palmerston would have been removed from the foreign office after this incident. A few days later the *coup d'état* in Paris led to another dispute. The cabinet decided to do nothing that could wear the appearance of interference in the internal affairs of France; but Lord Palmerston, in conversation with the French minister in London, took upon himself to approve the bold and decisive step taken by the president. The ministry naturally refused to tolerate this conduct, and Lord Palmerston was summarily removed from his office.

Palmerston dismissed.

The removal of Lord Palmerston led almost directly to the fall of the Whig government. Before relating, however, the exact occurrences which produced its defeat, it is necessary to retrace our steps and describe the policy which it had pursued in internal matters during the six years in which it had been in power. Throughout that period the Irish famine had been its chief anxiety and difficulty. Sir Robert Peel had attempted to deal with it (1) by purchasing large quantities of Indian corn, which he had retailed at low prices in Ireland; and (2) by enabling the grand juries to employ the people on public works, which were to be paid out of moneys advanced by the state, one-half being ultimately repayable by the locality. These measures were not entirely successful. It was found, in practice, that the sale of Indian corn at low prices by the government checked the efforts of private individuals to supply food; and that the offer of comparatively easy work to the poor at the cost of the public, prevented their seeking harder private work either in Ireland or in Great Britain. The new government, with this experience before it, decided on trusting to private enterprise to supply the necessary food, and on throwing the whole cost of the works which the locality might undertake on local funds. If the famine had been less severe, this policy might possibly have succeeded. Universal want, however, paralysed every one. The people, destitute of other means of livelihood, crowded to the relief works. In the beginning of 1847 nearly 750,000 persons—or nearly one person out of every ten in Ireland—were so employed. With such vast multitudes to relieve, it proved impracticable to exact the labour which was required as a test of destitution. The roads, which it was decided to make, were blocked by the labourers employed upon them, and by the stones, which the labourers were supposed to crush for their repair. In the presence of this difficulty the government decided, early in 1847, gradually to discontinue the relief works, and to substitute for them relief committees charged with the task of feeding the people. At one time no less than 3,000,000 persons—more than one-third of the entire population of Ireland—were supported by these committees. At the same time it decided on adopting two measures of a more permanent character. The poor law of 1838 had made no provision for the relief of the poor outside the workhouse, and outdoor relief was sanctioned by an act of 1847. Irish landlords complained that their properties, ruined by the famine, and encumbered by the extravagances of their predecessors, could not bear the cost of this new poor law; and the ministry introduced and carried a measure enabling the embarrassed owners of life estates to sell their property and discharge their liabilities. It is the constant misfortune of Ireland that the measures intended for her relief aggravate her distress. The encumbered estates act, though it substituted a solvent for an insolvent proprietary, placed the Irish tenants at the mercy of landlords of whom they had no previous knowledge, who were frequently absentees, who bought the land as a matter of business, and who dealt with it on business principles by raising the rent. The new poor law, by throwing the maintenance of the poor on the soil, encouraged landlords to extricate themselves from their responsibilities by evicting their tenants. Evictions were made on a scale which elicited from Sir Robert Peel an expression of the deepest abhorrence. The unfortunate persons driven from their holdings and forced to seek a refuge in the towns, in England, or—when they could afford it—in the United States, carried with them everywhere the seeds of disease, the constant handmaid of famine.

Irish famine.

Rebellion of 1848.

Famine, mortality and emigration left their mark on Ireland. In four years, from 1845 to 1849, its population decreased from 8,295,000 to 7,256,000, or by more than a million persons; and the decline which took place at that time went on to the end of the century. The population of Ireland in 1901 had decreased to 4,457,000 souls. This fact is the more remarkable, because Ireland is almost the only portion of the British empire, or indeed of the civilized world, where such a circumstance has occurred. We must go to countries like the Asiatic provinces of Turkey, devastated by Ottoman rule, to find such a diminution in the numbers of the people as was seen in Ireland during the last half of the 19th century. It was probably inevitable that the distress of Ireland should have been followed by a renewal of Irish outrages. A terrible series of agrarian crimes was committed in the autumn of 1847; and the ministry felt compelled, in consequence, to strengthen its hands by a new measure of coercion, and by suspending the Habeas Corpus Act in Ireland. The latter measure at once brought to a crisis the so-called rebellion of 1848, for his share in which Smith O'Brien, an Irish member of parliament, was convicted of high treason. The government, however, did not venture to carry out the grim sentence which the law still applied to traitors, and introduced an act enabling it to commute the death penalty to transportation. The "insurrection" had from the first proved abortive. With Smith O'Brien's transportation it practically terminated.

Chartism.

In the meanwhile the difficulties which the government was experiencing from the Irish famine had been aggravated by a grave commercial crisis in England. In the autumn of 1847 a series of failures in the great commercial centres created a panic in the city of London, which forced consols down to 78, and induced the government to take upon itself the responsibility of suspending the Bank Charter Act. That step, enabling the directors of the Bank of England to issue notes unsecured by bullion, had the effect of gradually restoring confidence. But a grave commercial crisis of this character is often attended with other than financial consequences. The stringency of the money market increases the distress of the industrial classes by diminishing the demand for work; and, when labour suffers, political agitation flourishes. Early in 1848, moreover, revolutions on the continent produced a natural craving for changes at home. Louis Philippe was driven out of Paris, the emperor of Austria was driven out of Vienna, the Austrian soldiery had to withdraw from Milan, and even in Berlin the crown had to make terms with the people. While thrones were falling or tottering in every country in Europe, it was inevitable that excitement and agitation should prevail in Great Britain. The Chartists, reviving the machinery which they had endeavoured to employ in 1839, decided on preparing a monster petition to parliament, which was to be escorted to Westminster by a monster procession. Their preparations excited general alarm, and on the invitation of the government no less than 170,000 special constables were sworn in to protect life and property against a rabble. By the judicious arrangements, however, which were made by the duke of Wellington, the peace of the metropolis was secured. The Chartists were induced to abandon the procession which had caused so much alarm, and the monster petition was carried in a cab to the House of Commons. There it was mercilessly picked to pieces by a select committee. It was found that, instead of containing nearly 6,000,000 signatures, as its originators had boasted, less than 2,000,000 names were attached to it. Some of the names, moreover, were obviously fictitious, or even absurd. The exposure of these facts turned the whole thing into ridicule, and gave parliament an excuse for postponing measures of organic reform which might otherwise have been brought forward.

Navigation Acts.

If the ministry thus abstained from pressing forward a large scheme of political reform, it succeeded in carrying two measures of the highest commercial and social importance. In 1849 it supplemented the free trade policy, which Sir Robert Peel had developed, by the repeal of the Navigation Acts. Briefly stated, these acts, which had been originated during the Protectorate of Cromwell, and continued after the Restoration, reserved the whole coasting trade of the country for British vessels and British seamen, and much of the foreign trade for British vessels, commanded and chiefly manned by British subjects. The acts, therefore, were in the strictest sense protective, but they were also designed to increase the strength of Great Britain at sea, by maintaining large numbers of British seamen. They had been defended by Adam Smith on the ground that defence was "of much more importance than opulence," and by the same reasoning they had been described by John Stuart Mill as, "though economically disadvantageous, politically expedient." The acts, however, threw a grave burden on British trade and British shipowners. Their provisions by restricting competition naturally tended to raise freights, and by restricting employment made it difficult for shipowners to man their vessels. Accordingly the government wisely determined on their repeal; and one of the last and greatest battles between Free Trade and Protection was fought over the question. The second reading of the government bill was carried in the House of Lords by a majority of only ten: it would not have been carried at all if the government had not secured a much larger number of proxies than their opponents could obtain.

Ten Hours Bill.

If the repeal of the Navigation Acts constituted a measure of the highest commercial importance, the passage of the Ten Hours Bill in 1847 marked the first great advance in factory legislation. Something, indeed, had already been done to remedy the evils arising from the employment of women and very young children in factories and mines. In 1833 Lord Ashley, better known as Lord Shaftesbury, had carried the first important Factory Act. In 1842 he had succeeded, with the help of the striking report of a royal commission, in inducing parliament to prohibit the employment of women and of boys under ten years of age in mines. And in 1843 Sir James Graham, who was home secretary in Sir Robert Peel's administration, had been compelled by the pressure of public opinion to introduce a measure providing for the education of children employed in factories, and for limiting the hours of work of children and young persons. The educational clauses of this bill were obviously framed in the interests of the Church of England, and raised a heated controversy which led to the abandonment of the measure; and in the following year Sir James Graham introduced a new bill dealing with the labour question alone. Briefly stated, his proposal was that no child under nine years of age should be employed in a factory, and that no young person under eighteen should be employed for more than twelve hours a day. This measure gave rise to the famous controversy on the ten hours clause, which commenced in 1844 and was protracted till 1847. Lord Ashley and the factory reformers contended, on the one hand, that ten hours were long enough for any person to work; their opponents maintained, on the contrary, that the adoption of the clause would injure the working-classes by lowering the rate of wages, and ruin the manufacturers by exposing them to foreign competition. In 1847 the reform was at last adopted. It is a remarkable fact that it was carried against the views of the leading statesmen on both sides of the House. It was the triumph of common sense over official arguments.

Death of Peel.

During the first four years of Lord John Russell's government, his administration had never enjoyed any very large measure of popular support, but it had been partly sustained by the advocacy of Sir Robert Peel. The differences which estranged Sir Robert from his old supporters were far greater than those which separated him from the Whigs, and the latter were therefore constantly able to rely on his assistance. In the summer of 1850, however, a lamentable accident—a fall from his horse—deprived the country of the services of its great statesman. His death naturally affected the position of parties. The small remnant of able men, indeed, who had been associated with him in his famous administration, still maintained an attitude of neutrality. But the bulk of the Conservative party rallied under the lead of Lord Stanley (afterwards Derby) in the House of Lords, and gradually submitted to, rather than accepted, the lead of Disraeli in the House of Commons.

Oxford movement.

In the autumn which succeeded Sir Robert Peel's death, an event which had not been foreseen agitated the country and produced a crisis. During the years which had succeeded the Reform Bill a great religious movement had influenced politics both in England and Scotland. In England, a body of eminent men at Oxford—of whom J. H., afterwards Cardinal, Newman was the chief but who numbered among their leaders Hurrell Froude, the brother of the historian, and Keble, the author of the *Christian Year*—endeavoured to prove that the doctrines of the Church of England were identical with those of the primitive Catholic Church, and that every Catholic doctrine might be held by those who were within its pale. This view was explained in a remarkable series of tracts, which gave their authors the name of Tractarians. The most famous of these, and the last of the series, Tract XC., was published three years after the queen's accession to the throne. In Scotland, the Presbyterian Church—mainly under the guidance of Dr Chalmers, one of the most eloquent preachers of the century—was simultaneously engaged in a contest with the state on the subject of ecclesiastical patronage. Both movements had this in common, that they indicated a revival of religious energy, and aimed at vindicating the authority of the church, and resisting the interference of the state in church matters. The Scottish movement led to the disruption of the Church of Scotland and the formation of the Free Church in 1843. The Tractarian movement was ultimately terminated by the secession of Newman and many of his associates from the Church of England, and their admission to the Church of Rome. These secessions raised a feeling of alarm throughout England. The people, thoroughly Protestant, were excited by the proofs—which they thought were afforded—that the real object of the Tractarians was to reconcile England with Rome; and practices which are now regarded as venial or even praiseworthy—such as the wearing of the surplice in the pulpit, and the institution of the weekly offertory—were denounced because they were instituted by the Tractarians, and were regarded as insidious devices to lead the country Romewards. The sympathies of the Whigs, and especially of the Whig prime minister, Lord John Russell, were with the people; and Lord John displayed his dislike to the Romanizing tendencies of the Tractarians by appointing Renn Dickson Hampden—whose views had been formally condemned by the Hebdomadal Board at Oxford—to the bishopric of Hereford. The High Church party endeavoured to oppose the appointment at every stage; but their attempts exposed them to a serious defeat. The courts held that, though the appointment of a bishop by the crown required confirmation in the archbishop's court, the confirmation was a purely ministerial act which could not be refused. The effort which the High Church party had made to resist Dr Hampden's appointment had thus resulted in showing conclusively that authority resided in the crown, and not in the archbishop. It so happened that about the same time this view was confirmed by another judicial decision. The lord chancellor presented the Rev. G. C. Gorham to a living in Devonshire; and Dr Phillpotts, the bishop of Exeter, declined to institute him, on the ground that he held heretical views on the subject of baptism. The court of arches upheld the bishop's decision. The finding of the court, however, was reversed by the privy council, and its judgment dealt a new blow at the Tractarian party. For it again showed that authority—even in doctrine—resided in the crown and not in the church. Within a few months of this famous decision the pope—perhaps encouraged by the activity and despondency of the High Church party—issued a brief "for re-establishing and extending the Catholic faith in England," and proceeded to divide England and Wales into twelve sees. One of them—Westminster—was made an archbishopric, and the new dignity was conferred on Nicholas Patrick Stephen Wiseman, who was almost immediately afterwards created cardinal. The publication of this brief caused much excitement throughout the country, which was fanned by a letter from the prime minister to the bishop of Durham, condemning the brief as "insolent and insidious" and "inconsistent with the queen's supremacy, with the rights of our bishops and clergy, and with the spiritual independence of the nation." Somewhat unnecessarily the prime minister went on to condemn the clergymen of the Church of England who had subscribed the Thirty-nine Articles, "who have been the most forward in leading their own flocks, step by step, to the very edge of the precipice."

Ecclesiastical Titles Bill.

In accordance with the promise of Lord John Russell's letter, the ministry, at the opening of the session of 1851, introduced a measure forbidding the assumption of territorial titles by the priests and bishops of the Roman Catholic Church, declaring all gifts made to them and all acts done by them under these titles null and void, and forfeiting to the crown all property bequeathed to them. The bill naturally encountered opposition from many Liberals, while it failed to excite any enthusiasm among Conservatives, who thought its remedies inadequate. In the middle of the debates upon it the government was defeated on another question—a proposal to reduce the county franchise—and, feeling that it could no longer rely on the support of the House of Commons, tendered its resignation. But Lord Stanley, whom the queen entrusted with the duty of forming a new administration, was compelled to decline the task, and Lord John resumed office. Mild as the original Ecclesiastical Titles Bill had been thought, the new edition of it, which was introduced after the restoration of the Whigs to power, was still milder. Though, after protracted debates, it at last became law, it satisfied nobody. Its provisions, as was soon found, could be easily evaded, and the bill, which had caused so much excitement, and had nearly precipitated the fall of a ministry, remained a dead letter. The government, in fact, was experiencing the truth that, if a defeated ministry may be occasionally restored to place, it cannot be restored to power. The dismissal of Lord Palmerston from the foreign office in 1851 further increased the embarrassments of the government. In February 1852 it was defeated on a proposal to revive the militia, and resigned.

French scare.

The circumstances which directly led to the defeat of the Whigs were, in one sense, a consequence of the revolutionary wave which had swept over Europe in 1848. The fall of Louis Philippe in that year created a panic in Great Britain. Men thought that the unsettled state of France made war probable, and they were alarmed at the defenceless condition of England. Lord Palmerston, speaking in 1845, had declared that "steam had bridged the Channel"; and the duke of Wellington had addressed a letter to Sir John Burgoyne, in which he had demonstrated that the country was not in a position to resist an invading force. The panic was so great that the ministry felt it necessary to make exceptional provisions for allaying it. Lord John Russell decided on asking parliament to sanction increased armaments, and to raise the income tax to 1s. in the pound in order to pay for them. The occasion deserves to be recollected as one on which a prime minister, who was not also chancellor of the exchequer, has himself proposed the budget of the year. But it was still more memorable because the remedy which Lord John proposed at once destroyed the panic which had suggested it. A certain increase of the income tax to a shilling seemed a much more serious calamity than the uncertain prospect of a possible invasion. The estimates were recast, the budget was withdrawn, and the nation was content to dispense with any addition to its military and naval strength. Events in France, in the meanwhile, moved with railway speed. Louis Napoleon became president of the French Republic: in 1852 he became emperor of the French. The new emperor, indeed, took pains to reassure a troubled continent that "the empire was peace." The people insisted on believing—and, as the event proved, rightly—that the empire was war. Notwithstanding the success of the Great Exhibition of 1851, which was supposed to inaugurate a new reign of peace, the panic, which had been temporarily allayed in 1848, revived at the close of 1851, and the government endeavoured to allay it by reconstituting the militia. There were two possible expedients. An act of 1757 had placed under the direct authority of the crown a militia composed of men selected in each parish by ballot, liable to be called out for active service, and to be placed under military law. But the act had been supplemented by a series of statutes passed between 1808 and 1812, which had provided a local militia, raised, like the regular militia, by ballot, but, unlike the latter, only liable for service for the suppression of riots, or in the event of imminent invasion. Lord John Russell's government, forced to do something by the state of public opinion, but anxious—from the experience of 1848—to make that something moderate, decided on reviving the local militia. Lord Palmerston at once suggested that the regular and not the local militia should be revived; and, in a small house of only 265 members, he succeeded in carrying a resolution to that effect. He had, in this way, what he called his "tit for tat" with Lord John; and the queen, accepting her minister's resignation, sent for Lord Derby—for Lord Stanley had now succeeded to this title—and charged him with the task of forming a ministry.

The government which Lord Derby succeeded in forming was composed almost exclusively of the men who had rebelled against Sir Robert Peel in 1845. It was led in the House of

Lord Derby.

Commons by the brilliant, but somewhat unscrupulous statesman who had headed the revolt. With the exception of Lord Derby and one other man, its members had no experience of high office; and it had no chance of commanding a majority of the House of Commons in the existing parliament. It owed its position to the divisions of its opponents. Profiting by their experience, it succeeded in framing and passing a measure reconstituting the regular militia, which obtained general approval. It is perhaps worth observing that it maintained the machinery of a ballot, but reserved it only in case experience should prove that it was necessary. Voluntary enlistment under the new Militia Bill was to be the rule: compulsory service was only to be resorted to if voluntary enlistment should fail. This success, to a certain extent, strengthened the position of the new ministry. It was obvious, however, that its stability would ultimately be determined by its financial policy. Composed of the men who had resisted the free trade measures of the previous decade, its fate depended on its attitude towards free trade. In forming his administration Lord Derby had found it necessary to declare that, though he was still in favour of a tax on corn, he should take no steps in this direction till the country had received an opportunity of expressing its opinion. His leader in the House of Commons went much further, and declared that the time had gone by for reverting to protection. The view which Disraeli thus propounded in defiance of his previous opinions was confirmed by the electors on the dissolution of parliament. Though the new government obtained some increased strength from the result of the polls, the country, it was evident, had no intention of abandoning the policy of free trade, which by this time, it was clear, had conferred substantial benefits on all classes. When the new parliament met in the autumn of 1852, it was at once plain that the issue would be determined on the rival merits of the old and the new financial systems. Disraeli courted the decision by at once bringing forward the budget, which custom, and perhaps convenience, would have justified him in postponing till the following spring. His proposal—in which he avowedly threw over his friends on the ground that "he had greater subjects to consider than the triumph of obsolete opinions"—was, in effect, an attempt to conciliate his old supporters by a policy of doles, and to find the means for doing so by the increased taxation of the middle classes. He offered to relieve the shipping interest by transferring some of the cost of lighting the coasts to the Consolidated Fund; the West India interest by sanctioning the refining of sugar in bond; and the landed classes by reducing the malt tax by one-half, and by repealing the old war duty on hops. He suggested that the cost of these measures should be defrayed by extending the income tax to Ireland to industrial incomes of £100 and to permanent incomes of £50 a year, as well as by doubling the house tax, and extending it to all £10 householders. The weight, therefore, of these measures was either purposely or unintentionally thrown mainly on persons living in houses worth from £10 to £20 a year, or on persons in receipt of incomes from £50 to £150 a year. This defect in the budget was exposed in a great speech by Gladstone, which did much to ensure the defeat of the scheme and the fall of the ministry.

Coalition, 1852.

On the resignation of Lord Derby, the queen, anxious to terminate a period of weak governments, decided on endeavouring to combine in one cabinet the chiefs of the Whig party and the followers of Sir Robert Peel. With this view she sent both for Lord Aberdeen, who had held the foreign office under Sir Robert, and for Lord Lansdowne, who was the Nestor of the Whigs; and with Lord Lansdowne's concurrence charged Lord Aberdeen with the task of forming a government. In the new ministry Lord Aberdeen became first lord of the treasury, Gladstone chancellor of the exchequer, Lord John Russell foreign minister—though he was almost immediately replaced in the foreign office by Lord Clarendon, and himself assumed the presidency of the council. Lord Palmerston went to the home office. One other appointment must also be mentioned. The secretary of state for the colonies was also at that time secretary of state for war. No one in 1852, however, regarded that office as of material importance, and it was entrusted by Lord Aberdeen to an amiable and conscientious nobleman, the duke of Newcastle.

Budget of 1853.

The first session of the Aberdeen administration will be chiefly recollected for the remarkable budget which Gladstone brought forward. It constituted a worthy supplement to the measures of 1842, 1845 and 1846. Gladstone swept away the duty on one great necessary of life—soap; he repealed the duties on 123 other articles; he reduced the duties on 133 others, among them that on tea; and he found means for paying for these reforms and for the gradual reduction and ultimate abolition of the income tax, which had become very unpopular, by (1) extending the tax to incomes of £100 a year; (2) an increase of the spirit duties; and (3) applying the death duties to real property, and to property passing by settlement. There can be little doubt that this great proposal was one of the most striking which had ever been brought forward in the House of Commons; there can also, unhappily, be no doubt that its promises and intentions were frustrated by events which proved too strong for its author. For Gladstone, in framing his budget, had contemplated a continuance of peace, and the country was, unhappily, already drifting into war.

The holy places.

For some years an obscure quarrel had been conducted at Constantinople about the custody of the holy places at Jerusalem. France, relying on a treaty concluded in the first half of the 18th century, claimed the guardianship of these places for the Latin Church. But the rights which the Latin Church had thus obtained had practically fallen into disuse, while the Greek branch of the Christian Church had occupied and repaired the shrines which the Latins had neglected. In the years which preceded 1853, however, France had shown more activity in asserting her claims; and the new emperor of the French, anxious to conciliate the church which had supported his elevation to the throne, had a keen interest in upholding them. If, for reasons of policy, the emperor had grounds for his action, he had personal motives for thwarting the tsar of Russia; for the latter potentate had been foolish enough, in recognizing the second empire, to address its sovereign as "Mon Cher Ami," instead of, in the customary language of sovereigns, as "Monsieur Mon Frère." Thus, at the close of 1852, and in the beginning of 1853, Russia and France were both addressing opposite and irreconcilable demands to the Porte, and France was already talking of sending her fleet to the Dardanelles, while Russia was placing an army corps on active service and despatching Prince Menshikov on a special mission to Constantinople. So far the quarrel which had occurred at the Porte was obviously one in which Great Britain had no concern. The Aberdeen ministry, however, thought it desirable that it should be represented in the crisis by a strong man at Constantinople; and it selected Lord Stratford de Redcliffe for the post, which he had filled in former years with marked ability. Whatever merits Lord Stratford possessed—and he stands out in current diplomacy as the one strong man whom England had abroad—there was no doubt that he had this disqualification: the emperor Nicholas had refused some years before to receive him as ambassador at St Petersburg, and Lord Stratford had resented, and never forgiven, the discourtesy of this refusal. Lord Stratford soon discovered that Prince Menshikov was the bearer of larger demands, and that he was requiring the Porte to agree to a treaty acknowledging the right of Russia to protect the Greek Church throughout the Turkish dominions. By Lord Stratford's advice the Porte—while making the requisite concession respecting the holy places—refused to grant the new demand; and Prince Menshikov thereupon withdrew from Constantinople.

The rejection of Prince Menshikov's ultimatum was followed by momentous consequences. Russia—or rather her tsar—resolved on the occupation of the Danubian principalities; the British ministry—though the quarrel did not directly concern Great Britain—sent a fleet to the Dardanelles and placed it under Lord Stratford's orders. Diplomacy, however, made a fresh attempt to terminate the dispute, and in July 1853 a note was agreed upon by the four neutral powers, France, Great Britain, Austria and Prussia, which it was decided to present to Constantinople and St Petersburg. This note, the adoption of which would have ensured peace, was accepted at St Petersburg; at Constantinople it was, unfortunately, rejected, mainly on Lord Stratford's advice, and in opposition to his instructions from home. Instead, however, of insisting on the adoption of the note to which it had agreed, Lord Aberdeen's ministry recommended the tsar to accept some amendments to it suggested by Lord Stratford, which it was disposed to regard as unimportant. It then discovered, however, that the tsar attached a meaning to the original note differing from that which it had itself applied to it, and in conjunction with France it thereupon ceased to recommend the Vienna note—as it was called—for acceptance. This decision separated the two western powers from Austria and Prussia, who were disposed to think that Russia had done all that could have been required of her in accepting the note which the four powers had agreed upon.

It was obvious that the control of the situation was passing from the hands of the cabinet at home into those of Lord Stratford at Constantinople. The ambassador, in fact, had the great advantage that he knew his own mind; the cabinet laboured under the fatal disadvantage that it had, collectively, no mind. Its chief, Lord Aberdeen, was dominated by a desire to preserve peace; but he had not the requisite force to control the stronger men who were nominally serving under him. Lord John Russell was a little sore at his own treatment by his party. He thought that he had a claim to the first place in the ministry, and he did not, in consequence, give the full support to Lord Aberdeen which the latter had a right to expect from him. Lord Palmerston, on the other hand, had no personal grudge to nurture, but he was convinced that the first duty of England was to support Turkey and to resist Russia. He represented in the cabinet the views which Lord Stratford was enforcing at Constantinople, and step by step Lord Stratford, thus supported, drove the country nearer and nearer to war.

Crimean War.

In October the Porte, encouraged by the presence of the British fleet in the Bosporus, took the bold step of summoning the Russians to evacuate the principalities. Following up this demand the Turkish troops attacked the Russian army, and inflicted on it one or two sharp defeats. The Russians retaliated by loosing their squadron from Sevastopol, and on the 30th of November it attacked and destroyed the Turkish fleet at Sinope. The massacre of Sinope—as it was rather inaccurately called in Great Britain, for it is difficult to deny that it was a legitimate act of a belligerent power—created an almost irresistible demand for war among the British people. Yielding to popular opinion, the British ministry assented to a suggestion of the French emperor that the fleets of the allied powers should enter the Black Sea and "invite" every Russian vessel to return to Sevastopol. The decision was taken at an unfortunate hour. Diplomatists, pursuing their labours at Vienna, had succeeded in drawing up a fresh note which they thought might prove acceptable both at St Petersburg and at Constantinople. This note was presented almost at the moment the tsar learned that the French and British fleets had entered the Black Sea, and the Russian government, instead of considering it, withdrew its ministers from London and Paris; the French and British ambassadors were thereupon withdrawn from St Petersburg. An ultimatum was soon afterwards addressed to Russia requiring her to evacuate the principalities, and war began. In deciding on war the British government relied on the capacity of its fleet, which was entrusted to the command of Sir Charles Napier, to strike a great blow in the Baltic. The fleet was despatched with extraordinary rejoicings, and amidst loud and confident expressions of its certain triumph. As a matter of fact it did very little. In the south of Europe, however, the Turkish armies on the Danube, strengthened by the advice of British officers, were more successful. The Russians were forced to retire, and the principalities were evacuated. A prudent administration might possibly have succeeded in stopping the war at this point. But the temper of the country was by this time excited, and it was loudly demanding something more than a preliminary success. It was resolved to invade the Crimea and attack the great arsenal, Sevastopol, whence the Russian fleet had sailed to Sinope, and in September 1854 the allied armies landed in the Crimea. On the 20th the Russian army, strongly posted on the banks of the Alma, was completely defeated, and it is almost certain that, if the victory had been at once followed up, Sevastopol would have fallen. The commanders of the allied armies, however, hesitated to throw themselves against the forts erected to the north of the town, and decided on the hazardous task of marching round Sevastopol and attacking it from the south. The movement was successfully carried out, but the Allies again hesitated to attempt an immediate assault. The Russians, who were advised by Colonel Todleben, the only military man who attained a great reputation in the war, thus gained time to strengthen their position by earthworks; and the Allies found themselves forced, with scanty preparations, to undertake a regular siege against an enemy whose force was numerically superior to their own. In the early days of the siege, indeed, the allied armies were twice in great peril. A formidable attack on the 25th October on the British position at Balaklava led to a series of encounters which displayed the bravery of British troops, but did not enhance the reputation of British commanders. A still more formidable sortie on the 5th of November was with difficulty repulsed at Inkerman. And the Russians soon afterwards found, in the climate of the country, a powerful ally. The allied armies, imperfectly organized, and badly equipped for such a campaign, suffered severely from the hardships of a Crimean winter. The whole expedition seemed likely to melt away from want and disease.

Palmerston's ministry.

The terrible condition of the army, vividly described in the letters which the war correspondents of the newspapers sent home, aroused strong feelings of indignation in Great Britain. When parliament met Roebuck gave notice that he would move for a committee of inquiry. Lord John Russell—who had already vainly urged in the cabinet that the duke of Newcastle should be superseded, and the conduct of the war entrusted to a stronger minister—resigned office. His resignation was followed by the defeat of the government, and Lord Aberdeen, thus driven from power, was succeeded by Lord Palmerston. In selecting him for the post, the queen undoubtedly placed her seal on the wish of the country to carry out the war to the bitter end. But it so happened that the formation of a new ministry was accompanied by a fresh effort to make terms of peace. Before the change of administration a conference had been decided on, and Lord Palmerston entrusted its management to Lord John Russell. While the latter was on his way to Vienna an event occurred which seemed at first to facilitate his task. The tsar, worn out with disappointment, suddenly died, and was succeeded by his son Alexander. Unfortunately the conference failed, and the war went on for another year. In September 1855 the allied troops succeeded in obtaining possession of the southern side of Sevastopol, and the emperor of the French, satisfied with this partial success, or alarmed at the expense of the war, decided on withdrawing from the struggle. The attitude of Napoleon made the conclusion of peace only a question of time. In the beginning of 1856 a congress to discuss the terms was assembled at Paris; in February hostilities were suspended; and in April a treaty was concluded. The peace set back the boundaries of Russia from the Danube to the Pruth; it secured the free navigation of the first of these rivers; it opened the Black Sea to the commercial navies of the world, closing it to vessels of war, and forbidding the establishment of arsenals upon its shores. The last condition, to which Great Britain attached most importance, endured for about fourteen years. Peace without this provision could undoubtedly have been secured at Vienna, and the prolongation of the war from 1855 to 1856 only resulted in securing this arrangement for a little more than one decade.

The Crimean War left other legacies behind it. The British government had for some time regarded with anxiety the gradual encroachments of Russia in central Asia. Russian diplomacy was exerting an increasing influence in Persia, and the latter had always coveted the city of Herat, which was popularly regarded as the gate of India. In 1856 the Persian government, believing that England had her hands fully occupied in the Crimea, seized Herat, and, in consequence, a fresh war—in which a British army under Sir James Outram rapidly secured a victory—broke out. The campaign, entered upon when parliament was not in session, was unpopular in the country. A grave constitutional question, which was ultimately settled by legislation, was raised as to the right of the government to undertake military operations beyond the boundaries of India without the consent of parliament. But the incidents of the Persian war were soon forgotten in the presence of a still graver crisis; for in the following year, 1857, the country suddenly found itself involved in war with China, and face to face with one of the greatest dangers which it has ever encountered—the mutiny of the sepoy army in India. The Chinese war arose from the seizure by the Chinese authorities of a small vessel, the "Arrow" commanded by a British subject, and at one time holding a licence (which, however, had expired at the time of the seizure) from the British superintendent at Hongkong, and the detention of her crew on the charge of piracy. Sir John Bowring, who represented Great Britain in China, failing to secure the reparation and apology which he demanded, directed the British admiral to bombard Canton. Lord Palmerston's cabinet decided to approve and support Sir John Bowring's vigorous action. Cobden, however, brought forward a motion in the House of Commons condemning these high-handed proceedings. He succeeded in securing the co-operation of his own friends, of Lord John Russell, and of other independent Liberals, as well as of the Conservative party, and in inflicting a signal defeat on the government. Lord Palmerston at once appealed from the House to the country. The constituencies, imperfectly acquainted with the technical issues involved in the dispute, rallied to the minister, who was upholding British interests. Lord Palmerston obtained a decisive victory, and returned to power apparently in irresistible strength. Lord Elgin had already been sent to China with a considerable force to support the demand for redress. On his way thither he learned that the British in India were reduced to the last extremities by the mutiny of the native army in Bengal, and, on the application of Lord Canning, the governor-general, he decided on diverting the troops, intended to bring the Chinese to reason, to the more pressing duty of saving India for the British crown.

Wars with Persia and China.

Indian mutiny.

During the years which had followed the accession of the queen, the territories and responsibilities of the East India Company had been considerably enlarged by the annexation of Sind by Lord Ellenborough, the conquest of the Punjab after two desperate military campaigns under Lord Dalhousie, the conquest of Pegu, and the annexation of Oudh. These great additions to the empire had naturally imposed an increased strain on the Indian troops, while the British garrison, instead of being augmented, had been depleted to meet the necessities of the Russian war. Several circumstances, moreover, tended to propagate disaffection in the Indian army. Indian troops operating outside the Company's dominions were granted increased allowances, but these were automatically reduced when conquest brought the provinces in which they were serving within the British pale. The Sepoys again had an ineradicable dislike to serve beyond the sea, and the invasion of Pegu necessitated their transport by water to the seat of war. Finally, the invention of a new rifle led to the introduction of a cartridge which, though it was officially denied at the moment, was in fact lubricated with a mixture of cow's fat and lard. The Sepoys thought that their caste would be destroyed if they touched the fat of the sacred cow or unclean pig; they were even persuaded that the British government wished to destroy their caste in order to facilitate their conversion to Christianity. Isolated mutinies in Bengal were succeeded by much more serious events at Cawnpore in Oudh, and at Meerut in the North-West Provinces. From Meerut the mutineers, after some acts of outrage and murder, moved on Delhi, the capital of the old Mogul empire, which became the headquarters of the mutiny. In Oudh the native regiments placed themselves under a Mahratta chief, Nana Sahib, by whose orders the British in Cawnpore, including the women and children, were foully murdered. In the summer of 1857 these events seemed to imperil British rule in India. In the autumn the courage of the troops and the arrival of reinforcements gradually restored the British cause. Delhi, after a memorable siege, was at last taken by a brilliant assault. Lucknow, where a small British garrison was besieged in the residency, was twice relieved, once temporarily by Sir James Outram and General Havelock, and afterwards permanently by Sir Colin Campbell, who had been sent out from England to take the chief command. Subsequent military operations broke up the remnants of the revolt, and in the beginning of 1858 the authority of the queen was restored throughout India. The mutiny, however, had impressed its lesson on the British people; and, as the first consequence, it was decided to transfer the government from the old East India Company to the crown. Lord Palmerston's administration was defeated on another issue before it succeeded in carrying the measure which it introduced for the purpose, though Lord Derby's second ministry, which succeeded it, was compelled to frame its proposals on somewhat similar lines. The home government of India was entrusted to a secretary of state, with a council to assist him; and though the numbers of the council have been reduced, the form of government which was then established has endured.

Orsini.

The cause which led to the second fall of Lord Palmerston was in one sense unexpected. Some Italian refugees living in London, of whom Orsini was the chief, formed a design to assassinate the emperor of the French. On the evening of 14th January 1858, while the emperor, accompanied by the empress, was driving to the opera, these men threw some bombs under his carriage. The brutal attempt happily failed. Neither the emperor nor the empress was injured by the explosion, but the carriage in which they were driving was wrecked, and a large number of persons who happened to be in the street at the time were either killed or wounded. This horrible outrage naturally created indignation in France, and it unfortunately became plain that the conspiracy had been hatched in England, and that the bombs had been manufactured in Birmingham. On these facts becoming known, Count Walewski, the chief of the French foreign office, who was united by ties of blood to the emperor, called on the British government to provide against the danger to which France was exposed. "Ought the right of asylum to protect such a state of things?" he asked. "Is hospitality due to assassins? Ought the British legislature to continue to favour their designs and their plans? And can it continue to shelter persons who by these flagrant acts place themselves beyond the pale of common rights?" Lord Clarendon, the head of the British foreign office, told the French ambassador, who read him this despatch, that "no consideration on earth would induce the British parliament to pass a measure for the extradition of political refugees," but he added that it was a question whether the law was as complete and as stringent as it should be, and he stated that the government had already referred the whole subject to the law officers of the crown for their consideration. Having made these remarks, however, he judged it wise to refrain from giving any formal reply to Count Walewski's despatch, and contented himself with privately communicating to the British ambassador in Paris the difficulties of the British government. After receiving the opinion of the law officers the cabinet decided to introduce a bill into parliament increasing in England the punishment for a conspiracy to commit a felony either within or without the United Kingdom. The first reading of this bill was passed by a considerable majority. But, before the bill came on for a second reading, the language which was being used in France created strong resentment in England. The regiments of the French army sent addresses to the emperor congratulating him on his escape and violently denouncing the British people. Some of these addresses, which were published in the *Moniteur*, spoke of London as "an assassins' den," and invited the emperor to give his troops the order to destroy it. Such language did not make it easier to alter the law in the manner desired by the government. The House of Commons, reflecting the spirit of the country, blamed Lord Clarendon for neglecting to answer Count Walewski's despatch, and blamed Lord Palmerston for introducing a bill at French dictation. The feeling was so strong that, when the Conspiracy Bill came on for a second reading, an amendment hostile to the government was carried, and Lord Palmerston at once resigned.

Lord Derby's second ministry.

For a second time Lord Derby undertook the difficult task of carrying on the work of government without the support of a majority of the House of Commons. If the Liberal party had been united his attempt would have failed immediately. In 1858, however, the Liberal party had no cohesion. The wave of popularity which had carried Lord Palmerston to victory in 1857 had lost its strength. The Radicals, who were slowly recovering the influence they had lost during the Crimean War, regarded even a Conservative government as preferable to his return to power, while many Liberals desired to entrust the fortunes of their party to the guidance of their former chief, Lord John Russell. It was obvious to most men that the dissensions thus visible in the Liberal ranks could be more easily healed in the cold shade of the opposition benches than in the warmer sunlight of office. And therefore, though no one had much confidence in Lord Derby, or in the stability of his second administration, every one was disposed to acquiesce in its temporary occupation of office.

Jews in parliament.

Ministries which exist by sufferance are necessarily compelled to adapt their measures to the wishes of those who permit them to continue in power. The second ministry of Lord Derby experienced the truth of this rule. For some years a controversy had been conducted in the legislature in reference to the admission of the Jews to parliament. This dispute had been raised in 1847 into a question of practical moment by the election of Baron Lionel Nathan Rothschild as representative of the City of London, and its importance had been emphasized in 1851 by the return of another Jew, Alderman Salomons, for another constituency. The Liberal party generally in the House of Commons was in favour of such a modification of the oaths as would enable the Jews so elected to take their seats. The bulk of the Conservative party, on the contrary, and the House of Lords, were strenuously opposed to the change. Early in 1858 the House of Commons, by an increased majority, passed a bill amending the oaths imposed by law on members of both Houses, and directing the omission of the words "on the true faith of a Christian" from the oath of abjuration when it was taken by a Jew. If the Conservatives had remained in opposition there can be little doubt that this bill would have shared the fate of its predecessors and have been rejected by the Lords. The lord chancellor, indeed, in speaking upon the clause relieving the Jews, expressed a hope that the peers would not hesitate to pronounce that our "Lord is king, be the people never so impatient." But some Conservative peers realized the inconvenience of maintaining a conflict between the two Houses when the Conservatives were in power; and Lord Lucan, who had commanded the cavalry in the Crimea, suggested as a compromise that either House should be authorized by resolution to determine the form of oath to be administered to its members. This solution was reluctantly accepted by Lord Derby, and Baron Rothschild was thus enabled to take the seat from which he had been so long excluded. Eight years afterwards parliament was induced to take a fresh step in advance. It imposed a new oath from which the words which disqualified the Jews were omitted. The door of the House of Lords was thus thrown open, and in 1885 Baron Nathan Mayer Rothschild, raised to the peerage, was enabled to take his seat in the upper chamber.

Reform Bill, 1859.

This question was not the only one on which a Conservative government, without a majority at its back, was compelled to make concessions. For some years past a growing disposition had been displayed among the more earnest Liberals to extend the provisions of the Reform Act of 1832. Lord John Russell's ministry had been defeated in 1851 on a proposal of Locke King to place £10 householders in counties on the same footing as regards the franchise as £10 householders in towns, and Lord John himself in 1854 had actually introduced a new Reform Bill. After the general election of 1857 the demand for reform increased, and, in accepting office in 1858, Lord Derby thought it necessary to declare that, though he had maintained in opposition that the settlement of 1832, with all its anomalies, afforded adequate representation to all classes, the promises of previous governments and the expectations of the people imposed on him the duty of bringing forward legislation on the subject. The scheme which Lord Derby's government adopted was peculiar. Its chief proposal was the extension of the county franchise to £10 householders. But it also proposed that persons possessing a 40s. freehold in a borough should in future have a vote in the borough in which their property was situated, and not in the county. The bill also conferred the franchise on holders of a certain amount of stock, on depositors in savings banks, on graduates of universities, and on other persons qualified by position or education. The defect of the bill was that it did nothing to meet the only real need of reform—the enfranchisement of a certain proportion of the working classes. On the contrary, in this respect it perpetuated the settlement of 1832. The £10 householder was still to furnish the bulk of the electorate, and the ordinary working man could not afford to pay £10 a year for his house. While the larger proposals of the bill were thus open to grave objection, its subsidiary features provoked ridicule. The suggestions that votes should be conferred on graduates and stockholders were laughed at as "fancy franchises." The bill, moreover, was not brought forward with the authority of a united cabinet. Two members of the government—Spencer Walpole and Henley—declined to be responsible for its provisions, and placed their resignations in Lord Derby's hands. In Walpole's judgment the bill was objectionable because it afforded no reasonable basis for a stable settlement. There was nothing in a £10 franchise which was capable of permanent defence, and if it was at once applied to counties as well as boroughs it would sooner or later be certain to be extended. He himself advocated with some force that it would be wiser and more popular to fix the county franchise at £20 and the borough franchise at £6 rateable value; and he contended that such a settlement could be defended on the old principle that taxation and representation should go together, for £20 was the minimum rent at which the house tax commenced, and a rateable value of £6 was the point at which the householder could not compound to pay his rates through his landlord. Weakened by the defection of two of its more important members, the government had little chance of obtaining the acceptance of its scheme. An amendment by Lord John Russell, condemning its main provisions, was adopted in an unusually full house by a substantial majority, and the cabinet had no alternative but to resign or dissolve. It chose the latter course. The general election, which almost immediately took place, increased to some extent the strength of the Conservative party. For the first time since their secession from Sir Robert Peel the Conservatives commanded more than three hundred votes in the House of Commons, but this increased strength was not sufficient to ensure them a majority. When the new parliament assembled, Lord Hartington, the eldest son of the duke of Devonshire, was put forward to propose a direct vote of want of confidence in the administration. It was carried by 323 votes to 310, and the second Derby administration came to an end.

Palmerston's second ministry.

It was plain that the House of Commons had withdrawn its support from Lord Derby, but it was not clear that any other leading politician would be able to form a government. The jealousies between Lord John Russell and Lord Palmerston still existed; the more extreme men, who were identified with the policy of Cobden and Bright, had little confidence in either of these statesmen; and it was still uncertain whether the able group who had been the friends of Sir Robert Peel would finally gravitate to the Conservative or to the Liberal camp. The queen, on the advice of Lord Derby, endeavoured to solve the first of these difficulties by sending for Lord Granville, who led the Liberal party in the Lords, and authorizing him to form a government which should combine, as far as possible, all the more prominent Liberals. The attempt, however, failed, and the queen thereupon fell back upon Lord Palmerston. Lord John Russell agreed to accept office as foreign minister; Gladstone consented to take the chancellorship of the exchequer. Cobden was offered, but declined, the presidency of the Board of Trade; and the post which he refused was conferred on a prominent free trader, who had associated himself with Cobden's fortunes, Milner Gibson. Thus Lord Palmerston had succeeded in combining in one ministry the various representatives of political progress. He had secured the support of the Peelites, who had left him after the fall of Lord Aberdeen in 1855, and of the free traders, who had done so much to defeat him in 1857 and 1858. His new administration was accordingly based on a broader bottom, and contained greater elements of strength than his former cabinet. And the country was requiring more stable government. The first three ministries of the queen had endured from the spring of 1835 to the spring of 1852, or for very nearly seventeen years; but the next seven years had seen the formation and dissolution of no less than four cabinets. It was felt that these frequent changes were unfortunate for the country, and every one was glad to welcome the advent of a government which seemed to promise greater permanence. That promise was fulfilled. The administration which Lord Palmerston succeeded in forming in 1859 endured till his death in 1865, and with slight modifications, under its second chief Lord John (afterwards Earl) Russell, till the summer of 1866. It had thus a longer life than any cabinet which had governed England since the first Reform Act. But it owed its lasting character to the benevolence of its opponents rather than to the enthusiasm of its supporters. The Conservatives learned to regard the veteran statesman, who had combined all sections of Liberals under his banner, as the most powerful champion of Conservative principles; a virtual truce of parties was established during his continuance in office; and, for the most part of his ministry, a tacit understanding existed that the minister, on his side, should pursue a Conservative policy, and that the Conservatives, on theirs, should abstain from any real attempt to oust him from power. Lord John Russell, indeed, was too earnest in his desire for reform to abstain from one serious effort to accomplish it. Early in 1860 he proposed, with the sanction of the cabinet, a measure providing for the extension of the county franchise to £10 householders, of the borough franchise to £6 householders, and for a moderate redistribution of seats. But the country, being in enjoyment of considerable prosperity, paid only a languid attention to the scheme; its indifference was reflected in the House; the Conservatives were encouraged in their opposition by the lack of interest which the new bill excited, and the almost unconcealed dislike of the prime minister to its provisions. The bill, thus steadily opposed and half-heartedly supported, made only slow progress; and at last it was withdrawn by its author. He did not again attempt during Lord Palmerston's life to reintroduce the subject. Absorbed in the work of the foreign office, which at this time was abnormally active, he refrained from pressing home the arguments for internal reform.

Gladstone's budgets.

In one important department, however, the ministry departed from the Conservative policy it pursued in other matters. Gladstone signalized his return to the exchequer by introducing a series of budgets which excited keen opposition at the time, but in the result largely added to the prosperity of the country. The first of these great budgets, in 1860, was partly inspired by the necessity of adapting the fiscal system to meet the requirements of a commercial treaty which, mainly through Cobden's exertions, had been concluded with the emperor of the French. The treaty bound France to reduce her duties on English coal and iron, and on many manufactured articles; while, in return, Great Britain undertook to sweep away the duties on all manufactured goods, and largely to reduce those on French wines. But Gladstone was not content with these great alterations, which involved a loss of nearly £1,200,000 a year to the exchequer; he voluntarily undertook to sacrifice another million on what he called a supplemental measure of customs reform. He proposed to repeal the duties on paper, by which means he hoped to increase the opportunities of providing cheap literature for the people. The budget of 1860 produced a protracted controversy. The French treaty excited more criticism than enthusiasm on both sides of the Channel. In France the manufacturers complained that they would be unable to stand against the competition of English goods. In England many people thought that Great Britain was wasting her resources and risking her supremacy by giving the French increased facilities for taking her iron, coal and machinery, and that no adequate advantage could result from the greater consumption of cheap claret. But the criticism which the French treaty aroused was drowned in the clamour which was created by the proposed repeal of the paper duties. The manufacture of paper was declared to be a struggling industry, which would be destroyed by the withdrawal of protection. The dissemination of cheap literature and the multiplication of cheap newspapers could not compensate the nation for the ruin of an important trade. If money could be spared, moreover, for the remission of taxation, the paper duties were much less oppressive than those on some other articles. The tax on tea, for example, which had been raised during the late war to no less than 1s. 5d. a lb, was much more injurious; and it would be far wiser—so it was contended—to reduce the duty on tea than to abandon the duties on paper. Notwithstanding the opposition which the Paper Duties Bill undoubtedly excited, the proposal was carried in the Commons; it was, however, thrown out in the Lords, and its rejection led to a crisis which seemed at one time to threaten the good relations between the two houses of parliament. It was argued that if the Lords had the right to reject a measure remitting existing duties, they had in effect the right of imposing taxation, since there was no material difference between the adoption of a new tax and the continuance of an old one which the Commons had determined to repeal. Lord Palmerston, however, with some tact postponed the controversy for the time by obtaining the appointment of a committee to search for precedents; and, after the report of the committee, he moved a series of resolutions affirming the right of the Commons to grant aids and supplies as their exclusive privilege, stating that the occasional rejection of financial measures by the Lords had always been regarded with peculiar jealousy, but declaring that the Commons had the remedy in their own hands by so framing bills of supply as to secure their acceptance. In accordance with this suggestion the Commons in the following year again resolved to repeal the paper duties; but, instead of embodying their decision in a separate bill, they included it in the same measure which dealt with all the financial arrangements of the year, and thus threw on the Lords the responsibility of either accepting the proposal, or of paralysing the whole machinery of administration by depriving the crown of the supplies which were required for the public services. The Lords were not prepared to risk this result, and they accordingly accepted a reform which they could no longer resist, and the bill became law. In order to enable him to accomplish these great changes, Gladstone temporarily raised the income tax, which he found at 9d. in the £, to 10d. But the result of his reforms was so marked that he was speedily able to reduce it. The revenue increased by leaps and bounds, and the income tax was gradually reduced till it stood at 4d. in the closing years of the administration. During the same period the duty on tea was reduced from 1s. 5d. to 6d. a lb; and the national debt was diminished from rather more than £800 000,000 to rather less than £780,000,000, the charge for the debt declining, mainly through the falling in of the long annuities, by some £2,600,000 a year. With the possible exception of Sir Robert Peel's term of office, no previous period of British history had been memorable for a series of more remarkable financial reforms. Their success redeemed the character of the administration. The

Paper duties repealed.

Liberals, who complained that their leaders were pursuing a Conservative policy, could at least console themselves by the reflection that the chancellor of the exchequer was introducing satisfactory budgets. The language, moreover, which Gladstone was holding on other subjects encouraged the more advanced Liberals to expect that he would ultimately place himself at the head of the party of progress. This expectation was the more remarkable because Gladstone was the representative in the cabinet of the old Conservative party which Sir Robert Peel had led to victory. As lately as 1858 he had reluctantly refused to serve under Lord Derby; he was still a member of the Carlton Club; he sat for the university of Oxford; and on many questions he displayed a constant sympathy with Conservative traditions. Yet, on all the chief domestic questions which came before parliament in Lord Palmerston's second administration, Gladstone almost invariably took a more Liberal view than his chief. It was understood, indeed, that the relations between the two men were not always harmonious; that Lord Palmerston disapproved the resolute conduct of Gladstone, and that Gladstone deplored the Conservative tendencies of Lord Palmerston. It was believed that Gladstone on more than one occasion desired to escape from a position which he disliked by resigning office, and that the resignation was only averted through a consciousness that the ministry could not afford to lose its most eloquent member.

China war, 1859-60.

While on domestic matters, other than those affecting finance, the Liberal ministry was pursuing a Conservative policy, its members were actively engaged on, and the attention of the public was keenly directed to, affairs abroad. For the period was one of foreign unrest, and the wars which were then waged have left an enduring mark on the map of the world, and have affected the position of the Anglo-Saxon race for all time. In the far East, the operations which it had been decided to undertake in China were necessarily postponed on account of the diversion of the forces, intended to exact redress at Peking, to the suppression of mutiny in India. It was only late in 1858 that Lord Elgin and Baron Gros, the French plenipotentiary (for France joined England in securing simultaneous redress of grievances of her own), were enabled to obtain suitable reparation. It was arranged that the treaty, which was then provisionally concluded at Tientsin, should be ratified at Peking in the following year; and in June 1859 Mr (afterwards Sir Frederick) Bruce, Lord Elgin's brother, who had been appointed plenipotentiary, attempted to proceed up the Peiho with the object of securing its ratification. The allied squadron, however, was stopped by the forts at the mouth of the Peiho, which fired on the vessels; a landing party, which was disembarked to storm the forts, met with a disastrous check, and the squadron had to retire with an acknowledged loss of three gunboats and 400 men. This reverse necessitated fresh operations, and in 1860 Lord Elgin and Baron Gros were directed to return to China, and, at the head of an adequate force, were instructed to exact an apology for the attack on the allied fleets, the ratification and execution of the treaty of Tientsin, and the payment of an indemnity for the expenses of the war. The weakness of the Chinese empire was not appreciated at that time; the unfortunate incident on the Peiho in the previous summer had created an exaggerated impression of the strength of the Chinese arms, and some natural anxiety was felt for the success of the expedition. But the allied armies met with no serious resistance. The Chinese, indeed, endeavoured to delay their progress by negotiation rather than by force; and they succeeded in treacherously arresting some distinguished persons who had been sent into the Chinese lines to negotiate. But by the middle of October the Chinese army was decisively defeated; Peking was occupied; those British and French prisoners who had not succumbed to the hardships of their confinement were liberated. Lord Elgin determined on teaching the rulers of China a lesson by the destruction of the summer palace; and the Chinese government was compelled to submit to the terms of the Allies, and to ratify the treaty of Tientsin. There is no doubt that these operations helped to open the Chinese markets to British trade; but incidentally, by regulating the emigration of Chinese coolies, they had the unforeseen effect of exposing the industrial markets of the world to the serious competition of "cheap yellow" labour. A distinguished foreign statesman observed that Lord Palmerston had made a mistake. He thought that he had opened China to Europe; instead, he had let out the Chinese. It was perhaps a happier result of the war that it tended to the continuance of the Anglo-French alliance. French and British troops had again co-operated in a joint enterprise, and had shared the dangers and successes of a campaign.

Unification of Italy.

War was not confined to China. In the beginning of 1859 diplomatists were alarmed at the language addressed by the emperor of the French to the Austrian ambassador at Paris, which seemed to breathe the menace of a rupture. Notwithstanding the exertions which Great Britain made to avert hostilities, the provocation of Count Cavour induced Austria to declare war against Piedmont, and Napoleon thereupon moved to the support of his ally, promising to free Italy from the Alps to the Adriatic. As a matter of fact, the attitude of northern Germany, which was massing troops on the Rhine, and the defenceless condition of France, which was drained of soldiers for the Italian campaign, induced the emperor to halt before he had carried out his purpose, and terms of peace were hastily concerted at Villafranca, and were afterwards confirmed at Zurich, by which Lombardy was given to Piedmont, while Austria was left in possession of Venice and the Quadrilateral, and central Italy was restored to its former rulers. The refusal of the Italians to take back the Austrian grand dukes made the execution of these arrangements impracticable. Napoleon, indeed, used his influence to carry them into effect; but Lord John Russell, who was now in charge of the British foreign office, and who had Lord Palmerston and Gladstone on his side in the cabinet, gave a vigorous support to the claim of the Italians that their country should be allowed to regulate her own affairs. The French emperor had ultimately to yield to the determination of the inhabitants of central Italy, when it was backed by the arguments of the British foreign office, and Tuscany, Modena, Parma, as well as a portion of the states of the Church, were united to Piedmont. There was no doubt that through the whole of the negotiations the Italians were largely indebted to the labours of Lord John Russell. They recognized that they owed more to the moral support of England than to the armed assistance of France. The French emperor, moreover, took a step which lost him the sympathy of many Italians. Before the war he had arranged with Count Cavour that France should receive, as the price of her aid, the duchy of Savoy and the county of Nice. After Villafranca, the emperor, frankly recognizing that he had only half kept his promise, consented to waive his claim to these provinces. But, when he found himself unable to resist the annexation of central Italy to Piedmont, he reverted to the old arrangement. The formation of a strong Piedmontese kingdom, with the spoliation of the papal dominion, was unpopular in France; and he thought—perhaps naturally—that he must have something to show his people in return for sacrifices which had cost him the lives of 50,000 French soldiers, and concessions which the whole Catholic party in France resented. Count Cavour consented to pay the price which Napoleon thus exacted, and the frontier of France was accordingly extended to the Alps. But it is very doubtful whether Napoleon did not lose more than he gained by this addition to his territory. It certainly cost him the active friendship of Great Britain. The Anglo-French alliance had been already strained by the language of the French colonels in 1858 and the Franco-Austrian War of 1859; it never fully recovered from the shock which it received by the evidence, which the annexation of Savoy and Nice gave, of the ambition of the French emperor. The British people gave way to what Cobden called the last of the three panics. Lord Palmerston proposed and carried the provision of a large sum of money for the fortification of the coasts; and the volunteer movement, which had its origin in 1859, received a remarkable stimulus in 1860. In this year the course of events in Italy emphasized the differences between the policy of Great Britain and that of France. Garibaldi, with a thousand followers, made his famous descent on the coast of Sicily. After making himself master of that island, he crossed over to the mainland, drove the king of Naples out of his capital, and forced him to take refuge in Gaeta. In France these events were regarded with dismay. The emperor wished to stop Garibaldi's passage across the strait, and stationed his fleet at Gaeta to protect the king of Naples. Lord John Russell, on the contrary, welcomed Garibaldi's success with enthusiasm. He declined to intervene in the affairs of Italy by confining the great liberator to Sicily; he protested against the presence of the French fleet at Gaeta; and when other foreign nations denounced the conduct of Piedmont, he defended it by quoting Vattel and citing the example of William III. When, finally, Italian troops entered the dominions of the pope, France withdrew her ambassador from the court of Turin, and England under Lord John Russell's advice at once recognized the new kingdom of Italy.

In these great events—for the union of Italy was the greatest fact which had been accomplished in Europe since the fall of the first Napoleon—the British ministry had undoubtedly acquired credit. It was everywhere felt that the new kingdom owed much to the moral support which had been steadily and consistently given to it by Great Britain. Soon afterwards, however, in the autumn of 1863, the death of the king of Denmark led to a new revolution in the north of Europe, in which Lord Palmerston's government displayed less resolution, and lost much of the prestige which it had acquired by its Italian policy. The duchies of Schleswig and Holstein had been for centuries united to the kingdom of Denmark by the golden link of the crown; in other respects they had been organically kept distinct, while one of them—Holstein—was a member of the German confederation. The succession to the crown of Denmark, however, was different from that in the duchies. In Denmark the crown could descend, as it descends in Great Britain, through females. In the duchies the descent was confined to the male line; and, as Frederick VII., who ascended the Danish throne in 1848, had no direct issue, the next heir to the crown of Denmark under this rule was Prince Christian of Glücksburg, afterwards king; the next heir to the duchies being the duke of Augustenburg. In 1850 an arrangement had been made to prevent the separation of the duchies from the kingdom. As a result of a conference held in London, the duke of Augustenburg was induced to renounce his claim on the receipt of a large sum of money. Most of the great powers of Europe were parties to this plan. But the German confederation was not represented at the conference, and was not therefore committed to its conclusions. During the reign of Frederick VII. the Danish government endeavoured to cement the alliance between the duchies and the kingdom, and specially to separate the interests of Schleswig, which was largely Danish in its sympathies, from those of Holstein, which was almost exclusively German. With this object, in the last year of his life, Frederick VII. granted Holstein autonomous institutions, and bound Schleswig more closely to the Danish monarchy. The new king Christian IX. confirmed this arrangement. The German diet at Frankfort at once protested against it. Following up words with acts, it decided on occupying Holstein, and it delegated the duty of carrying out its order to Hanover and Saxony. While this federal execution was taking place, the duke of Augustenburg—regardless of the arrangements to which he had consented—delegated his rights in the duchies to his son, who formally claimed the succession. So far the situation, which was serious enough, had been largely dependent on the action of Germany. In the closing days of 1863 it passed mainly into the control of the two chief German powers. In Prussia Bismarck had lately become prime minister, and was animated by ambitious projects for his country's aggrandizement. Austria, afraid of losing her influence in Germany, followed the lead of Prussia, and the two powers required Denmark to cancel the arrangements which Frederick VII. had made, and which Christian IX. had confirmed, threatening in case of refusal to follow up the occupation of Holstein by that of Schleswig. As the Danes gave only a provisional assent to the demand, Prussian and Austrian troops entered Schleswig. These events created much excitement in England. The great majority of the British people, who imperfectly understood the merits of the case, were unanimous in their desire to support Denmark by arms. Their wish had been accentuated by the circumstance that the marriage in the previous spring of the prince of Wales to the daughter of the new king of Denmark had given them an almost personal interest in the struggle. Lord Palmerston had publicly expressed the views of the people by declaring that, if Denmark were attacked, her assailants would not have to deal with Denmark alone. The language of the public press and of Englishmen visiting Denmark confirmed the impression which the words of the prime minister had produced; and there is unfortunately no doubt that Denmark was encouraged to resist her powerful opponents by the belief, which she was thus almost authorized in entertaining, that she could reckon in the hour of her danger on the active assistance of the United Kingdom. If Lord Palmerston had been supported by his cabinet, or if he had been a younger man, he might possibly, in 1864, have made good the words which he had rashly uttered in 1863. But the queen, who, it is fair to add, understood the movement which was tending to German unity much better than most of her advisers, was averse from war. A large section of the cabinet shared the queen's hesitation, and Lord Palmerston—with the weight of nearly eighty summers upon him—was not strong enough to enforce his will against both his sovereign and his colleagues. He made some attempt to ascertain whether the emperor of the French would support him if he went to war. But he found that the emperor had not much fancy for a struggle which would have restored Holstein to Denmark; and that, if he went to war at all, his chief object would be the liberation of Venice and the rectification of his own frontiers. Even Lord Palmerston shrank from entering on a campaign which would have involved all Europe in conflagration and would have unsettled the boundaries of most continental nations; and the British government endeavoured thenceforward to stop hostilities by referring the question immediately in dispute to a conference in London. The labours of the conference proved abortive. Its members were unable to agree upon any methods of settlements, and the war went on. Denmark, naturally unable to grapple with her powerful antagonists, was forced to yield, and the two duchies which were the subject of dispute were taken from her.

Schleswig-Holstein question.

The full consequences of this struggle were not visible at the time. It was impossible to foresee that it was the first step which was to carry Prussia forward, under her ambitious minister, to a position of acknowledged supremacy on the continent. But the results to Great Britain were plain enough. She had been mighty in words and weak in deeds. It was no doubt open to her to contend, as perhaps most wise people consider, that the cause of Denmark was not of sufficient importance to justify her in going to war. But it was not open to her to encourage a weak power to resist and then desert her in the hour of her necessity. Lord Palmerston should not have used the language which he employed in 1863 if he had not decided that his brave words would be followed by brave action. His conduct lowered the prestige of Great Britain at least as much as his Italian policy had raised it. Continental statesmen thenceforward assumed that Great Britain, however much she might protest, would not resort to arms, and the influence of England suffered, as it was bound to suffer, in consequence.

Meanwhile, in this period of warfare, another struggle was being fought out on a still greater scale in North America. The election of Abraham Lincoln to the presidency of the United States emphasized the fact that the majority of the inhabitants of the Northern States were opposed to the further spread of slavery; and, in the beginning of 1861, several of the Southern States formally seceded from the union. A steamer sent by the Federal government with reinforcements to Fort Sumter was fired upon, and both parties made preparations for the civil war which was apparently inevitable. On

American civil war.

the one side the Confederate States—as the seceding states were called—were animated by a resolution to protect their property. On the other side the "conscience" of the North was excited by a passionate desire to wipe out the blot of slavery. Thus both parties were affected by some of the most powerful considerations which can influence mankind, while the North were further actuated by the natural incentive to preserve the union, which was threatened with disruption. The progress of the great struggle was watched with painful attention in England. The most important manufacturing interest in England was paralysed by the loss of the raw cotton, which was obtained almost exclusively from the United States, and tens of thousands of workpeople were thrown out of employment. The distress which resulted naturally created a strong feeling in favour of intervention, which might terminate the war and open the Southern ports to British commerce; and the initial successes which the Confederates secured seemed to afford some justification for such a proceeding. In the course of 1862 indeed, when the Confederate armies had secured many victories, Gladstone, speaking at Newcastle, used the famous expression that President Jefferson Davis had "made a nation"; and Lord Palmerston's language in the House of Commons—while opposing a motion for the recognition of the South—induced the impression that his thoughts were tending in the same direction as Mr Gladstone's. The emperor Napoleon, in July of the same year, confidentially asked the British minister whether the moment had not come for recognizing the South; and in the following September Lord Palmerston was himself disposed in concert with France to offer to mediate on the basis of separation. Soon afterwards, however, the growing exhaustion of the South improved the prospects of the Northern States: an increasing number of persons in Great Britain objected to interfere in the interests of slavery; and the combatants were allowed to fight out their quarrel without the interference of Europe.

The "Trent" incident.

At the beginning of the war, Lord John Russell (who was made a peer as Earl Russell in 1861) acknowledged the Southern States as belligerents. His decision caused some ill-feeling at Washington; but it was inevitable. For the North had proclaimed a blockade of the Southern ports; and it would have been both inconvenient and unfair if Lord Russell had decided to recognize the blockade and had refused to acknowledge the belligerent rights of the Southern States. Lord Russell's decision, however, seemed to indicate some latent sympathy for the Southern cause; and the irritation which was felt in the North was increased by the news that the Southern States were accrediting two gentlemen to represent them at Paris and at London. These emissaries, Messrs Mason and Slidell, succeeded in running the blockade and in reaching Cuba, where they embarked on the "Trent," a British mail steamer sailing for England. On her passage home the "Trent" was stopped by the Federal steamer "San Jacinto"; she was boarded, and Messrs Mason and Slidell were arrested. There was no doubt that the captain of the "San Jacinto" had acted irregularly. While he had the right to stop the "Trent," examine the mails, and, if he found despatches for the enemy among them, carry the vessel into an American port for adjudication, he had no authority to board the vessel and arrest two of her passengers. "The British government," to use its own language, "could not allow such an affront to the national honour to pass without due reparation." They decided on sending what practically amounted to an ultimatum to the Federal government, calling upon it to liberate the prisoners and to make a suitable apology. The presentation of this ultimatum, which was accompanied by the despatch of troops to Canada, was very nearly provoking war with the United States. If, indeed, the ultimatum had been presented in the form in which it was originally framed, war might have ensued. But at the prince consort's suggestion its language was considerably modified, and the responsibility for the outrage was thrown on the officer who committed it, and not on the government of the Republic. It ought not to be forgotten that this important modification was the last service rendered to his adopted country by the prince consort before his fatal illness. He died before the answer to the despatch was received; and his death deprived the queen of an adviser who had stood by her side since the earlier days of her reign, and who, by his prudence and conduct, had done much to raise the tone of the court and the influence of the crown. Happily for the future of the world, the government of the United States felt itself able to accept the despatch which had been thus addressed to it, and to give the reparation which was demanded; and the danger of war between the two great branches of the Anglo-Saxon race was averted. But, in the following summer, a new event excited fresh animosities, and aroused a controversy which endured for the best part of ten years.

The "Alabama."

The Confederates, naturally anxious to harass the commerce of their enemies, endeavoured from the commencement of hostilities to purchase armed cruisers from builders of neutral nations. In June 1862 the American minister in London drew Lord Russell's attention to the fact that a vessel, lately launched at Messrs Laird's yard at Birkenhead, was obviously intended to be employed as a Confederate cruiser. The solicitor to the commissioners of customs, however, considered that no facts had been revealed to authorize the detention of the vessel, and this opinion was reported in July to the American minister, Charles Francis Adams. He thereupon supplied the government with additional facts, and at the same time furnished them with the opinion of an eminent English lawyer, R. P. Collier (afterwards Lord Monkswell), to the effect that "it would be difficult to make out a stronger case of infringement of the Foreign Enlistment Act, which if not enforced on this occasion is little better than a dead letter." These facts and this opinion were at once sent to the law officers. They reached the queen's advocate on Saturday the 26th of July; but, by an unfortunate mischance, the queen's advocate had just been wholly incapacitated by a distressing illness; and the papers, in consequence, did not reach the attorney- and solicitor-general till the evening of the following Monday, when they at once advised the government to detain the vessel. Lord Russell thereupon sent orders to Liverpool for her detention. In the meanwhile the vessel—probably aware of the necessity for haste—had put to sea, and had commenced the career which made her famous as the "Alabama." Ministers might even then have taken steps to stop the vessel by directing her detention in any British port to which she resorted for supplies. The cabinet, however, shrank from this course. The "Alabama" was allowed to prey on Federal commerce, and undoubtedly inflicted a vast amount of injury on the trade of the United States. In the autumn of 1862 Adams demanded redress for the injuries which had thus been sustained, and this demand was repeated for many years in stronger and stronger language. At last, in 1871, long after Lord Palmerston's death and Lord Russell's retirement, a joint commission was appointed to examine into the many cases of dispute which had arisen between the United States and Great Britain. The commissioners agreed upon three rules by which they thought neutrals should in future be bound, and recommended that they should be given a retrospective effect. They decided also that the claims which had arisen out of the depredations of the "Alabama" should be referred to arbitration. In the course of 1872 the arbitrators met at Geneva. Their finding was adverse to Great Britain, which was condemned to pay a large sum of money—more than £3,000,000—as compensation. A period of exceptional prosperity, which largely increased the revenue, enabled a chancellor of the exchequer to boast that the country had drunk itself out of the "Alabama" difficulty.

Lord Russell's second ministry.

In October 1865 Lord Palmerston's rule, which had been characterized by six years of political inaction at home and by constant disturbance abroad, was terminated by his death. The ministry, which had suffered many losses from death during its duration, was temporarily reconstructed under Lord Russell; and the new minister at once decided to put an end to the period of internal stagnation, which had lasted so long, by the introduction of a new Reform Bill. Accordingly, in March 1866 Gladstone, who now led the House of Commons, introduced a measure which proposed to extend the county franchise to £14 and the borough franchise to £7 householders. The bill did not create much enthusiasm among Liberals, and it was naturally opposed by the Conservatives, who were reinforced by a large section of moderate Liberals, nicknamed, in consequence of a phrase in one of Bright's speeches, Adullamites. After many debates, in which the Commons showed little disposition to give the ministry any effective support, an amendment was carried by Lord Dunkellin, the eldest son of Lord Clanricarde, basing the borough franchise on rating instead of rental. The cabinet, recognizing from the division that the control of the House had passed out of its hands, resigned office, and the queen was compelled to entrust Lord Derby with the task of forming a new administration.

Lord Derby's third ministry.

For the third time in his career Lord Derby undertook the formidable task of conducting the government of the country with only a minority of the House of Commons to support him. The moment at which he made this third attempt was one of unusual anxiety. Abroad, the almost simultaneous outbreak of war between Prussia and Austria was destined to affect the whole aspect of continental politics. At home, a terrible murrain had fallen on the cattle, inflicting ruin on the agricultural interest; a grave commercial crisis was creating alarm in the city of London, and, in its consequences, injuring the interests of labour; while the working classes, at last roused from their long indifference, and angry at the rejection of Lord Russell's bill, were assembling in their tens of thousands to demand reform. The cabinet determined to prohibit a meeting which the Reform League decided to hold in Hyde Park on the 23rd of July, and closed the gates of the park on the people. But the mob, converging on the park in thousands, surged round the railings, which a little inquiry might have shown were too weak to resist any real pressure. Either accidentally or intentionally, the railings were overturned in one place, and the people, perceiving their opportunity, at once threw them down round the whole circuit of the park. Few acts in Queen Victoria's reign were attended with greater consequences. For the riot in Hyde Park led almost directly to a new Reform Act, and to the transfer of power from the middle classes to the masses of the people.

Reform, 1867.

Yet, though the new government found it necessary to introduce a Reform Bill, a wide difference of opinion existed in the cabinet as to the form which the measure should take. Several of its members were in favour of assimilating the borough franchise to that in force in municipal elections, and practically conferring a vote on every householder who had three years' residence in the constituency. General Peel, however—Sir Robert Peel's brother—who held the seals of the war office, objected to this extension; and the cabinet ultimately decided on evading the difficulty by bringing forward a series of resolutions on which a scheme of reform might ultimately be based. Their success in 1858, in dealing with the government of India in this way, commended the decision to the acceptance of the cabinet. But it was soon apparent that the House of Commons required a definite scheme, and that it would not seriously consider a set of abstract resolutions which committed no one to any distinct plan. Hence on the 23rd of February 1867 the cabinet decided on withdrawing its resolutions and reverting to its original bill. On the following day Lord Cranborne—better known afterwards as Lord Salisbury—discovered that the bill had more democratic tendencies than he had originally supposed, and refused to be a party to it. On Monday, the 25th, the cabinet again met to consider the new difficulty which had thus arisen; and it decided (as was said afterwards by Sir John Pakington) in ten minutes to substitute for the scheme a mild measure extending the borough franchise to houses rated at £6 a year, and conferring the county franchise on £20 householders. The bill, it was soon obvious, would be acceptable to no one; and the government again fell back on its original proposal. Three members of the cabinet, however, Lord Cranborne, Lord Carnarvon and General Peel, refused to be parties to the measure, and resigned office, the government being necessarily weakened by these defections. In the large scheme which the cabinet had now adopted, the borough franchise was conferred on all householders rated to the relief of the poor, who had for two years occupied the houses which gave them the qualification; the county franchise was given to the occupiers of all houses rated at £15 a year or upwards. But it was proposed that these extensions should be accompanied by an educational franchise, and a franchise conferred on persons who had paid twenty shillings in assessed taxes or income tax; the tax-payers who had gained a vote in this way being given a second vote in respect of the property which they occupied. In the course of the discussion on the bill in the House of Commons, the securities on which its authors had relied to enable them to stem the tide of democracy were, chiefly through Gladstone's exertions, swept away. The dual vote was abandoned, direct payment of rates was surrendered, the county franchise was extended to £12 householders, and the redistribution of seats was largely increased. The bill, in the shape in which it had been introduced, had been surrounded with safeguards to property. With their loss it involved a great radical change, which placed the working classes of the country in the position of predominance which the middle classes had occupied since 1832.

Disraeli prime minister.

The passage of the bill necessitated a dissolution of parliament; but it had to be postponed to enable parliament to supplement the English Reform Act of 1867 with measures applicable to Scotland and Ireland, and to give time for settling the boundaries of the new constituencies which had been created. This delay gave the Conservatives another year of office. But the first place in the cabinet passed in 1868 from Lord Derby to his lieutenant, Disraeli. The change added interest to political life. Thenceforward, for the next thirteen years, the chief places in the two great parties in the state were filled by the two men, Gladstone and Disraeli, who were unquestionably the ablest representatives of their respective followers. But the situation was also remarkable because power thus definitely passed from men who, without exception, had been born in the 18th century, and had all held cabinet offices before 1832, to men who had been born in the 19th century, and had only risen to cabinet rank in the 'forties and the 'fifties. It was also interesting to reflect that Gladstone had begun life as a Conservative, and had only gradually moved to the ranks of the Liberal party; while Disraeli had fought his first election under the auspices of O'Connell and Hume, had won his spurs by his attacks on Sir Robert Peel, and had been only reluctantly adopted by the Conservatives as their leader in the House of Commons.

Irish Church.

The struggle commenced in 1868 on an Irish question. During the previous years considerable attention had been paid to a secret conspiracy in Ireland and among the Irish in America. The Fenians, as they were called, actually attempted insurrection in Ireland, and an invasion of Canada from the United States. At the beginning of 1866 Lord Russell's government thought itself compelled to suspend the Habeas Corpus Act in Ireland; and in 1867 Lord Derby's government was confronted in the spring by a plot to seize Chester Castle, and in the autumn by an attack on a prison van at Manchester containing Fenian prisoners, and by an atrocious attempt to blow up Clerkenwell prison. Conservative politicians deduced from these circumstances the necessity of applying firm government to Ireland. Liberal statesmen, on the contrary, desired to extirpate rebellion by remedying the grievances of which Ireland still complained. Chief among these was the fact that the Established Church in Ireland was the church of only a minority of the people. In March 1868 John Francis Maguire, an Irish Catholic, asked the House of Commons to resolve itself into a committee to take into immediate consideration the affairs of Ireland. Gladstone, in the course of the debate, declared that in his opinion the time had come when the Irish Church, as a political institution, should cease; and he followed up his declaration by a series of resolutions, which were accepted by considerable majorities, pledging the House to its disestablishment. Disraeli, recognizing the full significance of this decision, announced that, as soon as the necessary preparations could be made, the government would appeal from the House to the country. Parliament was dissolved at the end of July, but the general election did not take place till the end of the following November. The future of the Irish Church naturally formed one of the chief subjects which occupied the attention of the electors, but the issue was largely determined by wider considerations. The country, after the long political truce which had been maintained by Lord Palmerston, was again ranged in two hostile camps, animated by opposing views. It was virtually asked to decide in 1868 whether it would put its trust in Liberal or Conservative, in Gladstone or Disraeli. By an overwhelming majority it threw its lot in favour of Gladstone; and Disraeli, without even venturing to meet parliament, took the unusual course of at once placing his resignation in the queen's hands.

Abyssinian war.

The Conservative government, which thus fell, will be chiefly recollected for its remarkable concession to democratic principles by the passage of the Reform Act of 1867; but it deserves perhaps a word of praise for its conduct of a distant and unusual war. The emperor of Abyssinia had, for some time, detained some Englishmen prisoners in his country; and the government, unable to obtain redress in other ways, decided on sending an army to release them. The expedition, entrusted to Sir Robert Napier, afterwards Lord Napier of Magdala, was fitted out at great expense, and was rewarded with complete success. The prisoners were released, and the Abyssinian monarch committed suicide. Disraeli—whose oriental imagination was excited by the triumph—incurred some ridicule by his bombastic declaration that "the standard of St George was hoisted upon the mountains of Rasselas." But the ministry could at least claim that the war had been waged to rescue Englishmen from captivity, that it had been conducted with skill, and that it had accomplished its object. The events of the Abyssinian war, however, were forgotten in the great political revolution which had swept the Conservatives from office and placed Gladstone in power. His government was destined to endure for more than five years. During that period it experienced the alternate prosperity and decline which nearly forty years before had been the lot of the Whigs after the passage of the first Reform Act. During its first two sessions it accomplished greater changes in legislation than had been attempted by any ministry since that of Lord Grey. In its three last sessions it was destined to sink into gradual disrepute; and it was ultimately swept away by a wave of popular reaction, as remarkable as that which had borne it into power.

Gladstone's first ministry.

Irish land.

Elementary education.

It was generally understood that Gladstone intended to deal with three great Irish grievances—"the three branches of the upas tree"—the religious, agricultural and educational grievances. The session of 1869 was devoted to the first of these subjects. Gladstone introduced a bill disconnecting the Irish Church from the state, establishing a synod for its government, and—after leaving it in possession of its churches and its parsonages, and making ample provision for the life-interest of its existing clergy—devoting the bulk of its property to the relief of distress in Ireland. The bill was carried by large majorities through the House of Commons; and the feeling of the country was so strong that the Lords did not venture on its rejection. They satisfied themselves with engrafting on it a series of amendments which, on the whole, secured rather more liberal terms of compensation for existing interests. Some of these amendments were adopted by Gladstone; a compromise was effected in respect of the others; and the bill, which had practically occupied the whole session, and had perhaps involved higher constructive skill than any measure passed in the previous half-century, became law. Having dealt with the Irish Church in 1869, Gladstone turned to the more complicated question of Irish land. So far back as the 'forties Sir R. Peel had appointed a commission, known from its chairman as the Devon commission, which had recommended that the Irish tenant, in the event of disturbance, should receive some compensation for certain specified improvements which he had made in his holding. Parliament neglected to give effect to these recommendations; in a country where agriculture was the chief or almost only occupation, the tenant remained at his landlord's mercy. In 1870 Gladstone proposed to give the tenant a pecuniary interest in improvements, suitable to the holding, which he had made either before or after the passing of the act. He proposed also that, in cases of eviction, the smaller tenantry should receive compensation for disturbance. The larger tenantry, who were supposed to be able to look after their own interests, were entirely debarred, and tenants enjoying leases were excluded from claiming compensation, except for tillages, buildings and reclamation of lands. A special court, it was further provided, should be instituted to carry out the provisions of the bill. Large and radical as the measure was, reversing many of the accepted principles of legislation by giving the tenant a *quasi*-partnership with the landlord in his holding, no serious opposition was made to it in either House of Parliament. Its details, indeed, were abundantly criticized, but its principles were hardly disputed, and it became law without any substantial alteration of its original provisions. In two sessions two branches of the upas tree had been summarily cut off. But parliament in 1870 was not solely occupied with the wrongs of Irish tenantry. In the same year Forster, as vice-president of the council, succeeded in carrying the great measure which for the first time made education compulsory. In devising his scheme, Forster endeavoured to utilize, as far as possible, the educational machinery which had been voluntarily provided by various religious organizations. He gave the institutions, which had been thus established, the full benefit of the assistance which the government was prepared to afford to board schools, on their adopting a conscience clause under which the religious susceptibilities of the parents of children were protected. This provision led to many debates, and produced the first symptoms of disruption in the Liberal party. The Nonconformists contended that no such aid should be given to any school which was not conducted on undenominational principles. Supported by the bulk of the Conservative party, Forster was enabled to defeat the dissenters. But the victory which he secured was, in one sense, dearly purchased. The first breach in the Liberal ranks had been made; and the government, after 1870, never again commanded the same united support which had enabled it to pursue its victorious career in the first two sessions of its existence.

Black Sea neutrality.

Towards the close of the session of 1870 other events, for which the government had no direct responsibility, introduced new difficulties. War unexpectedly broke out between France and Prussia. The French empire fell; the German armies marched on Paris; and the Russian government, at Count Bismarck's instigation, took advantage of the collapse of France to repudiate the clause in the treaty of 1856 which neutralized the Black Sea. Lord Granville, who had succeeded Lord Clarendon at the foreign office, protested against this proceeding. But it was everywhere felt that his mere protest was not likely to affect the result; and the government at last consented to accept a suggestion made by Count Bismarck, and to take part in a conference to discuss the Russian proposal. Though this device enabled them to say that they had not yielded to the Russian demand, it was obvious that they entered the conference with the foregone conclusion of conceding the Russian claim. The attitude which the government thus chose to adopt was perhaps inevitable in the circumstances, but it confirmed the impression, which the abandonment of the cause of Denmark had produced in 1864, that Great Britain was not prepared to maintain its principles by going to war. The weakness of the British foreign office was emphasized by its consenting, almost at the same moment, to allow the claims of the United States, for the depredations of the "Alabama," to be settled under a rule only agreed upon in 1871. Most Englishmen now appreciate the wisdom of a concession which has gained for them the friendship of the United States. But in 1871 the country resented the manner in which Lord Granville had acted. Whatever credit the government might have derived from its domestic measures, it was discredited, or it was thought to be, by its foreign policy. In these circumstances legislation in 1871 was not marked with the success which had attended the government in previous sessions. The government succeeded in terminating a long controversy by abolishing ecclesiastical tests at universities. But the Lords ventured to reject a measure for the introduction of the ballot at elections, and refused to proceed with a bill for the abolition of purchase in the army. The result of these decisions was indeed remarkable. In the one case, the Lords in 1872 found it necessary to give way, and to pass the Ballot Bill, which they had rejected in 1871. In the other, Gladstone decided on abolishing, by the direct authority of the crown, the system which the Lords refused to do away with by legislation. But his high-handed proceeding, though it forced the Lords to reconsider their decision, strained the allegiance of many of his supporters, and still further impaired the popularity of his administration. Most men felt that it would have been permissible for him, at the commencement of the session, to have used the queen's authority to terminate the purchase system; but they considered that, as he had not taken this course, it was not open to him to reverse the decision of the legislature by resorting to the prerogative. Two appointments, one to a judicial office, the other to an ecclesiastical preferment, in which Gladstone, about the same time, showed more disposition to obey the letter than the spirit of the law, confirmed the impression which the abolition of purchase had made. Great reforming ministers would do well to recollect that the success of even liberal measures may be dearly purchased by the resort to what are regarded as unconstitutional expedients.

Army purchase.

In the following years the embarrassments of the government were further increased. In 1872 Bruce, the home secretary, succeeded in passing a measure of licensing reform. But the abstainers condemned the bill as inadequate; the publicans denounced it as oppressive; and the whole strength of the licensed victuallers was thenceforward arrayed against the ministry. In 1873 Gladstone attempted to complete his great Irish measures by conferring on Ireland the advantage of a university which would be equally acceptable to Protestants and Roman Catholics. But his proposal again failed to satisfy those in whose interests it was proposed. The second reading of the bill was rejected by a small majority, and Gladstone resigned; but, as Disraeli could not form a government, he resumed office. The power of the great minister was, however, spent; his ministry was hopelessly discredited. History, in fact, was repeating itself. The ministry was suffering, as Lord Grey's government had suffered nearly forty years before, from the effect of its own successes. It had accomplished more than any of its supporters had expected, but in doing so it had harassed many interests and excited much opposition. Gladstone endeavoured to meet the storm by a rearrangement of his crew. Bruce, who had offended the licensed victuallers, was removed from the home office, and made a peer and president of the council. Lowe, who had incurred unpopularity by his fiscal measures, and especially by an abortive suggestion for the taxation of matches, was transferred from the exchequer to the home office, and Gladstone himself assumed the duties of chancellor of the exchequer. He thereby created a difficulty for himself which he had not foreseen. Up to 1867 a minister leaving one office and accepting another vacated his seat; after 1867 a transfer from one post to another did not necessitate a fresh election. But Gladstone in 1873 had taken a course which had not been contemplated in 1867. He had not been transferred from one office to another. He had accepted a new in addition to his old office. It was, to say the least, uncertain whether his action in this respect had, or had not, vacated his seat. It would be unfair to suggest that the inconvenient difficulty with which he was thus confronted determined his policy, though he was probably insensibly influenced by it. However this may be, on the eve of the session of 1874 he suddenly decided to dissolve parliament and to appeal to the country. He announced his decision in an address to his constituents, in which, among other financial reforms, he promised to repeal the income tax. The course which Gladstone took, and the bait which he held out to the electors, were generally condemned. The country, wearied of the ministry and of its measures, almost everywhere supported the Conservative candidates. Disraeli found himself restored to power at the head of an overwhelming majority, and the great minister who, five years before, had achieved so marked a triumph temporarily withdrew from the leadership of the party with whose aid he had accomplished such important results. His ministry had been essentially one of peace, yet its closing days were memorable for one little war in which a great soldier increased a reputation already high. Sir Garnet Wolseley triumphed over the difficulties which the climate of the west coast of Africa imposes on Europeans, and brought a troublesome contest with the Ashantis to a successful conclusion.

1872–1874.

The history of Disraeli's second administration affords an exact reverse to that of Gladstone's first cabinet. In legislation the ministry attempted little and accomplished less. They did something to meet the wishes of the publicans, whose discontent had contributed largely to Gladstone's defeat, by amending some of the provisions of Bruce's licensing bill; they supported and succeeded in passing a measure, brought in by the primate, to restrain some of the irregularities which the Ritualists were introducing into public worship; and they were compelled by the violent insistence of Plimsoll to pass an act to protect the lives of merchant seamen. Disraeli's government, however, will be chiefly remembered for its foreign policy. Years before he had propounded in *Tancred* the theory that England should aim at eastern empire. Circumstances in his second term of office enabled him to translate his theory into practice. In 1875 the country was suddenly startled at hearing that it had acquired a new position and assumed new responsibilities in Egypt by the purchase of the shares which the khedive of Egypt held in the Suez Canal. In the following spring a new surprise was afforded by the introduction of a measure authorizing the queen to assume the title of empress of India. But these significant actions were almost forgotten in the presence of a new crisis; for in 1876 misgovernment in Turkey had produced its natural results, and the European provinces of the Porte were in a state of armed insurrection. In the presence of a grave danger, Count Andrassy, the Austrian minister, drew up a note which was afterwards known by his name, declaring that the Porte had failed to carry into effect the promises of reform which she had made, and that some combined action on the part of Europe was necessary to compel her to do so. The note was accepted by the three continental empires, but Great Britain refused in the first instance to assent to it, and only ultimately consented at the desire of the Porte, whose statesmen seem to have imagined that the nominal co-operation of England would have the effect of restraining the action of other powers. Turkey accepted the note and renewed the promises of reform, which she had so often made, and which meant so little. The three northern powers thereupon agreed upon what was known as the Berlin Memorandum, in which they demanded an armistice, and proposed to watch over the completion of the reforms which the Porte had promised. The British government refused to be a party to this memorandum, which in consequence became abortive. The insurrection increased in intensity. The sultan Abdul Aziz, thought unequal to the crisis, was hastily deposed; he was either murdered or led to commit suicide; and insurrection in Bulgaria was stamped out by massacre. The story of the "Bulgarian atrocities" was published in Great Britain in the summer of 1876. Disraeli characteristically dismissed it as "coffee-house babble," but official investigation proved the substantial accuracy of the reports which had reached England. The people regarded these events with horror. Gladstone, emerging from his retirement, denounced the conduct of the

Disraeli's second ministry.

Bulgarian "atrocities."

Berlin treaty.

Turks. In a phrase which became famous he declared that the only remedy for the European provinces of the Porte was to turn out the Ottoman government "bag and baggage." All England was at once arrayed into two camps. One party was led by Disraeli, who was supposed to represent the traditional policy of England of maintaining the rule of the Turk at all hazards; the other, inspired by the example of Gladstone, was resolved at all costs to terminate oppression, but was at the same time distrusted as indirectly assisting the ambitious views by which the Eastern policy of Russia had always been animated. The crisis soon became intense. In June 1876 Servia and Montenegro declared war against Turkey. In a few months Servia was hopelessly beaten. Through the insistence of Russia an armistice was agreed upon; and Lord Beaconsfield—for Disraeli had now been raised to the peerage—endeavoured to utilize the breathing space by organizing a conference of the great powers at Constantinople, which was attended on behalf of Great Britain by Lord Salisbury. The Constantinople conference proved abortive, and in the beginning of 1877 Russia declared war. For some time, however, her success was hardly equal to her expectations. The Turks, entrenched at Plevna, delayed the Russian advance; and it was only towards the close of 1877 that Plevna at last fell and Turkish resistance collapsed. With its downfall the war party in England, which was led by the prime minister, increased in violence. From the refrain of a song, sung night after night at a London music hall, its members became known as Jingoes. The government ordered the British fleet to pass the Dardanelles and go up to Constantinople; and though the order was subsequently withdrawn, it asked for and obtained a grant of £6,000,000 for naval and military purposes. When news came that the Russian armies had reached Adrianople, that they had concluded some arrangement with the Turks, and that they were pressing forward towards Constantinople, the fleet was again directed to pass the Dardanelles. Soon afterwards the government decided to call out the reserves and to bring a contingent of Indian troops to the Mediterranean. Lord Derby,[1] who was at the foreign office, thereupon retired from the ministry, and was succeeded by Lord Salisbury. Lord Derby's resignation was everywhere regarded as a proof that Great Britain was on the verge of war. Happily this did not occur. At Prince Bismarck's suggestion Russia consented to refer the treaty which she had concluded at San Stefano to a congress of the great powers; and the congress, at which Great Britain was represented by Lord Beaconsfield and Lord Salisbury, succeeded in substituting for the treaty of San Stefano the treaty of Berlin. The one great advantage derived from it was the tacit acknowledgment by Russia that Europe could alone alter arrangements which Europe had made. In every other sense it is doubtful whether the provisions of the treaty of Berlin were more favourable than those of the treaty of San Stefano. On Lord Beaconsfield's return, however, he claimed for Lord Salisbury and himself that they had brought back "peace with honour," and the country accepted with wild delight the phrase, without taking much trouble to analyse its justice.

Afghan wars.

If Lord Beaconsfield had dissolved parliament immediately after his return from Berlin, it is possible that the wave of popularity which had been raised by his success would have borne him forward to a fresh victory in the constituencies. His omission to do so gave the country time to meditate on the consequences of his policy. One result soon became perceptible. Differences with Russia produced their inevitable consequences in fresh complications on the Indian frontier. The Russian government, confronted with a quarrel with Great Britain in eastern Europe, endeavoured to create difficulties in Afghanistan. A Russian envoy was sent to Kabul, where Shere Ali, who had succeeded his father Dost Mahommed in 1863, was amir; and the British government, alarmed at this new embarrassment, decided on sending a mission to the Afghan capital. The mission was stopped on the frontier by an agent of Shere Ali, who declined to allow it to proceed. The British government refused to put up with an affront of this kind, and their envoy, supported by an army, continued his advance. Afghanistan was again invaded. Kabul and Kandahar were occupied; and Shere Ali was forced to fly, and soon afterwards died. His successor, Yakub Khan, came to the British camp and signed, in May 1879, the treaty of Gandamak. Under the terms of this treaty the Indian government undertook to pay the new amir a subsidy of £60,000 a year; and Yakub Khan consented to receive a British mission at Kabul, and to cede some territory in the Himalayas which the military advisers of Lord Beaconsfield considered necessary to make the frontier more "scientific." This apparent success was soon followed by disastrous news. The deplorable events of 1841 were re-enacted in 1879. The new envoy reached Kabul, but was soon afterwards murdered. A British army was again sent into Afghanistan, and Kabul was again occupied. Yakub Khan, who had been made amir in 1879, was deposed, and Abdur Rahman Khan was selected as his successor. The British did not assert their superiority without much fighting and some serious reverses. Their victory was at last assured by the excellent strategy of Sir Donald Stewart and Sir Frederick (afterwards Lord) Roberts. But before the final victory was gained Lord Beaconsfield had fallen. His policy had brought Great Britain to the verge of disaster in Afghanistan: the credit of reasserting the superiority of British arms was deferred till his successors had taken office.

Zulu War.

It was not only in Afghanistan that the new imperial policy which Lord Beaconsfield had done so much to encourage was straining the resources of the empire. In South Africa a still more serious difficulty was already commencing. At the time at which Lord Beaconsfield's administration began, British territory in South Africa was practically confined to Cape Colony and Natal. Years before, in 1852 and 1854 respectively, the British government, at that time a little weary of the responsibilities of colonial rule, had recognized the independence of the two Dutch republics, the Transvaal and the Orange Free State. Powerful native tribes occupied the territory to the north of Natal and the east of the Transvaal. War broke out between the Transvaal Republic and one of the most powerful of these native chieftains, Sikukuni; and the Transvaal was worsted in the struggle. Weary of the condition of anarchy which existed in the republic, many inhabitants of the Transvaal were ready to welcome its annexation to Great Britain—a proposal favoured by the colonial secretary, Lord Carnarvon, who wished to federate the South African states, after the manner in which the North American colonies had become by confederation the Dominion of Canada. Sir Theophilus Shepstone, who was sent to inquire into the proposal, mistook the opinion of a party for the verdict of the republic, and declared (April 1877) the Transvaal a part of the British Empire. His policy entailed far more serious consequences than the mission to Afghanistan. The first was a war with the Zulus, the most powerful and warlike of the South African natives, who under their ruler, Cetewayo, had organized a formidable army. A dispute had been going on for some time about the possession of a strip of territory which some British arbitrators had awarded to the Zulu king. Sir Bartle Frere, who had won distinction in India, and was sent out by Lord Beaconsfield's government to the Cape, kept back the award; and, though he ultimately communicated it to Cetewayo, thought it desirable to demand the disbandment of the Zulu army. In the war which ensued, the British troops who invaded Zulu territory met with a severe reverse; and, though the disaster was ultimately retrieved by Lord Chelmsford, the war involved heavy expenditure and brought little credit to the British army, while one unfortunate incident, the death of Prince Napoleon, who had obtained leave to serve with the British troops, and was surprised by the Zulus while reconnoitring, created a deep and unfortunate impression. Imperialism, which had been excited by Lord Beaconsfield's policy in 1878, and by the prospect of a war with a great European power, fell into discredit when it degenerated into a fresh expedition into

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[1] Edward Henry Stanley, 15th earl of Derby, son of the 14th earl and former prime minister.

Afghanistan, and an inglorious war with a savage African tribe. A period of distress at home increased the discontent which Lord Beaconsfield's external policy was exciting; and, when parliament was at last dissolved in 1880, it seemed no longer certain that the country would endorse the policy of the minister, who only a short time before had acquired such popularity. Gladstone, emerging from his retirement, practically placed himself again at the head of the Liberal party. In a series of speeches in Midlothian, where he offered himself for election, he denounced the whole policy which Lord Beaconsfield had pursued. His impassioned eloquence did much more than influence his own election. His speeches decided the contest throughout the kingdom. The Liberals secured an even more surprising success than that which had rewarded the Conservatives six years before. For the first time in the queen's reign, a solid Liberal majority, independent of all extraneous Irish support, was returned, and Gladstone resumed in triumph his old position as prime minister.

Gladstone's second ministry.

The new minister had been swept into power on a wave of popular favour, but he inherited from his predecessors difficulties in almost every quarter of the world; and his own language had perhaps tended to increase them. He was committed to a reversal of Lord Beaconsfield's policy; and, in politics, it is never easy, and perhaps rarely wise, suddenly and violently to change a system. In one quarter of the world the new minister achieved much success. The war in Afghanistan, which had begun with disaster, was creditably concluded. A better understanding was gradually established with Russia; and, before the ministry went out, steps had been taken which led to the delimitation of the Russian and Afghan frontier. In South Africa, however, a very different result ensued. Gladstone, before he accepted office, had denounced the policy of annexing the Transvaal; his language was so strong that he was charged with encouraging the Boers to maintain their independence by force; his example had naturally been imitated by some of his followers at the general election; and, when he resumed power, he found himself in the difficult dilemma of either maintaining an arrangement which he had declared to be unwise, or of yielding to a demand which the Boers were already threatening to support in arms. The events of the first year of his administration added to his difficulty. Before its close the Boers seized Heidelberg and established a republic; they destroyed a detachment of British troops at Bronkhorst Spruit; and they surrounded and attacked the British garrisons in the Transvaal. Troops were of course sent from England to maintain the British cause; and Sir George Colley, who enjoyed a high reputation and had experience in South African warfare, was made governor of Natal, and entrusted with the military command. The events which immediately followed will not be easily forgotten. Wholly miscalculating the strength of the Boers, Sir George Colley, at the end of January 1881, attacked them at Laing's Nek, in the north of Natal, and was repulsed with heavy loss. Some ten days afterwards he fought another action on the Ingogo, and was again forced to retire. On the 26th February, with some 600 men, he occupied a high hill, known as Majuba, which, he thought, dominated the Boer position. The following day the Boers attacked the hill, overwhelmed its defenders, and Sir George Colley was himself killed in the disastrous contest on the summit. News of these occurrences was received with dismay in England. It was, no doubt, possible to say a good deal for Gladstone's indignant denunciation of his predecessor's policy in annexing the Transvaal; it would have been equally possible to advance many reasons for reversing the measures of Lord Beaconsfield's cabinet, and for conceding independence to the Transvaal in 1880. But the great majority of persons considered that, whatever arguments might have been urged for concession in 1880, when British troops had suffered no reverses, nothing could be said for concession in 1881, when their arms had been tarnished by a humiliating disaster. Great countries can afford to be generous in the hour of victory; but they cannot yield, without loss of credit, in the hour of defeat. Unfortunately this reasoning was not suited to Gladstone's temperament. The justice or injustice of the British cause seemed to him a much more important matter than the vindication of military honour; and he could not bring himself to acknowledge that Majuba had altered the situation, and that the terms which he had made up his mind to concede before the battle could not be safely granted till military reputation was restored. The retrocession of the Transvaal was decided upon, though it was provided that the country should remain under the suzerainty of the queen. Even this great concession did not satisfy the ambition of the Boers, who were naturally elated by their victories. Three years later some Transvaal deputies, with their president, Kruger, came to London and saw Lord Derby, the secretary of state for the colonies. Lord Derby consented to a new convention, from which any verbal reference to suzerainty was excluded; and the South African republic was made independent, subject only to the condition that it should conclude no treaties with foreign powers without the approval of the crown. (For the details and disputes concerning the terms of this convention the reader is referred to the articles TRANSVAAL and SUZERAINTY.)

Boer War, 1881.

Gladstone's government declined in popularity from the date of the earliest of these concessions. Gladstone, in fact, had succeeded in doing what Lord Beaconsfield had failed to accomplish. Annoyance at his foreign policy had rekindled the imperialism which the embarrassments created by Lord Beaconsfield had done so much to damp down. And, if things were going badly with the new government abroad, matters were not progressing smoothly at home. At the general election of 1880, the borough of Northampton, which of late years has shown an unwavering preference for Liberals of an advanced type, returned as its members Henry Labouchere and Charles Bradlaugh. Bradlaugh, who had attained some notoriety for an aggressive atheism, claimed the right to make an affirmation of allegiance instead of taking the customary oath, which he declared was, in his eyes, a meaningless form. The speaker, instead of deciding the question, submitted it to the judgment of the House, and it was ultimately referred to a select committee, which reported against Bradlaugh's claim. Bradlaugh, on hearing the decision of the committee, presented himself at the bar and offered to take the oath. It was objected that, as he had publicly declared that the words of the oath had no clear meaning for him, he could not be permitted to take it; and after some wrangling the matter was referred to a fresh committee, which supported the view that Bradlaugh could not be allowed to be sworn, but recommended that he should be permitted to make the affirmation at his own risk. The House refused to accept the recommendation of this committee when a bill was introduced to give effect to it. This decision naturally enlarged the question before it. For, while hitherto the debate had turned on the technical points whether an affirmation could be substituted for an oath, or whether a person who had declared that an oath had no meaning for him could properly be sworn, the end at which Bradlaugh's opponents were thenceforward aiming was the imposition of a new religious test—the belief in a God—on members of the House of Commons. The controversy, which thus began, continued through the parliament of 1880, and led to many violent scenes, which lowered the dignity of the House. It was quietly terminated, in the parliament of 1886, by the firm action of a new speaker. Mr Peel, who had been elected to the chair in 1884, decided that neither the speaker nor any other member had the right to intervene to prevent a member from taking the oath if he was willing to take it. Parliament subsequently, by a new act, permitted affirmations to be used, and thenceforward religion, or the absence of religion, was no disqualification for a seat in the House of Commons. The atheist, like the Roman Catholic and the Jew, could sit and vote.

Bradlaugh

The Bradlaugh question was not the only difficulty with which the new government was confronted. Ireland was again attracting the attention of politicians. The Fenian movement had practically expired; some annual motions for the introduction of Home Rule, made with all the decorum of

Parnell.

parliamentary usage, had been regularly defeated. But the Irish were placing themselves under new leaders and adopting new methods. During the Conservative government of 1874, the Irish members had endeavoured to arrest attention by organized obstruction. Their efforts had increased the difficulties of government and taxed the endurance of parliament. These tactics were destined to be raised to a fine art by Parnell, who succeeded to the head of the Irish party about the time of the formation of Gladstone's government. It was Parnell's determination to make legislation impracticable, and parliament unendurable, till Irish grievances were redressed. It was his evident belief that by pursuing such tactics he could force the House of Commons to concede the legislation which he desired. The Irish members were not satisfied with the legislation which parliament had passed in 1869–1870. The land act of 1870 had given the tenant no security in the case of eviction for non-payment of rent; and the tenant whose rent was too high or had been raised was at the mercy of his landlord. It so happened that some bad harvests had temporarily increased the difficulties of the tenantry, and there was no doubt that large numbers of evictions were taking place in Ireland. In these circumstances, the Irish contended that the relief which the act of 1870 had afforded should be extended, and that, till such legislation could be devised, a temporary measure should be passed giving the tenant compensation for disturbance. Gladstone admitted the force of this reasoning, and a bill was introduced to give effect to it. Passed by the Commons, it was thrown out towards the end of the session by the Lords; and the government acquiesced—perhaps could do nothing but acquiesce—in this decision. In Ireland, however, the rejection of the measure was attended with disastrous results. Outrages increased, obnoxious landlords and agents were "boycotted"—the name of the first gentleman exposed to this treatment adding a new word to the language; and Forster, who had accepted the office of chief secretary, thought it necessary, in the presence of outrage and intimidation, to adopt stringent measures for enforcing order. A measure was passed on his initiation, in 1881, authorizing him to arrest and detain suspected persons; and many well-known Irishmen, including Parnell himself and other members of parliament, were thrown into prison. It was an odd commentary on parliamentary government that a Liberal ministry should be in power, and that Irish members should be in prison; and early in 1882 Gladstone determined to liberate the prisoners on terms. The new policy—represented by what was known as the Kilmainham Treaty—led to the resignation of the viceroy, Lord Cowper, and of Forster, and the appointment of Lord Spencer and Lord Frederick Cavendish as their successors. On the 6th of May 1882 Lord Spencer made his entry into Dublin, and on the evening of the same day Lord Frederick, unwisely allowed to walk home alone with Burke, the under-secretary to the Irish government, was murdered with his companion in Phoenix Park. This gross outrage led to fresh measures of coercion. The disclosure, soon afterwards, of a conspiracy to resort to dynamite still further alienated the sympathies of the Liberal party from the Irish nation. Gladstone might fairly plead that he had done much, that he had risked much, for Ireland, and that Ireland was making him a poor return for his services.

Egypt.

In the meanwhile another difficulty was further embarrassing a harassed government. The necessities of the khedive of Egypt had been only temporarily relieved by the sale to Lord Beaconsfield's government of the Suez Canal shares. Egyptian finance, in the interests of the bondholders, had been placed under the dual control of England and France. The new arrangement naturally produced some native resentment, and Arabi Pasha placed himself at the head of a movement which was intended to rid Egypt of foreign interference. His preparations eventually led to the bombardment of Alexandria by the British fleet, and still later to the invasion of Egypt by a British army under Sir Garnet, afterwards Lord Wolseley, and to the battle of Tell-el-Kebir, after which Arabi was defeated and taken prisoner. The bombardment of Alexandria led to the immediate resignation of Bright, whose presence in the cabinet had been of importance to the government; the occupation of Egypt broke up the dual control, and made Great Britain responsible for Egyptian administration. The effects of British rule were, in one sense, remarkable. The introduction of good government increased the prosperity of the people, and restored confidence in Egyptian finance. At the same time it provoked the animosity of the French, who were naturally jealous of the increase of British influence on the Nile, and it also threw new responsibilities on the British nation. For south of Egypt lay the great territory of the Sudan, which to some extent commands the Nile, and which had been added to the Egyptian dominions at various periods between 1820 and 1875. In 1881 a fanatic sheikh—known as the mahdi—had headed an insurrection against the khedive's authority; and towards the close of 1883 an Egyptian army under an Englishman, Colonel Hicks, was annihilated by the mahdi's followers. The insurrection increased the responsibilities which intervention had imposed on England, and an expedition was sent to Suakin to guard the littoral of the Red Sea; while, at the beginning of 1884, General Gordon—whose services in China had gained him a high reputation, and who had had previous experience in the Sudan—was sent to Khartum to report on the condition of affairs. These decisions led to momentous results. The British expedition to Suakin was engaged in a series of battles with Osman Digna, the mahdi's lieutenant; while General Gordon, after alternate reverses and successes, was isolated at Khartum. Anxious as Gladstone's ministry was to restrict the sphere of its responsibilities, it was compelled to send an expedition to relieve General Gordon; and Lord Wolseley, who was appointed to the command, decided on moving up the Nile to his relief. The expedition proved much more difficult than Lord Wolseley had anticipated. And before it reached its goal, Khartum was forced to surrender, and General Gordon and his few faithful followers were murdered (January 1885). General Gordon's death inflicted a fatal blow on the Liberal government. It was thought that the general, whose singular devotion to duty made him a popular hero, had been allowed to assume an impossible task; had been feebly supported; and that the measures for his relief had been unduly postponed and at last only reluctantly undertaken. The ministry ultimately experienced defeat on a side issue. The budget, which Childers brought forward as chancellor of the exchequer, was attacked by the Conservative party; and an amendment proposed by Sir Michael Hicks-Beach, condemning an increase in the duties on spirits and beer, was adopted by a small majority. Gladstone resigned office, and Lord Salisbury, who, after Lord Beaconsfield's death, had succeeded to the lead of the Conservative party, was instructed to form a new administration.

Gordon.

Reform Act, 1884.

It was obvious that the new government, as its first duty, would be compelled to dissolve the parliament that had been elected when Gladstone was enjoying the popularity which he had lost so rapidly in office. But it so happened that it was no longer possible to appeal to the old constituencies. For, in 1884, Gladstone had introduced a new Reform Bill; and, though its passage had been arrested by the Lords, unofficial communications between the leaders of both parties had resulted in a compromise which had led to the adoption of a large and comprehensive Reform Act. By this measure, household franchise was extended to the counties. But counties and boroughs were broken up into a number of small constituencies, for the most part returning only one member each; while the necessity of increasing the relative weight of Great Britain, and the reluctance to inflict disfranchisement on Ireland, led to an increase in the numbers of the House of Commons from 658 to 670 members. This radical reconstruction of the electorate necessarily made the result of the elections doubtful. As a matter of fact, the new parliament comprised 334 Liberals, 250 Conservatives and 86 Irish Nationalists. It was plain beyond the possibility of doubt that the future depended on the course which the Irish Nationalists might adopt. If they threw in their lot with Gladstone, Lord Salisbury's government was evidently doomed. If, on the contrary, they joined the Conservatives, they could make a Liberal administration impracticable.

Home Rule.

In the autumn of 1885 it was doubtful what course the Irish Nationalists would take. It was generally understood that Lord Carnarvon, who had been made viceroy of Ireland, had been in communication with Parnell; that Lord Salisbury was aware of the interviews which had taken place; and it was whispered that Lord Carnarvon was in favour of granting some sort of administrative autonomy to Ireland. Whatever opinion Lord Carnarvon may have formed—and his precise view is uncertain—a greater man than he had suddenly arrived at a similar conclusion. In his election speeches Gladstone had insisted on the necessity of the country returning a Liberal majority which could act independently of the Irish vote; and the result of the general election had left the Irish the virtual arbiters of the political situation. In these circumstances Gladstone arrived at a momentous decision. He recognized that the system under which Ireland had been governed in the past had failed to win the allegiance of her people; and he decided that it was wise and safe to entrust her with a large measure of self-government. It was perhaps characteristic of Gladstone, though it was unquestionably unfortunate, that, in determining on this radical change of policy, he consulted few, if any, of his previous colleagues. On the meeting of the new parliament Lord Salisbury's government was defeated on an amendment to the address, demanding facilities for agricultural labourers to obtain small holdings for gardens and pasture—the policy, in short, which was described as "three acres and a cow." Lord Salisbury resigned, and Gladstone resumed power. The attitude, however, which Gladstone was understood to be taking on the subject of Home Rule threw many difficulties in his way. Lord Hartington, and others of his former colleagues, declined to join his administration; Mr Chamberlain, who, in the first instance, accepted office, retired almost at once from the ministry; and Bright, whose eloquence and past services gave him a unique position in the House, threw in his lot in opposition to Home Rule. A split in the Liberal party thus began, which was destined to endure; and Gladstone found his difficulties increased by the defection of the men on whom he had hitherto largely relied. He persevered, however, in the task which he had set himself, and introduced a measure endowing Ireland with a parliament, and excluding the Irish members from Westminster. He was defeated, and appealed from the House which had refused to support him to the country. For the first time in the queen's reign two general elections occurred within twelve months. The country showed no more disposition than the House of Commons to approve the course which the minister was taking. A large majority of the members of the new parliament were pledged to resist Home Rule. Gladstone, bowing at once to the verdict of the people, resigned office, and Lord Salisbury returned to power.

Unionism.

The new cabinet, which was formed to resist Home Rule, did not succeed in combining all the opponents to this measure. The secessionists from the Liberal party—the Liberal Unionists, as they were called—held aloof from it; and Lord Salisbury was forced to form his cabinet out of his immediate followers. The most picturesque appointment was that of Lord Randolph Churchill, who was made chancellor of the exchequer and leader of the House of Commons. But before many months were over, Lord Randolph—unable to secure acceptance of a policy of financial retrenchment—resigned office, and Lord Salisbury was forced to reconstruct his ministry. Though he again failed to obtain the co-operation of the Liberal Unionists, one of the more prominent of them—Goschen—accepted the seals of the Exchequer. W. H. Smith moved from the war office to the treasury, and became leader of the House of Commons; while Lord Salisbury himself returned to the foreign office, which the dramatically sudden death of Lord Iddesleigh, better known as Sir Stafford Northcote, vacated. These arrangements lasted till 1891, when, on Smith's death, the treasury and the lead of the Commons were entrusted to Lord Salisbury's nephew, Mr Arthur Balfour, who had made a great reputation as chief secretary for Ireland.

The ministry of 1886, which endured till 1892, gave to London a county council; introduced representative government into every English county; and made elementary education free throughout England. The alliance with the Liberal Unionists was, in fact, compelling the Conservative government to promote measures which were not wholly consistent with the stricter Conservative traditions, or wishes. In other respects, the legislative achievements of the government were not great; and the time of parliament was largely occupied in devising rules for the conduct of its business, which the obstructive attitude of the Irish members made necessary, and in discussing the charges brought against the Nationalist party by *The Times*, of complicity in the Phoenix Park murders. Under the new rules, the sittings of the House on ordinary days were made to commence at 3 P.M., and opposed business was automatically interrupted at midnight, while for the first time a power was given to the majority in a House of a certain size to conclude debate by what was known as the closure. Notwithstanding these new rules obstructive tactics continued to prevail; and, in the course of the parliament, many members were suspended for disorderly conduct. The hostility of the Irish members was perhaps increased by some natural indignation at the charges brought against Parnell. *The Times*, in April 1887, printed the facsimile of a letter purporting to be signed by Parnell, in which he declared that he had no other course open to him but to denounce the Phoenix Park murders, but that, while he regretted "the accident" of Lord Frederick Cavendish's death, he could not "refuse to admit that Burke got no more than his deserts." The publication of this letter, and later of other similar documents, naturally created a great sensation; and the government ultimately appointed a special commission of three judges to inquire into the charges and allegations that were made. In the course of the inquiry it was proved that the letters had emanated from a man named Pigott, who had at one time been associated with the Irish Nationalist movement, but who for some time past had earned a precarious living by writing begging and threatening letters. Pigott, subjected to severe cross-examination by Sir Charles Russell (afterwards Lord Russell of Killowen), broke down, fled from justice and committed suicide. His flight practically settled the question; and an inquiry, which many people had thought at its inception would brand Parnell as a criminal, raised him to an influence which he had never enjoyed before. But in the same year which witnessed his triumph, he was doomed to fall. He was made co-respondent in a divorce suit brought by Captain O'Shea—another Irishman—for the dissolution of his marriage; and the disclosures made at the trial induced Gladstone, who was supported by the Nonconformists generally throughout the United Kingdom, to request Parnell to withdraw from the leadership of the Irish party. Parnell refused to comply with this request, and the Irish party was shattered into fragments by his decision. Parnell himself did not long survive the disruption of the party which he had done so much to create. The exertions which he made to retrieve his waning influence proved too much for his strength, and in the autumn of 1891 he died suddenly at Brighton.

Nationalist split.

Parnell's death radically altered the political situation. At the general elections of 1885 and 1886 the existence of a strong, united Irish party had exercised a dominating influence. As the parliament of 1886 was drawing to a close, the dissensions among the Irish members, and the loss of their great leader, were visibly sapping the strength of the Nationalists. At the general election of 1892 Home Rule was still the prominent subject before the electors. But the English Liberals were already a little weary of allies who were quarrelling among themselves, and whose disputes were introducing a new factor into politics. The political struggle virtually turned not on measures, but on men. Gladstone's great age, and the marvellous powers which he displayed at a time when most men seek the repose of retirement, were the chief causes which affected the results. His influence enabled him to secure a small Liberal majority. But it was noticed that the majority depended on Scottish, Irish and Welsh votes, and that England—the "predominant partner," as it was subsequently called by Lord Rosebery—returned a majority of members pledged to resist any attempt to dissolve the union between the three kingdoms.

Home Rule Bill, 1893.

On the meeting of the new parliament Lord Salisbury's government was defeated on a vote of want of confidence, and for a fourth time Gladstone became prime minister. In the session of 1893 he again introduced a Home Rule Bill. But the measure of 1893 differed in many respects from that of 1886. In particular, the Irish were no longer to be excluded from the imperial parliament at Westminster. The bill which was thus brought forward was actually passed by the Commons. It was, however, rejected by the Lords. The dissensions among the Irish themselves, and the hostility which English constituents were displaying to the proposal, emboldened the Peers to arrive at this decision. Some doubt was felt as to the course which Gladstone would take in this crisis. Many persons thought that he should at once have appealed to the country, and have endeavoured to obtain a distinct mandate from the constituencies to introduce a new Home Rule Bill. Other persons imagined that he should have followed the precedent which had been set by Lord Grey in 1831, and, after a short prorogation, have reintroduced his measure in a new session. As a matter of fact, Gladstone adopted neither of these courses. The government decided not to take up the gauntlet thrown down by the Peers, but to proceed with the rest of their political programme. With this object an autumn session was held, and the Parish Councils Act, introduced by Mr Fowler (afterwards Lord Wolverhampton), was passed, after important amendments, which had been introduced into it in the House of Lords, had been reluctantly accepted by Gladstone. On the other hand, an Employers' Liability Bill, introduced by Mr Asquith, the home secretary, was ultimately dropped by Gladstone after passing all stages in the House of Commons, rather than that an amendment of the Peers, allowing "contracting out," should be accepted.

Lord Rosebery.

Before, however, the session had quite run out (3rd March 1894), Gladstone, who had now completed his eighty-fourth year, laid down a load which his increasing years made it impossible for him to sustain (see the article Gladstone). He was succeeded by Lord Rosebery, whose abilities and attainments had raised him to a high place in the Liberal counsels. Lord Rosebery did not succeed in popularizing the Home Rule proposal which Gladstone had failed to carry. He declared, indeed, that success was not attainable till England was converted to its expediency. He hinted that success would not even then be assured until something was done to reform the constitution of the House of Lords. But if, on the one hand, he refused to introduce a new Home Rule Bill, he hesitated, on the other, to court defeat by any attempt to reform the Lords. His government, in these circumstances, while it failed to conciliate its opponents, excited no enthusiasm among its supporters. It was generally understod, moreover, that a large section of the Liberal party resented Lord Rosebery's appointment to the first place in the ministry, and thought that the lead should have been conferred on Sir W. Harcourt. It was an open secret that these differences in the party were reflected in the cabinet, and that the relations between Lord Rosebery and Sir W. Harcourt were too strained to ensure either the harmonious working or the stability of the administration. In these circumstances the fall of the ministry was only a question of time. It occurred—as often happens in parliament—on a minor issue which no one had foreseen. Attention was drawn in the House of Commons to the insufficient supply of cordite provided by the war office, and the House—notwithstanding the assurance of the war minister (Sir Henry Campbell-Bannerman) that the supply was adequate—placed the government in a minority. Lord Rosebery resigned office, and Lord Salisbury for the third time became prime minister, the duke of Devonshire, Mr Chamberlain and other Liberal Unionists joining the government. Parliament was dissolved, and a new parliament, in which the Unionists obtained an overwhelming majority, was returned.

The government of 1892–1895, which was successively led by Gladstone and Lord Rosebery, will, on the whole, be remembered for its failures. Yet it passed two measures which have exercised a wide influence. The Parish Councils Act introduced electoral institutions into the government of every parish, and in 1894 Sir W. Harcourt, as chancellor of the exchequer, availed himself of the opportunity, which a large addition to the navy invited, to reconstruct the death duties. He swept away in doing so many of the advantages which the owner of real estate and the life tenant of settled property had previously enjoyed, and drove home a principle which Goschen had tentatively introduced a few years before by increasing the rate of the duty with the amount of the estate. Rich men, out of their superfluities, were thenceforward to pay more than poor men out of their necessities.

The two Jubilees.

The Unionist government which came into power in 1895 lasted, with certain changes of *personnel*, till 1905, with a break caused by the dissolution of 1900. History may hereafter conclude that the most significant circumstance of the earlier period is to be found in the demonstration of loyalty and affection to which the sixtieth anniversary of Queen Victoria's accession led in 1897. Ten years before, her jubilee had been the occasion of enthusiastic rejoicings, and the queen's progress through London to a service of thanksgiving at Westminster had impressed the imagination of her subjects and proved the affection of her people. But the rejoicings of 1887 were forgotten amid the more striking demonstrations ten years later. It was seen then that the queen, by her conduct and character, had gained a popularity which has had no parallel in history, and had won a place in the hearts of her subjects which perhaps no other monarch had ever previously enjoyed. There was no doubt that, if the opinion of the English-speaking races throughout the world could have been tested by a plebiscite, an overwhelming majority would have declared that the fittest person for the rule of the British empire was the gracious and kindly lady who for sixty years, in sorrow and in joy, had so worthily discharged the duties of her high position. This remarkable demonstration was not confined to the British empire alone. In every portion of the globe the sixtieth anniversary of the queen's reign excited interest; in every country the queen's name was mentioned with affection and respect; while the people of the United States vied with the subjects of the British empire in praise of the queen's character and in expressions of regard for her person. Only a year or two before, an obscure dispute on the boundary of British Venezuela had brought the United States and Great Britain within sight of a quarrel. The jubilee showed conclusively that, whatever politicians might say, the ties of blood and kinship, which united the two peoples, were too close to be severed by either for some trifling cause; that the wisest heads in both nations were aware of the advantages which must arise from the closer union of the Anglo-Saxon races; and that the true interests of both countries lay in their mutual friendship. A war in which the United States was subsequently engaged with Spain cemented this feeling. The government and the people of the United States recognized the advantage which they derived from the goodwill of Great Britain in the hour of their necessity, and the two nations drew together as no other two nations had perhaps ever been drawn together before.

If the jubilee was a proof of the closer union of the many sections of the British empire, and of their warm attachment to their sovereign, it also gave expression to the "imperialism" which was becoming a dominant factor in British politics. Few people realized the mighty change which in this respect had been effected in thought and feeling. Forty years before, the most prominent English statesmen had regarded with anxiety the huge responsibilities of a world-wide empire. In 1897 the whole tendency of thought and opinion was to enlarge the burden of which the preceding generation had been weary. The extension of British influence, the protection of British interests, were almost universally advocated; and the few statesmen who

Omdurman, Fashoda.

Jameson Raid.

repeated in the 'nineties the sentiments which would have been generally accepted in the 'sixties, were regarded as "Little Englanders." It is important to note the consequences which these new ideas produced in Africa. Both in the north and in the south of this great and imperfectly explored continent, memories still clung which were ungrateful to imperialism. In the north, the murder of Gordon was still unavenged; and the vast territory known as the Sudan had escaped from the control of Egypt. In the south, war with the Transvaal had been concluded by a British defeat; and the Dutch were elated, the English irritated, at the recollection of Majuba. In 1896 Lord Salisbury's government decided on extending the Anglo-Egyptian rule over the Sudan, and an expedition was sent from Egypt under the command of Sir Herbert (afterwards Lord) Kitchener to Khartum. Few military expeditions have been more elaborately organized, or have achieved a more brilliant success. The conquest of the country was achieved in three separate campaigns in successive years. In September 1898 the Sudanese forces were decisively beaten, with great slaughter, in the immediate neighbourhood of Omdurman; and Khartum became thenceforward the capital of the new province, which was placed under Lord Kitchener's rule. Soon after this decisive success, it was found that a French expedition under Major Marchand had reached the upper Nile and had hoisted the French flag at Fashoda. It was obvious that the French could not be allowed to remain at a spot which the khedive of Egypt claimed as Egyptian territory; and after some negotiation, and some irritation, the French were withdrawn. In South Africa still more important events were in the meanwhile progressing. Ever since the independence of the South African Republic had been virtually conceded by the convention of 1884, unhappy differences had prevailed between the Dutch and British residents in the Transvaal. The discovery of gold at Johannesburg and elsewhere in 1885-1886 had led to a large immigration of British and other colonists. Johannesburg had grown into a great and prosperous city. The foreign population of the Transvaal, which was chiefly English, became in a few years more numerous than the Boers themselves, and they complained that they were deprived of all political rights, that they were subjected to unfair taxation, and that they were hampered in their industry and unjustly treated by the Dutch courts and Dutch officials. Failing to obtain redress, at the end of 1895 certain persons among them made preparations for a revolution. Dr Jameson, the administrator of Rhodesia, accompanied by some British officers, actually invaded the Transvaal. His force, utterly inadequate for the purpose, was stopped by the Boers, and he and his fellow-officers were taken prisoners. There was no doubt that this raid on the territory of a friendly state was totally unjustifiable. Unfortunately, Dr Jameson's original plans had been framed at the instance of Cecil Rhodes, the prime minister at the Cape, and many persons thought that they ought to have been suspected by the colonial office in London. England at any rate would have had no valid ground of complaint if the leaders of a buccaneering force had been summarily dealt with by the Transvaal authorities. The president of the republic, Kruger, however, handed over his prisoners to the British authorities, and parliament instituted an inquiry by a select committee into the circumstances of the raid. The inquiry was terminated somewhat abruptly. The committee acquitted the colonial office of any knowledge of the plot; but a good many suspicions remained unanswered. The chief actors in the raid were tried under the Foreign Enlistment Act, found guilty, and subsequently released after short terms of imprisonment. Rhodes himself was not removed from the privy council, as his more extreme accusers demanded; but he had to abandon his career in Cape politics for a time, and confine his energies to the development of Rhodesia, which had been added to the empire through his instrumentality in 1888-1889.

Boer War, 1899.

In consequence of these proceedings, the Transvaal authorities at once set to work to accumulate armaments, and they succeeded in procuring vast quantities of artillery and military stores. The British government would undoubtedly have been entitled to insist that these armaments should cease. It was obvious that they could only be directed against Great Britain; and no nation is bound to allow another people to prepare great armaments to be employed against itself. The criminal folly of the raid prevented the British government from making this demand. It could not say that the Transvaal government had no cause for alarm when British officers had attempted an invasion of its territory, and had been treated rather as heroes than as criminals at home. Ignorant of the strength of Great Britain, and elated by the recollection of their previous successes, the Boers themselves believed that a new struggle might give them predominance in South Africa. The knowledge that a large portion of the population of Cape Colony was of Dutch extraction, and that public men at the Cape sympathized with them in their aspirations, increased their confidence. In the meantime, while the Boers were silently and steadily continuing their military preparations, the British settlers at Johannesburg—the Uitlanders, as they were called—continued to demand consideration for their grievances. In the spring of 1899, Sir Alfred Milner, governor of the Cape, met President Kruger at Bloemfontein, the capital of the Orange Free State, and endeavoured to accomplish that result by negotiation. He thought, at the time, that if the Uitlanders were given the franchise and a fair proportion of influence in the legislature, other difficulties might be left to settle themselves. The negotiations thus commenced unfortunately failed. The discussion, which had originally turned on the franchise, was enlarged by the introduction of the question of suzerainty or supremacy; and at last, in the beginning of October, when the rains of an African spring were causing the grass to grow on which the Boer armies were largely dependent for forage, the Boers declared war and invaded Natal. The British government had not been altogether happy in its conduct of the preceding negotiations. It was certainly unhappy in its preparations for the struggle. It made the great mistake of underrating the strength of its enemy; it suffered its agents to commit the strategical blunder of locking up the few troops it had in an untenable position in the north of Natal. It was not surprising, in such circumstances, that the earlier months of the war should have been memorable for a series of exasperating reverses. These reverses, however, were redeemed by the valour of the British troops, the spirit of the British nation, and the enthusiasm which induced the great autonomous colonies of the empire to send men to support the cause of the mother country. The gradual arrival of reinforcements, and the appointment of a soldier of genius—Lord Roberts—to the supreme command, changed the military situation; and, before the summer of 1900 was concluded, the places which had been besieged by the Boers—Kimberley, Ladysmith and Mafeking—had been successively relieved; the capitals of the Orange Free State and of the Transvaal had been occupied; and the two republics, which had rashly declared war against the British empire, had been formally annexed.

The close of 1900.

The defeat and dispersal of the Boer armies, and the apparent collapse of Boer resistance, induced a hope that the war was over; and the government seized the opportunity in 1900 to terminate the parliament, which had already endured for more than five years. The election was conducted with unusual bitterness; but the constituencies practically affirmed the policy of the government by maintaining, almost unimpaired, the large majority which the Unionists had secured in 1895. Unfortunately, the expectations which had been formed at the time of the dissolution were disappointed. The same circumstances which had emboldened the Boers to declare war in the autumn of 1899, induced them to renew a guerilla warfare in the autumn of 1900—the approach of an African summer supplying the Boers with the grass on which they were dependent for feeding their hardy horses. Guerilla bands suddenly appeared in different parts of the Orange River Colony and of the Transvaal. They interrupted the communications of the British armies; they won isolated victories over British detachments; they even invaded Cape Colony. Thus the last year of the century closed in disappointment, and gloom. The serious losses which the war entailed, the heavy expenses which it involved, and the large force which it absorbed, filled thoughtful men with anxiety.

The death of the queen.

No one felt more sincerely for the sufferings of her soldiers, and no one regretted more truly the useless prolongation of the struggle, than the venerable lady who occupied the throne. She had herself lost a grandson (Prince Christian Victor) in South Africa; and sorrow and anxiety perhaps told even on a constitution so unusually strong as hers. About the middle of January 1901 it was known that she was seriously ill; on the 22nd she died. The death of the queen thus occurred immediately after the close of the century over so long a period of which her reign had extended.

The queen's own life is dealt with elsewhere (see Victoria, Queen), but the Victorian era is deeply marked in English history. During her reign the people of Great Britain doubled their number; but the accumulated wealth of the country increased at least threefold, and its trade sixfold. All classes shared the prevalent prosperity. Notwithstanding the increase of population, the roll of paupers at the end of the reign, compared with the same roll at the beginning, stood as 2 stands to 3; the criminals as 1 to 2. The expansion abroad was still more remarkable. There were not 200,000 white persons in Australasia when the queen came to the throne; there were nearly 5,000,000 when she died. The great Australian colonies were almost created in her reign; two of them—Victoria and Queensland—owe their name to her; they all received those autonomous institutions, under which their prosperity has been built up, during its continuance. Expansion and progress were not confined to Australasia. The opening months of the queen's reign were marked by rebellion in Canada. The close of it saw Canada one of the most loyal portions of the Empire. In Africa, the advance of the red line which marks the bounds of British dominion was even more rapid; while in India the Punjab, Sind, Oudh and Burma were some of the acquisitions added to the British empire while the queen was on the throne. When she died one square mile in four of the land in the world was under the British flag, and at least one person out of every five persons alive was a subject of the queen.

Material progress was largely facilitated by industry and invention. The first railways had been made, the first steamship had been built, before the queen came to the throne. But, so far as railways are concerned, none of the great trunk lines had been constructed in 1837; the whole capital authorized to be spent on railway construction did not exceed £55,000,000; and, five years after the reign had begun, there were only 18,000,000 passengers. The paid-up capital of British railways in 1901 exceeded £1,100,000,000; the passengers, not including season ticket-holders, also numbered 1,100,000,000; and the sum annually spent in working the lines considerably exceeded the whole capital authorized to be spent on their construction in 1837. The progress of the commercial marine was still more noteworthy. In 1837 the entire commercial navy comprised 2,800,000 tons, of which less than 100,000 tons were moved by steam. At the end of the reign the tonnage of British merchant vessels had reached 13,700,000 tons, of which more than 11,000,000 tons were moved by steam. At the beginning of the reign it was supposed to be impossible to build a steamer which could either cross the Atlantic, or face the monsoon in the Red Sea. The development of steam navigation since then had made Australia much more accessible than America was in 1837, and had brought New York, for all practical purposes, nearer to London than Aberdeen was at the commencement of the reign. Electricity had even a greater effect on communication than steam on locomotion; and electricity, as a practical invention, had its origin in the reign. The first experimental telegraph line was only erected in the year in which Queen Victoria came to the throne. Submarine telegraphy, which had done so much to knit the empire together, was not perfected for many years afterwards; and long ocean cables were almost entirely constructed in the last half of the reign. (S. W.)

Reign of Edward VII.

On the death of Queen Victoria, the prince of Wales succeeded to the throne, with the title of Edward VII. (*q.v.*). The coronation fixed for June in the following year was at the last moment stopped by the king's illness with appendicitis, but he recovered marvellously from the operation and the ceremony took place in August. His excellent health and activity in succeeding years struck every one with astonishment. The Boer War had at last been brought to an end in May 1902 (see Transvaal), and the king had the satisfaction of seeing South Africa settle down and eventually receive self-government. The political history of his reign, which ended with his death in May 1910, is dealt with in detail in separate biographical and other articles in this work (see especially those on Lord Salisbury, Mr A. J. Balfour, Mr J. Chamberlain, Lord Rosebery, Sir H. Campbell-Bannerman, Mr H. H. Asquith, Mr D. Lloyd George, and on the history of the various portions of the British Empire); and in this place only a summary need be given. The king himself (see Edward VII.), who nobly earned the title of Edward the Peacemaker, played no small part in the domestic and international politics of these years; and contemporary publicists, who had become accustomed to Victorian traditions, gradually realized that, within the limits of the constitutional monarchy, there was much more scope for the initiative of a masculine sovereign in public life than had been supposed by the generation which grew up after the death of his father in 1862. Edward VII. made the Crown throughout all classes of society a popular power which it had not been in England for long ages. And while the growing rivalry between England and Germany, in international relations, was continually threatening danger, his influence in cementing British friendship on all other sides was of the most marked description. His sudden death was felt, not only throughout the empire but throughout the world, with even more poignant emotion than that of Queen Victoria herself, for his personality had been much more in the forefront.

The Crisis of 1910.

The end of his reign coincided with a domestic constitutional crisis, to which party politics had been working up more and more acutely for several years. The Tariff Reform propaganda of Mr Chamberlain (*q.v.*) in 1903 convulsed the Conservative party, and the long period of Unionist domination came to an end in November 1905. Mr Balfour (*q.v.*), who became prime minister in 1902 on Lord Salisbury's retirement, resigned, and was succeeded by Sir H. Campbell-Bannerman (*q.v.*), as head of the Liberal party; and the general election of January 1906 resulted in an overwhelming victory for the Liberals and their allies, the Labour party (now a powerful force in politics) and the Irish Nationalists. Just before Sir H. Campbell-Bannerman's death in April 1908 he was succeeded as prime minister by Mr Asquith, a leader of far higher personal ability though with less hold on the affections of his party. The Liberals had long arrears to make up in their political programme, and their supremacy in the House of Commons was an encouragement to assert their views in legislation. In several directions, and notably in administration, they carried their policy into effect; but the House of Lords (see Parliament) was an obvious stumbling-block to some of their more important Bills, and the Unionist control of that House speedily made itself felt, first in wrecking the Education Bill of 1906, then in throwing out the Licensing Bill of 1908, and finally (see Lloyd George, D.) in forcing a dissolution by the rejection of the budget of 1909, with its novel proposals for the increased taxation of land and licensed houses. The Unionist party in the country had, meanwhile, been recovering from the Tariff Reform divisions of 1903, and was once more solid under Mr Balfour in favour of its new and imperial policy; but the campaign against the House of Lords started by Mr Lloyd George and the Liberal leaders, who put in the forefront the necessity of obtaining statutory guarantees for the passing into law of measures deliberately adopted by the elected Chamber, resulted in the return of Mr Asquith's government to office at the election of January 1910. The Unionists came back equal in numbers to the Liberals, but the latter could also count on the Labour party and the Irish Nationalists; and the battle was fully arrayed for a frontal attack on the powers of the Second Chamber when the king's death in May upset all calculations. This unthought-of complication seemed to act like the letting of blood in an apoplectic patient.

Accession of George V.

The prince of Wales became king as George V. (*q.v.*), and a temporary truce was called; and the reign began with a serious attempt between the leaders of the two great parties, by private conference, to see whether compromise was not possible (see PARLIAMENT). Apart from the parliamentary crisis, really hingeing on the difficulty of discovering a means by which the real will of the people should be carried out without actually making the House of Commons autocratically omnipotent, but also without allowing the House of Lords to obstruct a Liberal government merely as the organ of the Tory party, the new king succeeded to a noble heritage. The monarchy itself was popular, the country was prosperous and in good relations with the world, except for the increasing naval rivalry with Germany, and the consciousness of imperial solidarity had made extraordinary progress among all the dominions. However the domestic problems in the United Kingdom might be solved, the future of the greatness of the English throne lay with its headship of an empire, loyal to the core, over which the sun never sets. (H. CH.)

XIII.—SOURCES AND WRITERS OF ENGLISH HISTORY

The attempt here made to combine a bibliography of English history with some account of the progress of English historical writing is beset with some difficulty. The evidential value of what a writer says is quite distinct from the literary art with which he says it; the real sources of history are not the works of historians, but records and documents written with no desire to further any literary purpose. Domesday Book is unique as a source of medieval history, but it does not count in the development of English historical writing. That is quite a secondary consideration; for there was much English history before any Englishman could write; and even after he could write, his compositions constitute a minor part of the evidence.

Our earliest information about the land and its people is derived from geological, ethnological and archaeological studies, from the remains in British barrows and caves, Roman roads, walls and villas, coins, place-names and inscriptions. The writings of Caesar and Tacitus, and a few scattered notices in other Roman authors, supplement this evidence. But the scientific accuracy of Tacitus' *Germania* is not beyond dispute, and that light fails centuries before the Anglo-Saxon conquest of Great Britain. The history of that conquest itself is mainly inferential; there is the *flebilis narratio* of Gildas, vague and rhetorical, moral rather than historical in motive, and written more than a century after the conquest had begun, and the narrative of the Welsh Nennius, who wrote two and a half centuries after Gildas, and makes no critical distinction between the deeds of dragons and those of Anglo-Saxons. The Anglo-Saxons themselves could not write until Christian missionaries had reintroduced the art at the end of the 6th century, and history was not by any means the first purpose to which they applied it. It was first used to compile written statements of customs and dooms which were their nearest approach to law, and these codes and charters are the earliest written materials for Anglo-Saxon history. The remarkable outburst of literary culture in Northumbria during the 7th and 8th centuries produced a real historian in Bede; Bede, however, knows little or nothing of English history between 450 and 596, and he is valuable only for the 7th and early part of the 8th centuries. Almost contemporary is the *Vita Wilfridi* by Eddius, but more valuable are the letters we possess of Boniface and Alcuin. The famous Anglo-Saxon Chronicle was probably started under the influence of Alfred the Great towards the end of the 9th century. Its chronology is often one, two or three years wrong even when it seems to be a contemporary authority, and the value of its evidence on the conquest and the first two centuries after it is very uncertain. But from Egbert's reign onwards it supplies a good deal of apparently trustworthy information. For Alfred himself we have also Asser's biography and the *Annals of St Neots*, a very imaginative compilation, while most of the stories which have made Alfred's name a household word are fabulous. Even the Chronicle becomes meagre a few years after Alfred's death, and its value depends largely upon the ballads which it incorporates; nor is it materially supplemented by the lives of St Dunstan, for hagiologists have never treated historical accuracy as a matter of moment; and our knowledge of the last century of Anglo-Saxon history is derived mainly from Anglo-Norman writers who wrote after the Norman Conquest. Some collateral light on the Danish conquest of England is thrown by the *Heimskringla* and other materials collected in Vigfusson and Powell's *Corpus Poeticum Boreale*, and for the reign of Canute and his sons there is the contemporary *Encomium Emmae*, which is a dishonest panegyric on the widow of Æthelred and Canute. For Edward the Confessor there is an almost equally biased biography.

For the Norman Conquest itself strictly contemporary evidence is extremely scanty, and historians have exhausted their own and their readers' patience in disputing the precise significance of some phrases about the battle of Hastings used by Wace, a Norman poet who wrote nearly a century after the battle. One version of the Anglo-Saxon Chronicle goes down to 1079 and another to 1154, but their notices of current events are brief and meagre. The Bayeux tapestry affords, however, valuable contemporary evidence, and there are some facts related by eye-witnesses in the works of William of Poitiers and William of Jumièges. A generation of copious chroniclers was, moreover, springing up, and among them were Florence of Worcester, Henry of Huntingdon, Simeon of Durham and William of Malmesbury. Their ambition was almost invariably to write the history of the world, and they generally begin with the Creation. They only become original and contemporary authorities towards the end of their appointed tasks, and the bulk of their work is borrowed from their predecessors. Frequently they embody materials which would otherwise have perished, but their transcription is marred by an amount of conscious or unconscious falsification which seriously impairs their value. All the above-mentioned writers lived in the half-century immediately following the Norman Conquest, but their critical acumen and their literary art vary considerably. William of Malmesbury, Eadmer and Ordericus Vitalis attain a higher historical standard than had yet been reached in England by any one, with the possible exception of Bede. They are not mere annalists; they practise an art and cultivate a style; history has become to them a form of literature. They have also their philosophy and interpretation of history. It is mainly a theological conception, blind to economic influences, and attaching excessive importance to the effects of the individual action of emperors and popes, kings and cardinals. Even their characters are painted in different colours according to their action on quite irrelevant questions, as, for instance, their benefactions to the monastery, to which the historian happens to belong, or to rival houses; and the character once determined by such considerations, history is made to point the moral of their fortunes, or their fate. It is regarded as the record of moral judgments and the proof of orthodox doctrine, and it is long before ecclesiastical historians expel the sermon from their text.

The line of monastic historians stretches out to the close of the middle ages. Most of the great monasteries had their official annalists, who produced such works as the Annals of Tewkesbury, Gloucester, Burton, Waverley, Dunstable, Bermondsey, Oseney, Winchester (see *Annales Monastici*, 5 vols., ed. Luard, and other volumes in the Rolls series). Some of them are mainly local chronicles; others are almost national histories. In particular, St Albans developed a remarkable school of historians extending over nearly three centuries to the death of Whethamstede in 1465 (see *Chronica Monasterii S. Albani*, Rolls series, 7 vols., ed. Riley). Only a few of the 235 volumes published under the direction of the master of the Rolls, and called the Rolls series, can here be mentioned. Other medieval writers have been edited for the earlier English Historical Society; some of them have been re-edited without being superseded in the Rolls series. For the reign of Stephen we have the anonymous *Gesta Stephani* in addition to the writers already mentioned, several of whom continue into Stephen's reign. For Henry II. we have William of Newburgh, who reaches the highest point attained by historical composition in the 12th century; the so-called Benedict of Peterborough's *Gesta Henrici*, which Stubbs tentatively and without sufficient authority ascribed to Richard Fitznigel; Robert of Torigni; and seven volumes of "Materials for the History of Thomas Becket," which contain some of the best and worst samples of hagiological history. For Richard and John the chronicles of Roger of Hoveden, Ralph de Diceto (Diss), Gervase of Canterbury, Ralph of Coggeshall, and a later continuation of Hoveden, known under the name of Walter of Coventry, are the best narrative authorities.

With the accession of Henry III., Roger of Wendover, the first of the St Albans school whose writings are extant, becomes our chief authority. He was re-edited and continued after 1236 by Matthew Paris, the greatest of medieval historians. His work, which goes down to 1259, is picturesque, vivid, and marked by considerable breadth of view and independence of judgment. The story is carried on by a series of jejune compilations known as the *Flores historiarum* (ed. Luard). Better authorities for Edward I. are Rishanger, Trokelowe and Blanceforde, Wykes, Walter of Hemingburgh, Nicholas Trevet, Oxnead and Bartholomew Cotton, and others contained in Stubbs's *Chronicles of Edward I. and Edward II.* In the 14th century there is a significant deterioration in the monastic chroniclers, and their place is taken by the works of secular clergy like Adam Murimuth, Geoffrey the Baker, Robert of Avesbury, Henry Knighton and the anonymous author of the *Eulogium historiarum.* Monastic history is represented by Higden's voluminous *Polychronicon*, which succeeds the *Flores historiarum.* A brief revival of the St Albans school towards the end of the century is seen in the *Chronicon Angliae* and the works of T. Walsingham, which continue into the reign of Henry V. For Richard II. we have also Malverne and the Monk of Evesham; for the early Lancastrians, Capgrave, Elmham, Otterbourne, Adam of Usk; and for Henry VI., Amundesham, Whethamstede, William of Worcester and John Hardyng, as well as a number of anonymous briefer chronicles, edited, though not in the Rolls series, by J. Gairdner, C. L. Kingsford, N. H. Nicolas and J. S. Davies.

These are the principal English historical writers for the middle ages; but as the connexion between England and the continent grew closer, and international relations developed, an increasing amount of light is thrown on English history by foreign writers. Of these authorities one of the earliest is the *Histoire des ducs de Normandie et des rois d'Angleterre* (ed. Michel); briefer are the *Chronique de l'Anonyme de Béthune* and the *Histoire de Guillaume le Maréchal.* A large number of French and Flemish chronicles illustrate the history of the Hundred Years' War, by far the most important being Froissart (best edition by Luce, though Lettenhove's is bigger). Next come Jehan le Bel, Waurin's *Recueil*, Monstrelet, Chastellain, Juvenal des Ursins, and more limited works such as Créton's *Chronique de la traison et mort de Richard II.*

Chronicles, however, grow less important as sources of history as time goes on. Their value is always dependent upon the absence of the more satisfactory materials known as records, and these records gradually become more copious and complete. They develop with the government, of whose activity and policy they are the real test and evidence. Perhaps the most important thing in history is the evolution of government, the development of consciousness and a will on the part of the state. This will is expressed in records; and, as the state progresses from infancy through the stage of tutelage under the church to its modern "omnicompetence," so its will is expressed in an ever widening and differentiating series of records. The first need of a government is finance; the earliest organized machinery for exerting its will is the exchequer; and the earliest great record in English history is Domesday Book. It is followed by a series of exchequer records, called the Pipe Rolls, which begin in the reign of Henry I., and dating from that of Henry II. is the *Dialogus de scaccario*, which explains in none too lucid language the intricate working of the exchequer system. It was Henry II. who gave the greatest impetus to the development of the machinery for expressing the will of the state. He began with finance and went on to justice, recognizing that *justitia magnum emolumentum*, the administration of justice was a great source of revenue. So national courts of law are added to the national exchequer, and by the end of the 12th century legal records become an even more important source of history than financial documents. The judicial system is described by Glanvill at the end of the 12th, and by Bracton and Fleta in the 13th century (for the exchequer see the *Testa de Nevill* and the *Red Book of the Exchequer*). During that period the Curia Regis threw off three offshoots—the courts of exchequer, king's bench and common pleas; and records of their judicial proceedings survive in the Plea Rolls and Year Books, some of which have been edited for the Rolls series, the Selden and other societies. Numerous other classes of legal and administrative records gradually develop, the Patent and Close Rolls (first calendared by the Record Commission, and subsequently treated more adequately under the direction of the deputy keeper of the Records), Charters (which were first grants to individuals, then to collective groups, monasteries or boroughs, then to classes, and finally expanded—as in Magna Carta—into grants to the whole nation), Escheats, Feet of Fines, Inquisitiones post mortem, Inquisitiones ad quod damnum, Placita de Quo Warranto, and others for which the reader is referred to S. R. Scargill-Bird's *Guide to the Principal Classes of Documents preserved in the Record Office* (3rd ed., 1908). Every branch of administration comes to be represented in records almost as soon as it is developed. The evolution of the army which won Creçy and Poitiers is accompanied by the accumulation of a mass of indentures and other military documents, the value of which has been illustrated in Dr Morris's *Welsh Wars of Edward I.* and George Wrottesley's *Creçy and Calais from the Public Records.* The growth of naval organization is reflected in the *Black Book of the Admiralty*; the growth of taxation in the *Liber custumarum* and *Subsidy Rolls*; the rise of parliament in the *Parliamentary Writs* (ed. Palgrave), in the *Rotuli parliamentorum*, in the *Official Return of Members of Parliament*, and in the *Statutes of the Realm*; that of Convocation in David Wilkins's *Concilia.* The register of the privy council does not begin until later in the 14th century, and then is broken off between the middle of the 15th and 1539.

Local as well as central government begets records as it grows. From the *Extenta manerii* of the 12th century we get to the *Manorial Rolls* of the 13th, when also we have *Hundred Rolls*, records of forest courts, of courts leet and of coroners' courts, and a variety of municipal documents, for which the reader is referred to Dr C. Gross's *Bibliography of British Municipal History* and to Mrs J. R. Green's more popular *Town Life in the Fifteenth Century.* The municipal records of London, its hustings court and city companies, are too multifarious to describe; some classes of these documents have been exemplified in the works of Dr R. R. Sharpe. Ecclesiastical records are represented by the episcopal registers (for the most part still unpublished), monastic cartularies, and other documents rendered comparatively scarce by the spoliation of the monasteries, and scattered proceedings of ecclesiastical courts. (See also the article RECORD.)

Documents, other than records strictly so called, begin to grow with the habit of correspondence and the necessity of communication. A few letters survive from the time of the Norman kings, but the earliest collection of English royal letters is the *Letters of Henry III.* (Rolls series). Contemporary are the *Letters of Grosseteste*, and a little later come the *Letters of Archbishop Peckham* and Raine's *Letters from Northern Registers* (all in the Rolls series). Private correspondence appeared earlier in the voluminous epistles of Peter of Blois, archdeacon of Bath (ed. Giles). This is a somewhat intermittent source of history until we come to the 15th century, when the well-known *Paston*

Letters (ed. Gairdner) begin a stream which never fails thereafter and soon becomes a torrent. The most important series of official correspondence is the *Papal Letters*, calendared from 1198 to 1404 in 4 vols. (ed. Bliss, Johnson and Twemlow). Subsidiary sources are the *Political Songs* (ed. Wright), treatises like those of John of Salisbury, Gerald of Wales, and, later, Wycliffe's works, Netter's *Fasciculi Zizaniorum*, Gascoigne's *Loci e libro veritatum*, Pecock's *Repressor*, and the literary writings of Chaucer, Langland, Gower, Richard Rolle and others.

During the 15th century the transition, which marks the change from medieval to modern history, affects also the character of historical sources and historical writing. In the first place, history ceases to be the exclusive province of the church; monastic chronicles shrink to a trickle and then dry up; the last of their kind in England is the *Greyfriars Chronicle* (Camden Society), which ends in 1554. Their place is taken by the city chronicle compiled by middle-class laymen, just as the Renaissance was not a revival of clerical learning, but the expression of new intellectual demands on the part of the laity. Secondly, the definite disappearance of the medieval ideas of a cosmopolitan world and the emergence of national states begat diplomacy, and with it an ever-swelling mass of diplomatic material. Diplomacy had hitherto been occasional and intermittent, and embassies rare; now we get resident ambassadors carrying on a regular correspondence (see DIPLOMACY). The mercantile interests of Venice made it the pioneer in this direction, though its representatives abroad were at first commercial rather than diplomatic agents. The *Calendar of Venetian State Papers* goes back to the 14th century, but does not become copious till the reign of Henry VII., when also the Spanish Calendar begins. Resident French ambassadors in England only begin in the 16th century, and later still those from the emperor, the German and Italian states other than Venice. In the third place, the development of the new monarchy involved an enormous extension of the activity of the central government, and therefore a corresponding expansion in the records of its energy.

The political records of this energy are the State Papers, a class of document which soon dwarfs all others, and renders chroniclers, historians and the like almost negligible quantities as sources of history; but in another way their value is enhanced, for these hundreds of thousands of documents provide a test of the accuracy of modern historians which is imperfect in the case of medieval chroniclers and almost non-existent in that of ancient writers. These state papers are either "foreign" or "domestic," that is to say, the correspondence of the English government with its agents abroad, or at home. There is also the correspondence of foreign ambassadors resident in England with their governments. This last class of documents exists in England mainly in the form of transcripts from the originals in foreign archives, which have been made for the purpose of the Venetian and Spanish Calendars of state papers. The Venetian Calendar had by 1909 been carried well into the 17th century; the Spanish (which includes transcripts from the Habsburg archives at Vienna, Brussels and Simancas) covered only the reigns of Henry VII. and VIII. and Queen Elizabeth. No attempt had yet been made to calendar the French correspondence in a similar way, though the French Foreign Office published some fragmentary collections, such as the *Correspondance de MM. de Castillon et de Marillac* and that of Odet de Selve. There are other collections too numerous to enumerate, such as Lettenhove's edition of Philip II.'s correspondence relating to the Netherlands, Diegerick and Müller's, Teulet's and Albèri's collections, the French *Documents inédits* and the Spanish *Documentos ineditos*, all containing state papers relating to England's foreign policy in the 16th century. The Scottish and Irish state papers are calendared in separate series and without much system. Thus for Scottish affairs there are four series, the Border Papers, the Hamilton Papers, Thorp's Calendar, and, more recent and complete, Bain's Calendar. For Ireland, besides the regular Irish state papers, there are the Carew Papers, almost as important. Anarchy, indeed, pervades the whole method of publication. For the reign of Henry VII. we have, besides the Venetian and Spanish Calendars, only three volumes—Gairdner's *Letters and Papers of Richard III. and Henry VII.* and Campbell's *Materials* (2 vols., Rolls series). Then with the reign of Henry VIII. begins the magnificent and monumental *Letters and Papers of Henry VIII.*, the one modern series for which the Record Office deserves unstinted praise. This is not limited to state papers, domestic and foreign, nor to documents in the Record Office; it calendars private letters, grants, &c., extant in the British Museum and elsewhere. It extends to 21 volumes, each volume consisting of two or more parts, and some parts (as in vol. iv.) containing over a thousand pages; it comprises at least fifty thousand documents. Its value, however, varies; the earlier volumes are not so full as the later, the documents are not so well calendared, and some classes are excluded from earlier, which appear in the later, volumes.

After 1547 a different plan is adopted, though not consistently followed. Only state papers are calendared, and as a rule only those in the Record Office; and the domestic are separated from the foreign. The great fault is the neglect of the vast quantities of state papers in the British Museum. The Domestic Calendar (the first volume of which is very inadequate) extended in 1909 in a series of more than seventy volumes nearly to the end of the 17th century; the mass of MSS. calendared therein may be gathered from the fact that for the reign of Elizabeth the Domestic state papers fill over three hundred MS. volumes. The Foreign Calendar had only got to 1582, but it occupied sixteen printed volumes against one of the Domestic Calendar. For the masses of MSS. uncalendared in the British Museum there is no guide except the imperfect indexes to the Cotton, Harleian, Lansdowne, Additional and other collections. Hardly less important than the calendars are the reports of the Historical Manuscripts Commission and the appendices thereto, which extend to over a hundred volumes; twelve are occupied by Lord Salisbury's 16th-century MSS. at Hatfield House. The dispersion of these state papers is due to the fact that they were in those days treated not as the property of the state, but as the private property of individual secretaries.

State papers represent only one side of the activity of the central government. The register of the privy council, extending with some lacunae from 1539 to 1604, has been printed in thirty-two volumes. The *Rotuli parliamentorum* end with Henry VII., but in 1509 begin the journals of the House of Lords, and in 1547 the journals of the House of Commons. These are supplemented by private diaries of members of parliament, several of which were used in D'Ewes's *Journals*. Legal history can now be followed in a continuous series of law reports, beginning with Keilway, Staunford and Dyer, and going on with Coke and many others; documentary records of various courts are exemplified in the *Select Cases* from the star chamber, the court of requests and admiralty courts, published by the Selden Society; and there are voluminous records of the courts of augmentations, first-fruits, wards and liveries in the Record Office. For Ireland, besides the state papers, there are the Calendars of Patents and of Fiants, and for Scotland the Exchequer Rolls and Registers of the Privy Council and of the Great Seal, both extending to many volumes.

Unofficial sources multiply with equal rapidity, but it is impossible to enumerate the collections of private letters, &c., only a few of which have been published. The chronicles, which in the 15th century are usually meagre productions like Warkworth's (Camden Society), get fuller, especially those emanating from London. Fabyan is succeeded by Hall, an indispensable authority for Henry VIII., and Hall by Grafton. Other useful books are Wriothesley's *Chronicle* and Machyn's *Diary*, and they have numerous successors; some of their works have been edited for the Camden Society, which now takes the place of the Rolls series. The most important are Holinshed, Stow and Camden; and gradually, with Speed and Bacon, the chronicle develops into the history, and early in the 17th century we get such works as Lord Herbert's *Reign of Henry VIII.*, Hayward's *Edward VI.*, and, on the ecclesiastical side, Heylyn, Fuller, Burnet and Collier's histories of the church and

Reformation. Foxe, who died in 1587, included a vast and generally accurate collection of documents in his *Acts and Monuments*, popularized as the *Book of Martyrs*, though his own contributions have to be discounted as much as those of Sanders, Parsons and other Roman Catholic controversialists. Two other great collections are the Parker Society's publications (56 vols.), which contain besides the works of the reformers a considerable number of their letters, and Strype's works (26 vols.). The naval epic of the period is Hakluyt's *Navigations*, re-edited in 12 vols. in 1902, and continued in Purchas's *Pilgrims*.

In the 17th century the domestic and foreign state papers eclipse other sources almost more completely than in the 16th. The colonial state papers now become important and extensive, those relating to America and the West Indies being most numerous (18 vols. to 1700). Parliamentary records naturally expand, and the journals of both Houses become more detailed. Parliamentary diarists like D'Ewes, Burton and Walter Yonge, only a fragment of whose shorthand notes in the British Museum has been published (Camden Society), elucidate the bare official statements; and from 1660 the series of parliamentary debates is fairly complete, though not so full or authoritative as it becomes with Hansard in the 19th century. Social diarists of great value appear after the Restoration in Pepys, Evelyn, Reresby, Narcissus Luttrell and Swift (*Journal to Stella*), and political writing grows more important as a source of history, whether it takes the form of Bacon's (ed. Spedding) or Milton's treatises, or of satires like Dryden's and political pamphlets like Halifax's and then Swift's, Defoe's and Steele's. Clarendon's *Great Rebellion* and Burnet's *History of My Own Time* are the first modern attempts at contemporary history, as distinct from chronicles and annals, in England, although it is difficult to exclude the work of Matthew Paris from the category. The innumerable tracts and newsletters are a valuable source for the Civil Wars and Commonwealth period (see J. B. Williams, *A History of English Journalism*, 1909), while Thurloe's, Clarendon's and Nalson's collections of state papers deserve a mention apart from the Domestic Calendar. There is a still more monumental collection—the Carte Papers—on Irish affairs in the Bodleian Library, where also the Tanner MSS. and other collections have only been very partially worked. The volumes of the Historical MSS. Commission are of great value for the later Stuart period, notably the House of Lords MSS.

For the 18th century the only calendars are the Home Office Papers and the Treasury Books and Papers, the further specialization of government having made it necessary to differentiate domestic state papers into several classes. But it need hardly be said that the bulk of correspondence in the Record Office does not diminish. Outside its walls the most important single collection is perhaps the duke of Newcastle's papers among the Additional MSS. in the British Museum; the Stuart papers at Windsor, Mr Fortescue's at Dropmore, Lord Charlemont's (Irish affairs), Lord Dartmouth's (American affairs) and Lord Carlisle's, all calendared by the Historical MSS. Commission, are also valuable. Chatham's correspondence with colonial governors has been published (2 vols., 1906), as have the *Grenville Papers*, *Bedford Correspondence*, Malmesbury's *Diaries*, Auckland's *Journals and Correspondence*, Grafton's *Correspondence*, Lord North's *Correspondence with George III.*, and other correspondence in *The Memoirs of Rockingham*, and the duke of Buckingham's *Court and Cabinets of George III*. Mention should also be made of Gower's *Despatches*, the *Cornwallis Correspondence*, Rose's *Correspondence* and Lord Colchester's *Correspondence*. Of special interest is the series of naval records, despatches to and from naval commanders, proceedings of courts-martial, and logs in the Record Office which have never been properly utilized.

Among unofficial sources the most characteristic of the 18th century are letters, memoirs and periodical literature. Horace Walpole's *Letters* (Clarendon Press, 16 vols.) are the best comment on the history of the period; his *Memoirs* are not so good, though they are superior to Wraxall, who succeeds him. Periodical literature becomes regular in the reign of Queen Anne, chiefly in the form of journals like the *Spectator*; but several daily newspapers, including *The Times*, were founded during the century. *The Craftsman* provided a vehicle for Bolingbroke's attacks on Walpole, while the *Gentleman's Magazine* and *Annual Register* begin a more serious and prolonged career. Both contain occasional state papers, and not very trustworthy reports of parliamentary proceedings. The publication of debates was not authorized till the last quarter of the century; parliamentary papers begin earlier, but only slowly attain their present portentous dimensions. Political writing is at its best from Halifax to Cobbett, and its three greatest names are perhaps Swift, "Junius" and Burke, though Steele, Defoe, Bolingbroke and Dr Johnson are not far behind, while Canning's contributions to the *Anti-Jacobin* and Gillray's caricatures require mention.

The sources for 19th-century history are somewhat similar to those for the 18th. Diaries continue in the *Creevey Papers*, Greville's Diary, and lesser but not less voluminous writers like Sir M. E. Grant-Duff. The most important series of letters is Queen Victoria's (ed. Lord Esher and A. C. Benson, 1908), and the correspondence of most of her prime ministers and many of her other advisers has been partially published. Of political biographies there is no end. The great bulk of material, however, consists of blue-books, Hansard's *Parliamentary Debates*, and newspapers—which are better as indirect than direct evidence. The real truth is not of course revealed at once, and many episodes in 19th-century history are still shrouded by official secrecy. In this respect English governments are more cautious or reactionary than many of those on the continent of Europe, and access to official documents is denied when it is granted elsewhere; even the lapse of a century is not considered a sufficient salve for susceptibilities which might be wounded by the whole truth.

Meanwhile the 19th century witnessed a great development in historical writing. In the middle ages the stimulus to write was mainly of a moral or ecclesiastical nature, though the patriotic impulse which had suggested the Anglo-Saxon Chronicle was perhaps never entirely absent, and the ecclesiastical motive often degenerated into a desire to glorify, sometimes even by forgery, not merely the church as a whole, but the particular monastery to which the writer belonged. As nationalism developed, the patriotic motive supplanted the ecclesiastical, and stress is laid on the "famous" history of England. Insular self-glorification was, however, modified to some extent by the Renaissance, which developed an interest in other lands, and the Reformation, which gave to much historical writing a partisan theological bias. This still colours most of the "histories" of the Reformation period, because the issues of that time are living issues, and the writers of these histories are committed beforehand by their profession and their position to a particular interpretation. In the 17th century political partisanship coloured historical writing, and that, too, remained a potent motive so long as historians were either Whigs or Tories. Histories were often elaborate party pamphlets, and this race of historians is hardly yet extinct. Macaulay is not greatly superior in impartiality to Hume; Gibbon and Robertson were less open to temptation because they avoided English subjects. Hallam deliberately aimed at impartiality, but he could not escape his Whig atmosphere. Nevertheless, the effort to be impartial marks a new conception of history, which is well expressed in Lord Acton's admonition to his contributors in the *Cambridge Modern History*. Historians are to serve no cause but that of truth; in so far even as they desire a line of investigation to lead to a particular result, they are not, maintains Professor Bury, real historians. S. R. Gardiner perhaps attained most nearly this severe ideal among English historians, and Ranke among Germans. But, even when all conscious bias is eliminated, the unconscious bias remains, and Ranke's history of the Reformation is essentially a middle-class, even *bourgeois*, presentment. Stubbs's medievalist sympathies colour his history throughout, and still more strongly does Froude's anti-clericalism. Freeman's bias was peculiar; he is really a West Saxon of Godwine's time reincarnated, and his Somerset hatred of French, Scots and Mercian foreigners sets off his robust loyalty to the house of Wessex. Lecky and Creighton are almost as dispassionate as Gardiner, but are more definitely committed to particular points of views, while democratic fervour pervades the fascinating pages of J. R. Green, and an intellectual secularism, which is almost religious in its intensity and idealism, inspired the genius of Maitland.

The latest controversy about history is whether it is a science or an art. It is, of course, both, simply because there must be science in every art and art in every science. The antithesis is largely false; science lays stress on analysis, art on synthesis. The historian must apply scientific methods to his materials and artistic methods to his results; he must test his documents and then turn them into literature. The relative importance of the two methods is a matter of dispute. There are some who still maintain that history is merely an art, that the best history is the story that is best told, and that what is said is less important than the way in which it is said. This school generally ignores records. Others attach little importance to the form in which truth is presented; they are concerned mainly with the principles and methods of scientific criticism, and specialize in palaeography, diplomatic and sources. The works of this school are little read, but in time its results penetrate the teaching in schools and universities, and then the pages of literary historians; it is represented in England by a fairly good organization, the Royal Historical Society (with which the Camden Society has been amalgamated), and by an excellent periodical, *The English Historical Review* (founded in 1884), while some sort of propaganda is attempted by the Historical Association (started in 1906). Its standards have also been upheld with varying success in great co-operative undertakings, such as the *Dictionary of National Biography*, the *Cambridge Modern History*, and Messrs Longmans' *Political History of England*.

These 19th-century products require some sort of classification for purposes of reference, and the chronological is the most convenient. Lingard's, J. R. Green's and Messrs Longmans' histories are the only notable attempts to tell the history of England as a whole, though Stubbs's *Constitutional History* (3 vols.) covers the middle ages and embodies a political survey as well (for corrections and modifications see Petit-Dutaillis, *Supplementary Studies*, 1908), while Hallam's *Constitutional History* (3 vols.) extends from 1485 to 1760 and Erskine May's (3 vols.) from 1760 to 1860. Sir James Ramsay's six volumes also cover the greater part of medieval English history. There is no work on a larger scale than Lappenberg and Kemble, dealing with England before the Norman Conquest, though J. R. Green's *Making of England* and *Conquest of England* deal with certain portions in some detail, and Freeman gives a preliminary survey in his *Norman Conquest* (6 vols.). For the succeeding period see Freeman's *William Rufus*, J. H. Round's *Feudal England* and *Geoffrey de Mandeville*, and Miss Norgate's *England under the Angevins* and *John Lackland*. From 1216 we have nothing but Ramsay, Stubbs, Longmans' *Political History* and monographs (some of them good), until we come to Wylie's *Henry IV.* (4 vols.); and again from 1413 the same is true (Gairdner's *Lollardy and the Reformation* being the most elaborate monograph) until we come to Brewer's *Reign of Henry VIII.* (2 vols.; to 1530 only), Froude's *History* (12 vols., 1529–1588) and R. W. Dixon's *Church History* (6 vols., 1529–1570). From 1603 to 1656 we have Gardiner's *History* (England, 10 vols.; Civil War, 4 vols.; Commonwealth and Protectorate, 3 vols.), and to 1714 Ranke's *History of England* (6 vols.; see also Firth's *Cromwell* and *Cromwell's Army*, and various editions of texts and monographs). For Charles II. there is no good history; then come Macaulay, and Stanhope and Wyon's *Queen Anne*, and for the 18th century Stanhope and Lecky (England, 7 vols.; Ireland, 5 vols.). From 1793 to 1815 is another gap only partially filled. Spencer Walpole deals with the period from 1815 to 1880, and Herbert Paul with the years 1846–1895.

A few books on special subjects deserve mention. For legal history see Pollock and Maitland's *History of English Law* (2 vols. to Edward I.), Maitland's *Domesday Book and Beyond*, and Anson's *Law and Custom of the Constitution*; for economic history, Cunningham's *Growth of Industry and Commerce*, and Ashley's *Economic History*; for ecclesiastical history, Stephens and Hunt's series (7 vols.); for foreign and colonial, Seeley's *British Foreign Policy* and *Expansion of England*, and J. A. Doyle's books on the American colonies; for military history, Fortescue's *History of the British Army*, Napier's and Oman's works on the *Peninsular War*, and Kinglake's *Invasion of the Crimea*; and for naval history, Corbett's *Drake and the Tudor Navy*, *Successors of Drake*, *English in the Mediterranean* and *Seven Years' War*, and Mahan's *Influence of Sea-Power on History* and *Influence of Sea-Power upon the French Revolution and Empire*.

BIBLIOGRAPHY OF BIBLIOGRAPHIES.—The sources for the middle ages have been enumerated in C. Gross's *Sources and Literature of English History . . . to about 1485* (London, 1900), but there is nothing similar for modern history. G. C. Lee's *Source Book of English History* is not very satisfactory. More information can be obtained from the bibliographies appended to the volumes in Longmans' *Political History*, or the chapters in the *Cambridge Modern History*, or to the biographical articles in the *D.N.B.* and *Ency. Brit.* A series of bibliographical leaflets for the use of teachers is issued by the Historical Association. For MSS. sources see Scargill-Bird's *Guide to the Record Office*, and the class catalogues in the MSS. Department of the British Museum. Lists of the state papers and other documents printed and calendared under the direction of the master of the Rolls and deputy keeper of the Records are supplied at the end of many of their volumes. (A. F. P.)

ENGLISH LANGUAGE. In its historical sense, the name *English* is now conveniently used to comprehend the language of the English people from their settlement in Britain to the present day, the various stages through which it has passed being distinguished as Old, Middle, and New or Modern English. In works yet recent, and even in some still current, the term is confined to the third, or at most extended to the second and third of these stages, since the language assumed in the main the vocabulary and grammatical forms which it now presents, the oldest or inflected stage being treated as a separate language, under the title of *Anglo-Saxon*, while the transition period which connects the two has been called *Semi-Saxon*. This view had the justification that, looked upon by themselves, either as vehicles of thought or as objects of study and analysis, Old English or Anglo-Saxon and Modern English are, for all practical ends, distinct languages,—as much so, for example, as Latin and Spanish. No amount of familiarity with Modern English, including its local dialects, would enable the student to read Anglo-Saxon, three-fourths of the vocabulary of which have perished and been reconstructed within 900 years;[1] nor would a knowledge even of these lost words give him the power, since the grammatical system, alike in accidence and syntax, would be entirely strange to him. Indeed, it is probable that a modern Englishman would acquire the power of reading and writing French in less time than it would cost him to attain to the same proficiency in Old English; so that if the test of distinct languages be their degree of practical difference from each other, it cannot be denied that "Anglo-Saxon" is a distinct language from Modern English. But when we view the subject historically, recognizing the fact that living speech is subject to continuous change in certain definite directions, determined by the constitution and circumstances of mankind, as an evolution or development of which we can trace the steps, and that, owing to the abundance of written materials, this evolution appears so gradual in English that we can nowhere draw distinct lines separating its successive stages, we recognize these stages as merely temporary phases of an individual whole, and speak of the English language as used alike by Cynewulf, by Chaucer, by Shakespeare and by Tennyson.[2] It must not be forgotten, however, that in this wide sense the English language includes, not only the literary or courtly forms of speech used at successive periods, but also the popular and, it may be, altogether unwritten dialects that exist by their side. Only on this basis, indeed, can we speak of Old, Middle and Modern English as the same *language*, since in actual fact the precise *dialect* which is now the cultivated language, or "Standard English," is not the descendant of that dialect which was the cultivated language or "Englisc" of Alfred, but of a sister dialect then sunk in comparative obscurity,—even as the direct descendant of Alfred's Englisc is now to be found in the non-literary rustic speech of Wiltshire and Somersetshire. Causes which, linguistically considered, are external and accidental, have shifted the political and intellectual centre of England, and along with it transferred literary and official patronage from one form of English to another; if the centre of influence had happened to be fixed at York or on the banks of the Forth, both would probably have been neglected for a third.

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[1] A careful examination of several letters of Bosworth's Anglo-Saxon dictionary gives in 2000 words (including derivatives and compounds, but excluding orthographic variants) 535 which still exist as modern English words.

[2] The practical convenience of having one name for what was the same thing in various stages of development is not affected by the probability that (E. A. Freeman notwithstanding) *Engle* and *Englisc* were, at an early period, *not* applied to the whole of the inhabitants of Teutonic Britain, but only to a part of them. The dialects of *Engle* and *Seaxan* were alike old forms of what was afterwards English speech, and so, viewed in relation to it, *Old English*, whatever their contemporary names might be.

The English language, thus defined, is not "native" to Britain, that is, it was not found there at the dawn of history, but was introduced by foreign immigrants at a date many centuries later. At the Roman Conquest of the island the languages spoken by the natives belonged all (so far as is known) to the Celtic branch of the Indo-European or Indo-Germanic family, modern forms of which still survive in Wales, Ireland, the Scottish Highlands, Isle of Man and Brittany, while one has at no distant date become extinct in Cornwall (see CELT: *Language*). Brythonic dialects, allied to Welsh and Cornish, were apparently spoken over the greater part of Britain, as far north as the firths of Forth and Clyde; beyond these estuaries and in the isles to the west, including Ireland and Man, Goidelic dialects, akin to Irish and Scottish Gaelic, prevailed. The long occupation of south Britain by the Romans (A.D. 43-409)—a period, it must not be forgotten, equal to that from the Reformation to the present day, or nearly as long as the whole duration of modern English—familiarized the provincial inhabitants with Latin, which was probably the ordinary speech of the towns. Gildas, writing nearly a century and a half after the renunciation of Honorius in 410, addressed the British princes in that language;[1] and the linguistic history of Britain might have been not different from that of Gaul, Spain and the other provinces of the Western Empire, in which a local type of Latin, giving birth to a neo-Latinic language, finally superseded the native tongue except in remote and mountainous districts,[2] had not the course of events been entirely changed by the Teutonic conquests of the 5th and 6th centuries.

The Angles, Saxons, and their allies came of the Teutonic stock, and spoke a tongue belonging to the Teutonic or Germanic branch of the Indo-Germanic (Indo-European) family, the same race and form of speech being represented in modern times by the people and languages of Holland, Germany, Denmark, the Scandinavian peninsula and Iceland, as well as by those of England and her colonies. Of the original home of the so-called primitive Aryan race (*q.v.*), whose language was the parent Indo-European, nothing is certainly known, though the subject has called forth many conjectures; the present tendency is to seek it in Europe itself. The tribe can hardly have occupied an extensive area at first, but its language came by degrees to be diffused over the greater part of Europe and some portion of Asia. Among those whose Aryan descent is generally recognized as beyond dispute are the Teutons, to whom the Angles and Saxons belonged.

The Teutonic or Germanic people, after dwelling together in a body, appear to have scattered in various directions, their language gradually breaking up into three main groups, which can be already clearly distinguished in the 4th century A.D., North Germanic or Scandinavian, West Germanic or Low and High German, and East Germanic, of which the only important representative is Gothic. Gothic, often called Moeso-Gothic, was the language of a people of the Teutonic stock, who, passing down the Danube, invaded the borders of the Empire, and obtained settlements in the province of Moesia, where their language was committed to writing in the 4th century; its literary remains are of peculiar value as the oldest specimens, by several centuries, of Germanic speech. The dialects of the invaders of Britain belonged to the West Germanic branch, and within this to the Low German group, represented at the present day by Dutch, Frisian, and the various "Platt-Deutsch" dialects of North Germany. At the dawn of history the forefathers of the English appear to have been dwelling between and about the estuaries and lower courses of the Rhine and the Weser, and the adjacent coasts and isles; at the present day the most English or Angli-form dialects of the European continent are held to be those of the North Frisian islands of Amrum and Sylt, on the west coast of Schleswig. It is well known that the greater part of the ancient Friesland has been swept away by the encroachments of the North Sea, and the *disjecta membra* of the Frisian race, pressed by the sea in front and more powerful nationalities behind, are found only in isolated fragments from the Zuider Zee to the coasts of Denmark. Many Frisians accompanied the Angles and Saxons to Britain, and Old English was in many respects more closely connected with Old Frisian than with any other Low German dialect. Of the Geatas, Eotas or "Jutes," who, according to Bede, occupied Kent and the Isle of Wight, and formed a third tribe along with the Angles and Saxons, it is difficult to speak linguistically. The speech of Kent certainly formed a distinct dialect in both the Old English and the Middle English periods, but it has tended to be assimilated more and more to neighbouring southern dialects, and is at the present day identical with that of Sussex, one of the old Saxon kingdoms. Whether the speech of the Isle of Wight ever showed the same characteristic differences as that of Kent cannot now be ascertained, but its modern dialect differs in no respect from that of Hampshire, and shows no special connexion with that of Kent. It is at least entirely doubtful whether Bede's Geatas came from Jutland; on linguistic grounds we should expect that they occupied a district lying not to the north of the Angles, but between these and the old Saxons.

The earliest specimens of the language of the Germanic invaders of Britain that exist point to three well-marked dialect groups: the Anglian (in which a further distinction may be made between the Northumbrian and the Mercian, or South-Humbrian); the Saxon, generally called West-Saxon from the almost total lack of sources outside the West-Saxon domain; and the Kentish. The Kentish and West-Saxon are sometimes, especially in later times, grouped together as southern dialects as opposed to midland and northern. These three groups were distinguished from each other by characteristic points of phonology and inflection. Speaking generally, the Anglian dialects may be distinguished by the absence of certain normal West-Saxon vowel-changes, and the presence of others not found in West-Saxon, and also by a strong tendency to confuse and simplify inflections, in all which points, moreover, Northumbrian tended to deviate more widely than Mercian. Kentish, on the other hand, occupied a position intermediate between Anglian and West-Saxon, early Kentish approaching more nearly to Mercian, owing perhaps to early historical connexion between the two, and late Kentish tending to conform to West-Saxon characteristics, while retaining several points in common with Anglian. Though we cannot be certain that these dialectal divergences date from a period previous to the occupation of Britain, such evidence as can be deduced points to the existence of differences already on the continent, the three dialects corresponding in all likelihood to Bede's three tribes, the Angles, Saxons and Geatas.

As it was amongst the *Engle* or Angles of Northumbria that literary culture first appeared, and as an Angle or *Englisc* dialect was the first to be used for vernacular literature, *Englisc* came eventually to be a general name for all forms of the vernacular as opposed to Latin, &c.; and even when the West-Saxon of Alfred became in its turn the literary or classical form of speech, it was still called Englisc or *English*. The origin of the name *Angul-Seaxan* (Anglo-Saxons) has been disputed, some maintaining that it means a union of Angles and Saxons, others (with better foundation) that it meant *English Saxons*, or Saxons of England or of the Angel-cynn as distinguished from Saxons of the Continent (see *New English Dictionary*, *s.v.*). Its modern use is mainly due to the little band of scholars who in the 16th and 17th centuries turned their attention to the long-forgotten language of Alfred and Ælfric, which, as it differed so greatly from the English of their own day, they found it convenient to distinguish by a name which was applied to themselves by those who spoke it.[1] To these scholars "Anglo-Saxon" and "English" were separated by a gulf which it was reserved for later scholarship to bridge across, and show the historical continuity of the English of all ages.

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[1] The works of Gildas in the original Latin were edited by Mr Stevenson for the English Historical Society. There is an English translation in *Six Old English Chronicles* in Bohn's Antiquarian library.

[2] As to the continued existence of Latin in Britain, see further in Rhys's *Lectures on Welsh Philology*, pp. 226-227; also Dogatschar, *Lautlehre d. gr., lat. u. roman. Lehnworte im Altengl.* (Strassburg, 1888).

As already hinted, the English language, in the wide sense, presents three main stages of development—Old, Middle and Modern—distinguished by their inflectional characteristics. The latter can be best summarized in the words of Dr Henry Sweet in his *History of English Sounds*:[2] "Old English is the period of *full* inflections (*nama, gifan, caru*), Middle English of *levelled* inflections (*naame, given, caare*), and Modern English of *lost* inflections (*name, give, care = nām, giv, cār*). We have besides two periods of *transition*, one in which *nama* and *name* exist side by side, and another in which final *e* [with other endings] is beginning to drop." By *lost* inflections it is meant that only very few remain, and those mostly non-syllabic, as the *-s* in stones and loves, the *-ed* in lov*ed*, the *-r* in thei*r*, as contrasted with the Old English stán-*as*, lufað, luf-*od-e* and luf-*od-on*, *þá-ra*. Each of these periods may also be divided into two or three; but from the want of materials it is difficult to make any such division for all dialects alike in the first.

As to the chronology of the successive stages, it is of course impossible to lay down any exclusive series of dates, since the linguistic changes were inevitably gradual, and also made themselves felt in some parts of the country much earlier than in others, the north being always in advance of the midland, and the south much later in its changes. It is easy to point to periods at which Old, Middle and Modern English were fully developed, but much less easy to draw lines separating these stages; and even if we recognize between each part a "transition" period or stage, the determination of the beginning and end of this will to a certain extent be a matter of opinion. But bearing these considerations in mind, and having special reference to the midland dialect from which literary English is mainly descended, the following may be given as approximate dates, which if they do not demarcate the successive stages, at least include them:—

Old English or Anglo-Saxon . . .	to 1100
Transition Old English ("Semi-Saxon") .	1100 to 1150
Early Middle English	1150 to 1250
(Normal) Middle English	1250 to 1400
Late and Transition Middle English . .	1400 to 1485
Early Modern or Tudor English . . .	1485 to 1611
Seventeenth century transition . . .	1611 to 1688
Modern or current English	1689 onward

Dr Sweet has reckoned Transition Old English (Old Transition) from 1050 to 1150, Middle English thence to 1450, and Late or Transition Middle English (Middle Transition) 1450 to 1500. As to the Old Transition see further below.

The OLD ENGLISH or Anglo-Saxon tongue, as introduced into Britain, was highly inflectional, though its inflections at the date when it becomes known to us were not so full as those of the earlier Gothic, and considerably less so than those of Greek and Latin during their classical periods. They corresponded more closely to those of modern literary German, though both in nouns and verbs the forms were more numerous and distinct; for example, the German *guten* answers to *three* Old English forms,—*gódne, gódum, gódan*; *guter* to *two*—*gódre, gódra*; *liebten* to *two*,—*lufodon* and *lufeden*. Nouns had four cases, *Nominative*, *Accusative* (only sometimes distinct), *Genitive*, *Dative*, the latter used also with prepositions to express locative, instrumental, and most ablative relations; of a distinct *instrumental* case only vestiges occur. There were several declensions of nouns, the main division being that known in Germanic languages generally as strong and weak,—a distinction also extending to adjectives in such wise that every adjective assumed either the strong or the weak inflection as determined by associated grammatical forms. The first and second personal pronouns possessed a dual number = *we two, ye two*; the third person had a complete declension of the stem *he*, instead of being made up as now of the three stems seen in *he, she, they*. The verb distinguished the subjunctive from the indicative mood, but had only two inflected tenses, present and past (more accurately, that of incomplete and that of completed or "perfect" action)—the former also used for the future, the latter for all the shades of past time. The order of the sentence corresponded generally to that of German. Thus from King Alfred's additions to his translation of Orosius: "Donne þy ylcan dæge hi hine to þæm ade beran wyllað þonne todælað hi his feoh þaet þæt to lafe bið æfter þæm gedrynce and þæm plegan, on fif oððe syx, hwilum on ma, swa swa þaes feos andefn bið" ("Then on the same day [that] they him to the pile bear will, then divide they his property that there to remainder shall be after the drinking and the sports, into five or six, at times into more, according as the property's value is").

The poetry was distinguished by alliteration, and the abundant use of figurative and metaphorical expressions, of bold compounds and archaic words never found in prose. Thus in the following lines from Beowulf (ed. Thorpe, l. 645, Zupitza 320):—

*St*ræt wæs *st*án-fáh, *st*ig wisode
*G*umum ætgædere. *g*úð-byrne scán
*H*eard *h*ond-locen. *h*ring-iren scir
*S*ong in *s*earwum, þa hie to *s*ele furðum
*I*n hyra gry're geatwum gangan cwomon.

Trans.:—

The street was stone-variegated, the path guided
(The) men together; the war-mailcoat shone,
Hard hand-locked. Ring-iron sheer (bright ring-mail)
Sang in (their) cunning-trappings, as they to hall forth
In their horror-accoutrements going came.

The Old English was a homogeneous language, having very few foreign elements in it, and forming its compounds and derivatives entirely from its own resources. A few Latin appellatives learned from the Romans in the German wars had been adopted into the common West Germanic tongue, and are found in English as in the allied dialects. Such were *stræte* (street, *via strata*), *camp* (battle), *cásere* (Cæsar), *míl* (mile), *pín* (punishment), *mynet* (money), *pund* (pound), *wín* (wine); probably also *cyrice* (church), *biscop* (bishop), *læden* (Latin language), *cése* (cheese), *butor* (butter), *pipor* (pepper), *olfend* (camel, *elephantus*), *ynce* (inch, *uncia*), and a few others. The relations of the first invaders to the Britons were to a great extent those of destroyers; and with the exception of the proper names of places and prominent natural features, which as is usual were retained by the new population, few British words found their way into the Old English. Among these are named *broc* (a badger), *bréc* (breeches), *clút* (clout), *púl* (pool), and a few words relating to the employment of field or household menials. Still fewer words seem to have been adopted from the provincial Latin, almost the only certain ones being *castra*, applied to the Roman towns, which appeared in English as *cæstre, ceaster*, now found in composition as *-caster, -chester, -cester*, and *culina* (kitchen), which gave *cylen* (kiln). The introduction and gradual adoption of Christianity, brought a new series of Latin words connected with the offices of the church, the accompaniments of higher civilization, the foreign productions either actually made known, or mentioned in the Scriptures and devotional books. Such were *mynster* (monasterium), *munuc* (monk), *nunne* (nun), *maesse* (mass), *scol* (school), *ælmesse* (eleemosyna), *candel* (candela), *turtle* (turtur), *fic* (ficus), *cedar* (cedrus). These words, whose number increased from the 7th to the 10th century, are commonly called *Latin of the second period*, the Latin of the first period including the Latin words brought by the English from the continent, as well as those picked up in Britain either from the Roman provincials or the Welsh. The Danish invasions of the 8th and 10th centuries resulted in the establishment of extensive Danish and Norwegian populations, about the basin of the Humber and its tributaries, and above Morecambe Bay. Although these Scandinavian settlers must have greatly affected the language of their own localities, but few traces of their influence are to be found in the literature of the Old English period. As with the greater part of the words adopted from the Celtic, it was not until after the dominion of the Norman had overlaid all preceding conquests, and the new English began to emerge from the ruins of the old, that Danish words in any number made their appearance in books, as equally "native" with the Anglo-Saxon.

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[1] Æthelstan in 934 calls himself in a charter "Ongol-Saxna cyning and Brytaenwalda eallaes thyses iglandes"; Eadred in 955 is "Angul-seaxna cyning and cásere totius Britanniae," and the name is of frequent occurrence in documents written in Latin. These facts ought to be remembered in the interest of the scholars of the 17th century, who have been blamed for the use of the term Anglo-Saxon, as if they had invented it. By "Anglo-Saxon" language they meant the language of the people who *sometimes at least* called themselves "Anglo-Saxons." Even now the name is practically useful, when we are dealing with the subject *per se*, as is *Old English*, on the other hand, when we are treating it historically or in connexion with English as a whole.

[2] *Transactions of the Philological Society* (1873–1874), p. 620; new and much enlarged edition, 1888.

The earliest specimens we have of English date to the end of the 7th century, and belong to the Anglian dialect, and particularly to Northumbrian, which, under the political eminence of the early Northumbrian kings from Edwin to Ecgfrið, aided perhaps by the learning of the scholars of Ireland and Iona, first attained to literary distinction. Of this literature in its original form mere fragments exist, one of the most interesting of which consists of the verses uttered by Bede on his deathbed, and preserved in a nearly contemporary MS.:—

> Fore there neid faerae . naenig uuiurthit
> thonc snotturra . than him tharf sie,
> to ymb-hycggannae . aer his hin-iongae,
> huaet his gastae . godaes aeththa yflaes,
> aefter deoth-daege . doemid uueorthae.

Trans.:—

> Before the inevitable journey becomes not any
> Thought more wise than (that) it is needful for him,
> To consider, ere his hence-going,
> What, to his ghost, of good or ill,
> After death-day, doomed may be.

But our chief acquaintance with Old English is in its West-Saxon form, the earliest literary remains of which date to the 9th century, when under the political supremacy of Wessex and the scholarship of King Alfred it became the literary language of the English nation, the classical "Anglo-Saxon." If our materials were more extensive, it would probably be necessary to divide the Old English into several periods; as it is, considerable differences have been shown to exist between the "early West-Saxon" of King Alfred and the later language of the 11th century, the earlier language having numerous phonetic and inflectional distinctions which are "levelled" in the later, the inflectional changes showing that the tendency to pass from the synthetical to the analytical stage existed quite independently of the Norman Conquest. The northern dialect, whose literary career had been cut short in the 8th century by the Danish invasions, reappears in the 10th in the form of glosses to the Latin gospels and a service-book, often called the *Ritual of Durham*, where we find that, owing to the confusion which had so long reigned in the north, and to special Northumbrian tendencies, *e.g.* the dropping of the inflectional *n* in both verbs and nouns, this dialect had advanced in the process of inflection-levelling far beyond the sister dialects of Mercian and the south, so as already to anticipate the forms of Early Middle English.

Among the literary remains of the Old English may be mentioned the epic poem of Beowulf, the original nucleus of which has been supposed to date to heathen and even continental times, though we now possess it only in a later form; the poetical works of Cynewulf; those formerly ascribed to Cædmon; several works of Alfred, two of which, his translation of Orosius and of *The Pastoral Care* of St Gregory, are contemporary specimens of his language; the Old English or Anglo-Saxon Chronicle; the theological works of Ælfric (including translations of the Pentateuch and the gospels) and of Wulfstan; and many works both in prose and verse, of which the authors are unknown.

The earliest specimens, the inscriptions on the Ruthwell and Bewcastle crosses, are in a Runic character; but the letters used in the manuscripts generally are a British variety of the Roman alphabet which the Anglo-Saxons found in the island, and which was also used by the Welsh and Irish.[1] Several of the Roman letters had in Britain developed forms, and retained or acquired values, unlike those used on the continent, in particular ꝺ ꝼ ᵹ ꞃ ꞅ ꞇ (d f g r s t). The letters *q* and *z* were not used, *q* being represented by *cw*, and *k* was a rare alternative to *c*; *u* or *v* was only a vowel, the consonantal power of *v* being represented as in Welsh by *f*. The Runes called *thorn* and *wén*, having the consonantal values now expressed by *th* and *w*, for which the Roman alphabet had no character, were at first expressed by *th*, ð (a contraction for ꝺꝺ or ꝺh), and *u* or *uu*; but at a later period the characters þ and ƿ were revived from the old Runic alphabet. Contrary to Continental usage, the letters *c* and ᵹ (*g*) had originally only their hard or guttural powers, as in the neighbouring Celtic languages; so that words which, when the Continental Roman alphabet came to be used for Germanic languages, had to be written with *k*, were in Old English written with *c*, as *céne*=keen, *cynd*=kind.[2] The key to the values of the letters, and thus to the pronunciation of Old English, is also to be found in the Celtic tongues whence the letters were taken.

The Old English period is usually considered as terminating 1120, with the death of the generation who saw the Norman Conquest. The Conquest established in England a foreign court, a foreign aristocracy and a foreign hierarchy.[3] The French language, in its Norman dialect, became the only polite medium of intercourse. The native tongue, despised not only as unknown but as the language of a subject race, was left to the use of boors and serfs, and except in a few stray cases ceased to be written at all. The natural results followed.[4] When the educated generation that saw the arrival of the Norman died out, the language, ceasing to be read and written, lost all its literary words. The words of ordinary life whose preservation is independent of books lived on as vigorously as ever, but the literary terms, those that related to science, art and higher culture, the bold artistic compounds, the figurative terms of poetry, were speedily forgotten. The practical vocabulary shrank to a fraction of its former extent. And when, generations later, English began to be used for general literature, the only terms at hand to express ideas above those of every-day life were to be found in the French of the privileged classes, of whom alone art, science, law and theology had been for generations the inheritance. Hence each successive literary effort of the reviving English tongue showed a larger adoption of French words to supply the place of the forgotten native ones, till by the days of Chaucer they constituted a notable part of the vocabulary. Nor was it for the time being only that the French words affected the English vocabulary. The Norman French words introduced by the Conquest, as well as the Central or Parisian French words which followed under the early Plantagenets, were mainly Latin words which had lived on among the people of Gaul, and, modified in the mouths of succeeding generations, had reached forms more or less remote from their originals. In being now adopted as English, they supplied precedents in accordance with which other Latin words might be converted into English ones, whenever required; and long before the Renascence of classical learning, though in much greater numbers after that epoch, these precedents were freely followed.

While the eventual though distant result of the Norman Conquest was thus a large reconstruction of the English vocabulary, the grammar of the language was not directly affected by it. There was no reason why it should—we might almost add, no way by which it could. While the English used their own *words*, they could not forget their own *way* of using them, the inflections and constructions by which alone the words expressed ideas—in other words, their grammar; when one by one French words were introduced into the sentence they became English by the very act of admission, and were at once subjected to all the duties and liabilities of English words in the same position. This is of course precisely what happens at the present day: *telegraph* and *telegram* make participle *telegraphing* and plural *telegrams*, and *naïve* the adverb *naïvely*, precisely as if they had been in the language for ages.

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[1] See on this Rhys, *Lectures on Welsh Philology*, v.

[2] During the Old English period both *c* and ᵹ appear to have acquired a palatal value in conjunction with front or palatal vowel-sounds, except in the north where *c*, and in some cases ᵹ, tended to remain guttural in such positions. This value was never distinguished in Old English writing, but may be deduced from certain phonetic changes depending upon it, and from the use of *c*, *cc*, as an alternative for *tj* (as in *ortᵹeard*, *orceard*=orchard, *fetian*, *feccean*=fetch), as well as from the normal occurrence of *ch* and *y* in these positions in later stages of the language, *e.g.* *cild*=child, *tæcean*=teach, ᵹ*iellan*=yell, *dæ*ᵹ=day, &c.

[3] For a discriminating view of the effects of the Norman Conquest on the English Language, see Freeman, *Norman Conquest*, ch. xxv.

[4] There is no reason to suppose that any attempt was made to proscribe or suppress the native tongue, which was indeed used in some official documents addressed to Englishmen by the Conqueror himself. Its social degradation seemed even on the point of coming to an end, when it was confirmed and prolonged for two centuries more by the accession of the Angevin dynasty, under whose everything French received a fresh impetus.

But indirectly the grammar was affected very quickly. In languages in the inflected or synthetic stage the terminations must be pronounced with marked distinctness, as these contain the correlation of ideas; it is all-important to hear whether a word is *bonus* or *bonis* or *bonas* or *bonos*. This implies a measured and distinct pronunciation, against which the effort for ease and rapidity of utterance is continually struggling, while indolence and carelessness continually compromise it. In the Germanic languages, as a whole, the main stress-accent falls on the radical syllable, or on the prefix of a nominal compound, and thus at or near the beginning of the word; and the result of this in English has been a growing tendency to suffer the concluding syllables to fall into obscurity. We are familiar with the cockney *winder*, *sofer*, *holler*, *Sarer*, *Sunder*, *would yer*, for wind*ow*, sof*a*, holl*o*, Sar*ah*, Sund*ay*, would *you*, the various final vowels sinking into an obscure neutral one now conventionally spelt *er*, but formerly represented by final *e*. Already before the Conquest, forms originally *kalu*, *sello*, *tunga*, appeared as *kale*, *selle*, *tunge*, with the terminations levelled to obscure *ĕ*; but during the illiterate period of the language after the Conquest this careless obscuring of terminal vowels became universal, all unaccented vowels in the final syllable (except *i*) sinking into *e*. During the 12th century, while this change was going on, we see a great confusion of grammatical forms, the full inflections of Old English standing side by side in the same sentence with the levelled ones of Middle English. It is to this state of the language that the names *Transition* and *Period of Confusion* (Dr Abbott's appellation) point; its appearance, as that of Anglo-Saxon broken down in its endings, had previously given to it the suggestive if not logical appellation of Semi-Saxon.

Although the written remains of the transition stage are few, sufficient exist to enable us to trace the course of linguistic change in some of the dialects. Within three generations after the Conquest, faithful pens were at work transliterating the old homilies of Ælfric, and other lights of the Anglo-Saxon Church, into the current idiom of their posterity.[1] Twice during the period, in the reigns of Stephen and Henry II., Ælfric's gospels were similarly modernized so as to be "understanded of the people."[2] Homilies and other religious works of the end of the 12th century[3] show us the change still further advanced, and the language passing into Early Middle English in its southern form. While these southern remains carry on in unbroken sequence the history of the Old English of Alfred and Ælfric, the history of the northern English is an entire blank from the 11th to the 13th century. The stubborn resistance of the north, and the terrible retaliation inflicted by William, apparently effaced northern English culture for centuries. If anything was written in the vernacular in the kingdom of Scotland during the same period, it probably perished during the calamities to which that country was subjected during the half-century of struggle for independence. In reality, however, the northern English had entered upon its transition stage two centuries earlier; the glosses of the 10th century show that the Danish inroads had there anticipated the results hastened by the Norman Conquest in the south.

Meanwhile a dialect was making its appearance in another quarter of England, destined to overshadow the old literary dialects of north and south alike, and become the English of the future. The Mercian kingdom, which, as its name imports, lay along the *marches* of the earlier states, and was really a congeries of the outlying members of many tribes, must have presented from the beginning a linguistic mixture and transition; and it is evident that more than one intermediate form of speech arose within its confines, between Lancashire and the Thames. The specimens of early Mercian now in existence consist mainly of glosses, in a mixed Mercian and southern dialect, dating from the 8th century; but, in a 9th-century gloss, the so-called Vespasian Psalter, representing what is generally held to be pure Mercian. Towards the close of the Old English period we find some portions of a gloss to the Rushworth Gospels, namely St Matthew and a few verses of St John xviii., to be in Mercian. These glosses, with a few charters and one or two small fragments, represent a form of Anglian which in many respects stands midway between Northumbrian and Kentish, approaching the one or the other more nearly as we have to do with North Mercian or South Mercian. And soon after the Conquest we find an undoubted midland dialect in the transition stage from Old to Middle English, in the eastern part of ancient Mercia, in a district bounded on the south and south-east by the Saxon Middlesex and Essex, and on the east and north by the East Anglian Norfolk and Suffolk and the Danish settlements on the Trent and Humber. In this district, and in the monastery of Peterborough, one of the copies of the Anglo-Saxon Chronicle, transcribed about 1120, was continued by two succeeding hands to the death of Stephen in 1154. The section from 1122 to 1131, probably written in the latter year, shows a notable confusion between Old English forms and those of a Middle English, impatient to rid itself of the inflectional trammels which were still, though in weakened forms, so faithfully retained south of the Thames. And in the concluding section, containing the annals from 1132 to 1154, and written somewhere about the latter year, we find Middle English fairly started on its career. A specimen of this new tongue will best show the change that had taken place:

1140 A.D.—*And*[4] te eorl of Angæu wærd ded, and his sune Henri toc to þe rice. And te cuen of France to-dælde fra þe king, and scæ co*m* to þe iunge eorl Henri. *and* he toc hire to wiue, *and* al Peitou mid hire. Þa ferde he mid micel færd into Engleland *and* wan castles—*and* te king ferde agenes hi*m* mid micel mare ferd. Þoþwæthere fuhtten hi noht. oc ferden þe ærcebi*scop* *and* te wise men betwux heo*m*, and makede *that* sahte *that* te king sculde ben lauerd *and* king wile he liuede. *and* æf*ter* his dæi ware Henri king. *and* he helde hi*m* for fader, *and* he hi*m* for sune, *and* sib *and* sæhte sculde ben betwyx heo*m*, and on al Engleland.[5]

With this may be contrasted a specimen of southern English, from 10 to 20 years later (Hatton Gospels, Luke i. 46[6]):

Ða cwæð Maria: Min saulé mersed drihten, and min gast geblissode on gode minen hælende. For þam þe he geseah his þinene eadmodnysse. Soðlice heonen-forð me eadige seggeð alle cneornesse; for þam þe me mychele þing dyde se þe mihtyg ys; *and* his name is halig. *And* his mildheortnysse of cneornisse on cneornesse hine ondraedende. He worhte maegne on hys earme; he to-daelde þa ofermode, on moda heora heortan. He warp þa rice of setlle, and þa eadmode he up-an-hof. Hyngriende he mid gode ge-felde, *and* þa ofermode ydele for-let. He afeng israel his cniht, and gemynde his mildheortnysse; Swa he spræc to ure fæderen, Abrahame *and* his sæde on a weorlde.

To a still later date, apparently close upon 1200, belongs the versified chronicle of Layamon or Laweman, a priest of Ernely on the Severn, who, using as his basis the French *Brut* of Wace, expanded it by additions from other sources to more than twice the extent: his work of 32,250 lines is a mine of illustration for the language of his time and locality. The latter was intermediate between midland and southern, and the language, though forty years later than the specimen from the Chronicle, is much more archaic in structure, and can scarcely be considered even as Early Middle English. The following is a specimen (lines 9064–9079):

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[1] MS. Cotton Vesp. A. 22.

[2] Gospels in Anglo-Saxon, &c., ed. for Cambridge Press, by W. W. Skeat (1871–1887), second text.

[3] *Old English Homilies of Twelfth Century*, first and second series, ed. R. Morris (E.E.T.S.), (1868–1873).

[4] The article *þe* becomes *te* after a preceding *t* or *d* by assimilation.

[5] Earle, *Two of the Saxon Chronicles parallel* (1865), p. 265.

[6] Skeat, *Anglo-Saxon and Northumbrian Gospels* (1874).

On Kinbelines dacie . . . Þe king wes inne Bruttene, com a þissen middel aerde . . . anes maidenes sune, iboren wes in Beþleem . . . of bezste alre burden. He is ihaten Jesu Crist . . . þurh þene halie gost, alre woruldc wunne . . . walden englenne; faeder he is on heuenen . . . froure moncunnes; sune he is on eorðen . . . of sclc þon maeidene, & þene halie gost . . . haldeð mid him seoluen.

The Middle English was pre-eminently the *Dialectal* period of the language. It was not till after the middle of the 14th century that English obtained official recognition. For three centuries, therefore, there was no standard form of speech which claimed any pre-eminence over the others. The writers of each district wrote in the dialect familar to them; and between extreme forms the difference was so great as to amount to unintelligibility; works written for southern Englishmen had to be translated for the benefit of the men of the north:—

> " In sotherin Inglis was it drawin,
> And turnid ic haue it till ur awin
> Langage of þe northin lede
> That can na nothir Inglis rede."
>
> *Cursor Mundi*, 20,064.

Three main dialects were distinguished by contemporary writers, as in the often-quoted passage from Trevisa's translation of Higden's *Polychronicon* completed in 1387:—

> " Also Englysche men . . . hadde fram þe bygynnynge þre maner speche, Souþeron, Norþeron *and* Myddel speche (in þe myddel of þe lond) as hy come of þre maner people of Germania. . . . Also of þe forseyde Saxon tonge, þat ys deled a þre, *and* ys abyde scarslyche wiþ feaw uplondysche men *and* ys gret wondur, for men of þe est wiþ men of þe west, as hyt were under þe same part of heyvene, acordeþ more in sounynge of speche þan men of þe norþ wiþ men of þe souþ; þerfore hyt ys þat Mercii, þat buþ men of myddel Engelond, as hyt were parteners of þe endes, undurstondeþ betre þe syde longages Norþeron and Souþeron, þan Norþern *and* Souþern undurstondeþ oyþer oþer."

The modern study of these Middle English dialects, initiated by the elder Richard Garnett, scientifically pursued by Dr Richard Morris, and elaborated by many later scholars, both English and German, has shown that they were readily distinguished by the conjugation of the present tense of the verb, which in typical specimens was as follows:—

Southern.

Ich singe.	We singeþ.
Þou singest.	ȝe singeþ.
He singeþ.	Hy singeþ.

Midland.

Ich, I, singe.	We singen.
Þou singest.	ȝe singen.
He singeþ.	Hy, thei, singen.

Northern.

Ic, I, sing(e) (I þat singes).	We sing(e), We þat synges.
Þu singes.	ȝe sing(e), ȝe foules synges.
He singes.	Thay sing(e), Men synges.

Of these the southern is simply the old West-Saxon, with the vowels levelled to *e*. The northern second person in *-es* preserves an older form than the southern and West-Saxon *-est*; but the *-es* of the third person and plural is derived from an older *-eth*, the change of *-th* into *-s* being found in progress in the Durham glosses of the 10th century. In the plural, when accompanied by the pronoun subject, the verb had already dropped the inflections entirely as in Modern English. The origin of the *-en* plural in the midland dialect, unknown to Old English, is probably an instance of *form-levelling*, the inflection of the present indicative being assimilated to that of the past, and the present and past subjunctive, in all of which *-en* was the plural termination. In the declension of nouns, adjectives and pronouns, the northern dialect had attained before the end of the 13th century to the simplicity of Modern English, while the southern dialect still retained a large number of inflections, and the midland a considerable number. The dialects differed also in phonology, for while the northern generally retained the hard or guttural values of *k*, *g*, *sc*, these were in the two other dialects palatalized before front vowels into *ch*, *j* and *sh*. *Kirk*, *chirche* or *church*, *bryg*, *bridge; scryke*, *shriek*, are examples. Old English *hw* was written in the north *qu*(h), but elsewhere *wh*, often sinking into *w*. The original long *á* in *stán*, *már*, preserved in the northern *stane*, *mare*, became *ó* elsewhere, as in *stone*, *more*. So that the north presented a general aspect of conservation of old sounds with the most thorough-going dissolution of old inflections; the south, a tenacious retention of the inflections, with an extensive evolution in the sounds. In one important respect, however, phonetic decay was far ahead in the north: the final *e* to which all the old vowels had been levelled during the transition stage, and which is a distinguishing feature of Middle English in the midland and southern dialects, became mute, *i.e.*, disappeared, in the northern dialect before that dialect emerged from its three centuries of obscuration, shortly before 1300. So thoroughly modern had its form consequently become that we might almost call it Modern English, and say that the Middle English stage of the northern dialect is lost. For comparison with the other dialects, however, the same nomenclature may be used, and we may class as Middle English the extensive literature which northern England produced during the 14th century. The earliest specimen is probably the Metrical Psalter in the Cotton Library,[1] copied during the reign of Edward II. from an original of the previous century. The gigantic versified paraphrase of Scripture history called the *Cursor Mundi*,[2] is held also to have been composed before 1300. The dates of the numerous alliterative romances in this dialect have not been determined with exactness, as all survive in later copies, but it is probable that some of them were written before 1300. In the 14th century appeared the theological and devotional works of Richard Rolle the anchorite of Hampole, Dan Jon Gaytrigg, William of Nassington, and other writers whose names are unknown; and towards the close of the century, specimens of the language also appear from Scotland both in official documents and in the poetical works of John Barbour, whose language, barring minute points of orthography, is identical with that of the contemporary northern English writers. From 1400 onward, the distinction between northern English and Lowland Scottish becomes clearly marked.

In the southern dialect one version of the work called the *Ancren Riwle* or " Rule of Nuns," adapted about 1225 for a small sisterhood at Tarrant-Kaines, in Dorsetshire, exhibits a dialectal characteristic which had probably long prevailed in the south, though concealed by the spelling, in the use of *v* for *f*, as *valle* fall, *vordonne* fordo, *vorto* for to, *veder* father, *vrom* from. Not till later do we find a recognition of the parallel use of *z* for *s*. Among the writings which succeed, *The Owl and the Nightingale* of Nicholas de Guildford, of Portesham in Dorsetshire, before 1250, the *Chronicle* of Robert of Gloucester, 1298, and Trevisa's translation of Higden, 1387, are of special importance in illustrating the history of southern English. The earliest form of Langland's *Piers Ploughman*, 1362, as preserved in the Vernon MS., appears to be in an intermediate dialect between southern and midland.[3] The Kentish form of southern English seems to have retained specially archaic features; five short sermons in it of the middle of the 13th century were edited by Dr Morris (1866); but the great work illustrating it is the *Ayenbite of Inwyt* (Remorse of Conscience), 1340,[4] a translation from the French by Dan Michel of Northgate, Kent, who tells us—

> " Þet þis boc is y-write mid englis of Kent;
> Þis boc is y-mad uor lewede men,
> Vor uader, and uor moder, and uor oþer ken,
> Ham uor to berȝe uram alle manyere zen,
> Þet ine hare inwytte ne bleue no uoul wen."

In its use of *v* (*u*) and *z* for *f* and *s*, and its grammatical inflections, it presents an extreme type of southern speech, with peculiarities specially Kentish; and in comparison with contemporary Midland English works, it looks like a fossil of two centuries earlier.

Turning from the dialectal extremes of the Middle English to the midland speech, which we left at the closing leaves of the

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[1] Edited for the Surtees Society, by Rev. J. Stevenson.

[2] Edited for the Early English Text Society, by Rev. Dr Morris.

[3] *The Vision of William concerning Piers the Ploughman* exists in three different recensions, all of which have been edited for the Early English Text Society by Rev. W. W. Skeat.

[4] Edited by Rev. Dr Morris for Early English Text Society, in 1866.

Peterborough *Chronicle* of 1154, we find a rapid development of this dialect, which was before long to become the national literary language. In this, the first great work is the *Ormulum*, or metrical Scripture paraphrase of Orm or Ormin, written about 1200, somewhere near the northern frontier of the midland area. The dialect has a decided smack of the north, and shows for the first time in English literature a large percentage of Scandinavian words, derived from the Danish settlers, who, in adopting English, had preserved a vast number of their ancestral forms of speech, which were in time to pass into the common language, of which they now constitute some of the most familiar words. *Blunt*, *bull*, *die*, *dwell*, *ill*, *kid*, *raise*, *same*, *thrive*, *wand*, *wing*, are words from this source, which appear first in the work of Orm, of which the following lines may be quoted:—

"Þe Judewisshe folkess boc
hemm seȝȝde, þatt hemm birrde
Twa bukkes samenn to þe preost
att kirrke-dure brinngenn;
And teȝȝ þa didenn bliþeliȝ,
swa summ þe boc hemm tahhte,
And brohhtenn tweȝȝenn bukkess þær
Drihhtin þærwiþþ to lakenn.
And att[1] te kirrke-dure toc
þe preost ta tweȝȝenn bukkess,
And o þatt an he leȝȝde þær
all þeȝȝre sake *and* sinne,
And lét itt eornenn forþwiþþ all
út inntill wilde wesste;
And toc *and* snaþ þatt oþerr bucc
Drihhtin þærwiþþ to lakenn.
All þiss wass don forr here ned,
and ec forr ure nede;
For hemm itt hallp biforenn Godd
to clennsenn hemm of sinne;
And all swa maȝȝ itt hellpenn þe
ȝiff þatt tu willt [itt] follȝhenn.
ȝiff þatt tu willt full innwarrdliȝ
wiþþ fulle trowwþe lefenn
All þatt tatt wass bitacnedd tær,
to lefenn *and* to trowwenn."

Ormulum, ed. White, l. 1324.

The author of the *Ormulum* was a phonetist, and employed a special spelling of his own to represent not only the quality but the *quantities* of vowels and consonants—a circumstance which gives his work a peculiar value to the investigator. He is generally assumed to have been a native of Lincolnshire or Notts, but the point is a disputed one, and there is somewhat to be said for the neighbourhood of Ormskirk in Lancashire.

It is customary to differentiate between east and west midland, and to subdivide these again into north and south. As was natural in a tract of country which stretched from Lancaster to Essex, a very considerable variety is found in the documents which agree in presenting the leading midland features, those of Lancashire and Lincolnshire approaching the northern dialect both in vocabulary, phonetic character and greater neglect of inflections. But this diversity diminishes as we advance.

Thirty years after the *Ormulum*, the east midland rhymed *Story of Genesis and Exodus*[2] shows us the dialect in a more southern form, with the vowels of modern English, and from about the same date, with rather more northern characteristics, we have an east midland *Bestiary*.

Different tests and different dates have been proposed for subdividing the Middle English period, but the most important is that of Henry Nicol, based on the observation that in the early 13th century, as in Ormin, the Old English short vowels in an open syllable still retained their short quantity, as *năma*, *ŏver*, *mĕle*; but by 1250 or 1260 they had been lengthened to *nā-me*, *ō-ver*, *mē-le*, a change which has also taken place at a particular period in all the Germanic, and even the Romanic languages, as in *buō-no* for *bŏ-num*, *pā-dre* for *pă-trem*, &c. The lengthening of the penult left the final syllable by contrast shortened or weakened, and paved the way for the disappearance of final *e* in the century following, through the stages *nā-me*, *nā-mĕ*, *nā-m'*, *nām*, the one long syllable in *nām(e)* being the quantitative equivalent of the two short syllables in *nă-mĕ*; hence the notion that mute *e* makes a preceding vowel long, the truth being that the lengthening of the vowel led to the *e* becoming mute.

After 1250 we have the *Lay of Havelok*, and about 1300 the writings of Robert of Brunne in South Lincolnshire. In the 14th century we find a number of texts belonging to the western part of the district. South-west midland is hardly to be distinguished from southern in its south-western form, and hence texts like *Piers Plowman* elude any satisfactory classification, but several metrical romances exhibit what are generally considered to be west midland characteristics, and a little group of poems, *Sir Gawayne and the Grene Knighte*, the *Pearl*, *Cleanness* and *Patience*, thought to be the work of a north-west midland writer of the 14th century, bear a striking resemblance to the modern Lancashire dialect. The end of the century witnessed the prose of Wycliff and Mandeville, and the poetry of Chaucer, with whom Middle English may be said to have culminated, and in whose writings its main characteristics as distinct from Old and Modern English may be studied. Thus, we find final *e* in full use representing numerous original vowels and terminations as

Him thoughtè that his hertè woldè brekè,

in Old English—

Him þuhte þæt his heorte wolde brecan,

which may be compared with the modern German—

Ihm däuchte dass sein Herze wollte brechen.

In nouns the *-es* of the plural and genitive case is still syllabic—

Reede as the berstl-es of a sow-es eer-es.

Several old genitives and plural forms continued to exist, and the dative or prepositional case has usually a final *e*. Adjectives retain so much of the old declension as to have *-e* in the definite form and in the plural—

The tend-re cropp-es and the yong-e sonne.
And smal-e fowl-es maken melodie.

Numerous old forms of comparison were in use, which have not come down to Modern English, as *herre*, *ferre*, *lenger*, *hext* = higher, farther, longer, highest. In the pronouns, *ich* lingered alongside of *I*; *ye* was only nominative, and *you* objective; the northern *thei* had dispossessed the southern *hy*, but *her* and *hem* (the modern *'em*) stood their ground against *their* and *them*. The verb is *I lov-e*, *thou lov-est*, *he lov-eth*; but, in the plural, *lov-en* is interchanged with *lov-e*, as rhyme or euphony requires. So in the plural of the past *we love-den* or *love-de*. The infinitive also ends in *en*, often *e*, always syllabic. The present participle, in Old English *-ende*, passing through *-inde*, has been confounded with the verbal noun in *-ynge*, *-yng*, as in Modern English. The past participle largely retains the prefix *y-* or *i-*, representing the Old English *ge-*, as in *i-ronne*, *y-don*, Old English *zerunnen*, *zedón*, run, done. Many old verb forms still continued in existence. The adoption of French words, not only those of Norman introduction, but those subsequently introduced under the Angevin kings, to supply obsolete and obsolescent English ones, which had kept pace with the growth of literature since the beginning of the Middle English period, had now reached its climax; later times added many more, but they also dropped some that were in regular use with Chaucer and his contemporaries.

Chaucer's great contemporary, William Langland, in his *Vision of William concerning Piers the Ploughman*, and his imitator the author of *Pierce the Ploughman's Crede* (about 1400) used the Old English alliterative versification for the last time in the south. Rhyme had made its appearance in the language shortly after the Conquest—if not already known before; and in the south and midlands it became decidedly more popular than alliteration; the latter retained its hold much longer in the north, where it was written even after 1500: many of the northern romances are either simply alliterative, or have both alliteration and rhyme. To these characteristics of northern and southern verse respectively Chaucer alludes in the prologue of the "Persone," who, when called upon for his tale said:—

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[1] Here, and in *tatt*, *tu*, *taer*, for þatt, þu, þaet, after *t*, *d*, there is the same phonetic assimilation as in the last section of the Anglo-Saxon Chronicle above.

[2] Edited for the Early English Text Society by Dr Morris (1865).

"But trusteth wel; I am a sotherne man,
I cannot geste *rom*, *ram*, *ruf*, by my letter,
And, God wote, rime hold I but litel better:
And therefore, if you list, I wol not glose,
I wol you tell a litel tale in prose."

The changes from Old to Middle English may be summed up thus: Loss of a large part of the native vocabulary, and adoption of French words to fill their place; not infrequent adoption of French words as synonyms of existing native ones; modernization of the English words preserved, by vowel change in a definite direction from back to front, and from open to close, *ā* becoming *ǭ*, original *ē*, *ō*, tending to *ee*, *oo*, monophthongization of the old diphthongs *eo*, *ea*, and development of new diphthongs in connexion with *g*, *h*, and *w*; adoption of French orthographic symbols, *e.g.* *ou* for *ū*, *qu*, *v*, *ch*, and gradual loss of the symbols ȝ, þ, ð, ƿ; obscuration of vowels after the accent, and especially of final *a*, *o*, *u* to *ĕ*; consequent confusion and loss of old inflections, and their replacement by prepositions, auxiliary verbs and rules of position; abandonment of alliteration for rhyme; and great development of dialects, in consequence of there being no standard or recognized type of English.

But the recognition came at length. Already in 1258 was issued the celebrated English proclamation of Henry III., or rather of Simon de Montfort in his name, which, as the only public recognition of the native tongue between William the Conqueror and Edward III., has sometimes been spoken of as the first specimen of English. It runs:—

"Henri þurȝ godes fultume king on Engleneloande Lhoauerd on Yrloande. Duk on Normandie on Aquitaine and eorl on Aniow. Send igretinge to alle hise holde ilærde and ileawede on Huntendoneschire. þæt witen ȝe wel alle þæt we willen and vnnen þæt þæt vre rædesmen alle oþer þe moare dæl of heom þæt beoþ ichosen þurȝ us and þurȝ þæt loandes folk on vre kuneriche. habbeþ idon and schullen don in þe worþnesse of gode and on vre treowþe. for þe freme of þe loande. þurȝ þe besiȝte of þan to-foren-iseide redesmen. beo stedefæst and ilestinde in alle þinge a buten ænde. And we hoaten alle vre treowe in þe treowþe þæt heo vs oȝen. þæt heo stedefæstliche healden and swerien to healden and to werien þo isetnesses þæt ben imakede and beon to makien þurȝ þan to-foren iseide rædesmen. oþer þurȝ þe moare dæl of heom alswo alse hit is biforen iseid. And þæt æhc oþer helpe þæt for to done bi þan ilche oþe aȝenes alle men. Riȝt for to done and to foangen. And noan ne nime of loande ne of eȝte. wherþurȝ þis besiȝte muȝe beon ilet oþer iwersed on onie wise. And ȝif oni oþer onie cumen her onȝenes; we willen and hoaten þæt alle vre treowe heom healden deadliche ifoan. And for þæt we willen þæt þis beo stedefæst and lestinde; we senden ȝew þis writ open iseined wiþ vre seel. to halden amanges ȝew ine hord. Witnesse vs seluen æt Lundene. þane Eȝtetenþe day. on þe Monþe of Octobre In þe Two-and-fowertiȝþe ȝeare of vre cruninge. And þis wes idon ætforen vre isworene redesmen. . . .

"And al on þo ilche worden is isend in to æurihce oþre shcire ouer al þære kuneriche on Engleneloande. and ek in tel Irelonde."

The dialect of this document is more southern than anything else, with a slight midland admixture. It is much more archaic inflectionally than the *Genesis and Exodus* or *Ormulum*; but it closely resembles the old Kentish sermons and *Proverbs of Alfred* in the southern dialect of 1250. It represents no doubt the London speech of the day. London being in a Saxon county, and contiguous to Kent and Surrey, had certainly at first a southern dialect; but its position as the capital, as well as its proximity to the midland district, made its dialect more and more midland. Contemporary London documents show that Chaucer's language, which is distinctly more southern than standard English eventually became, is behind the London dialect of the day in this respect, and is at once more archaic and consequently more southern.

During the next hundred years English gained ground steadily, and by the reign of Edward III. French was so little known in England, even in the families of the great, that about 1350 "John Cornwal, a maystere of gramere, chaungede þe lore (=*teaching*) in gramere scole *and* construccion of [*i.e.* *from*] Freynsch into Englysch";[1] and in 1362–1363 English by statute took the place of French in the pleadings in courts of law. Every reason conspired that this "English" should be the midland dialect. It was the intermediate dialect, intelligible, as Trevisa has told us, to both extremes, even when these failed to be intelligible to each other; in its south-eastern form, it was the language of London, where the supreme law courts were, the centre of political and commercial life; it was the language in which the Wycliffite versions had given the Holy Scriptures to the people; the language in which Chaucer had raised English poetry to a height of excellence admired and imitated by contemporaries and followers. And accordingly after the end of the 14th century, all Englishmen who thought they had anything to say to their countrymen generally said it in the midland speech. Trevisa's own work was almost the last literary effort of the southern dialect; henceforth it was but a rustic patois, which the dramatist might use to give local colouring to his creations, as Shakespeare uses it to complete Edgar's peasant disguise in *Lear*, or which 19th century research might disinter to illustrate obscure chapters in the history of language. And though the northern English proved a little more stubborn, it disappeared also from literature in England; but in Scotland, which had now become politically and socially estranged from England, it continued its course as the national language of the country, attaining in the 15th and 16th centuries a distinct development and high literary culture, for the details of which readers are referred to the article on SCOTTISH LANGUAGE.

The 15th century of English history, with its bloody French war abroad and Wars of the Roses at home, was a barren period in literature, and a transition one in language, witnessing the decay and disappearance of the final *e*, and most of the syllabic inflections of Middle English. Already by 1420, in Chaucer's disciple Hoccleve, final *e* was quite uncertain; in Lydgate it was practically gone. In 1450 the writings of Pecock against the Wycliffites show the verbal inflections in *-en* in a state of obsolescence; he has still the southern pronouns *her* and *hem* for the northern *their*, *them*:—

"And here-aȝens holi scripture wole þat men schulden lacke þe coueryng which wommen schulden haue, & thei schulden so lacke bi þat þe heeris of her heedis schulden be schorne, & schulde not growe in lengþe doun as wommanys heer schulde growe. . . .

"Also here-wiþal into þe open siȝt of ymagis in open chirchis, alle peple, men & wommen & children mowe come whanne euere þei wolen in ech tyme of þe day, but so mowe þei not come in-to þe vce of bokis to be delyuered to hem neiþer to be red bifore hem; & þerfore, as for to soone & ofte come into remembraunce of a long mater bi ech oon persoon, and also as forto make þat þe mo persoones come into remembraunce of a mater, ymagis & picturis serven in a specialer maner þan bokis doon, þouȝ in an oþer maner ful substanciali bokis seruen better into remembrauncing of þo same materis þan ymagis & picturis doon; & þerfore, þouȝ writingis seruen weel into remembrauncing upon þe bifore seid þingis, ȝit not at þe ful: Forwhi þe bokis han not þe avail of remembrauncing now seid whiche ymagis han."[2]

The change of the language during the second period of Transition, as well as the extent of dialectal differences, is quaintly expressed a generation later by Caxton, who in the prologue to one of the last of his works, his translation of Virgil's *Eneydos* (1490), speaks of the difficulty he had in pleasing all readers:—

"I doubted that it sholde not please some gentylmen, whiche late blamed me, sayeng, yᵗ in my translacyons I had ouer curyous termes, whiche coud not be vnderstande of comyn peple, and desired me to vse olde and homely termes in my translacyons. And fayn wolde I satysfy euery man; and so to doo, toke an olde boke and redde therein; and certaynly the englysshe was so rude and brood that I coude not wele vnderstande it. And also my lorde abbot of Westmynster ded do shewe to me late certayn euydences wryton in olde englysshe for to reduce it in to our englysshe now vsid. And certaynly it was wreton in suche wyse that it was more lyke to dutche than englysshe; I coude not reduce ne brynge it to be vnderstonden. And certaynly, our langage now vsed varyeth ferre from that whiche was vsed and spoken whan I was borne. For we englysshemen ben borne vnder the domynacyon of the mone, whiche is neuer stedfaste, but euer wauerynge, wexynge one season, and waneth and dyscreaseth another season. And that comyn englysshe that is spoken in one shyre varyeth from a nother. In so much that in my days happened that certayn marchauntes were in a shipe in tamyse, for to haue sayled ouer the sea into zelande, and for lacke of wynde thei taryed atte forlond, and wente to lande for to refreshe them. And one of theym named sheffelde, a mercer, cam in to an hows and axed for mete, and specyally he axyd after eggys. And the goode wyf answerde, that she coude speke no frenshe. And the marchaunt was angry, for he also coulde speke no frenshe, but wolde haue hadde egges; and she vnderstode hym not. And thenne at laste a nother sayd that he wolde haue eyren; then the good wyf sayd that she vnderstod hym wel. Loo! what sholde a man in thyse dayes now wryte, egges or eyren? certaynly, it is harde to playse euery man, by cause of dyuersite & chaunge of langage. For in these dayes, euery man that is in ony reputacyon in his countre wyll vtter his comynycacyon and maters in suche maners & termes that fewe men shall vnderstonde theym. And som honest and grete clerkes haue ben wyth me, and desired me to wryte the moste curyous termes that I coude fynde. And thus bytwene playn, rude and curyous, I stande abasshed; but in my Iudgemente, the comyn termes that be dayli vsed ben lyghter to be vnderstonde than the olde and auncyent englysshe."

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[1] Trevisa, *Translation of Higden's Polychronicon.*

[2] Skeat, *Specimens of English Literature*, pp. 49, 54.

In the productions of Caxton's press we see the passage from Middle to Early Modern English completed. The earlier of these have still an occasional verbal plural in *-n*, especially in the word *they ben*; the southern *her* and *hem* of Middle English vary with the northern and Modern English *their*, *them*. In the late works, the older forms have been practically ousted, and the year 1485, which witnessed the establishment of the Tudor dynasty, may be conveniently put as that which closed the Middle English transition, and introduced Modern English. Both in the completion of this result, and in its comparative permanence, the printing press had an important share. By its exclusive patronage of the midland speech, it raised it still higher above the sister dialects, and secured its abiding victory. As books were multiplied and found their way into every corner of the land, and the art of reading became a more common acquirement, the man of Northumberland or of Somersetshire had forced upon his attention the book-English in which alone these were printed. This became in turn the model for his own writings, and by-and-by, if he made any pretensions to education, of his own speech. The written *form* of the language also tended to uniformity. In previous periods the scribe made his own spelling with a primary aim at expressing his own speech, according to the particular values attached by himself or his contemporaries to the letters and combinations of the alphabet, though liable to disturbance in the most common words and combinations by his ocular recollections of the spelling of others. But after the introduction of printing, this ocular recognition of words became ever more and more an aim; the book addressed the mind directly through the eye, instead of circuitously through eye and ear; and thus there was a continuous tendency for written words and parts of words to be reduced to a single form, and that the most usual, or through some accident the best known, but not necessarily that which would have been chosen had the *ear* been called in as umpire. Modern English spelling, with its rigid uniformity as to individual results and whimsical caprice as to principles, is the creation of the printing-office, the victory which, after a century and a half of struggle, mechanical convenience won over natural habits. Besides eventually creating a uniformity in writing, the introduction of printing made or at least ratified some important changes. The British and Old English form of the Roman alphabet has already been referred to. This at the Norman Conquest was superseded by an alphabet with the French forms and values of the letters. Thus *k* took the place of the older *c* before *e* and *i*; *qu* replaced *cw*; the Norman *w* took the place of the *wên* (ƿ), &c.; and hence it has often been said that Middle English stands nearer to Old English in pronunciation, but to Modern English in spelling. But there were certain sounds in English for which Norman writing had no provision; and for these, in writing English, the native characters were retained. Thus the Old English g (ᵹ), beside the sound in *go*, had a guttural sound as in German tag, Irish ma*gh*, and in certain positions a palatalized form of this approaching *y* as in *y*ou (if pronounced with aspiration *hy*ou or *ghy*ou). These sounds continued to be written with the native form of the letter as *burȝ*, *ȝour*, while the French form was used for the sounds in *go*, *age*,—one original letter being thus represented by two. So for the sounds of *th*, especially the sound in *th*at, the Old English *thorn* (þ) continued to be used. But as these characters were not used for French and Latin, their use even in English became disturbed towards the 15th century, and when printing was introduced, the founts, cast for continental languages, had no characters for them, so that they were dropped entirely, being replaced, ȝ by *gh*, *yh*, *y*, and þ by *th*. This was a real loss to the English alphabet. In the north it is curious that the printers tried to express the *forms* rather than the powers of these letters, and consequently ȝ was represented by *z*, the black letter form of which was confounded with it, while the þ was expressed by *y*, which its MS. form had come to approach or in some cases simulate. So in early Scotch books we find *zallow*, *ze*, *yat*, *yem*=*yellow*, *ye*, *that*, *them*; and in Modern Scottish, such names as *Menzies*, *Dalziel*, *Cockenzie*, and the word *gaberlunzie*, in which the *z* stands for *y*.

Modern English thus dates from Caxton. The language had at length reached the all but flectionless state which it now presents. A single older verbal form, the southern *-eth* of the third person singular, continued to be the literary prose form throughout the 16th century, but the northern form in *-s* was intermixed with it in poetry (where it saved a syllable), and must ere long, as we see from Shakespeare, have taken its place in familiar speech. The fuller *an*, *none*, *mine*, *thine*, in the early part of the 16th century at least, were used in positions where their shortened forms *a*, *no*, *my*, *thy* are now found (*none other*, *mine own*=*no other*, *my own*). But with such minute exceptions, the accidence of the 16th century was the accidence of the 19th. While, however, the older inflections had disappeared, there was as yet no general agreement as to the mode of their replacement. Hence the 16th century shows a syntactic licence and freedom which distinguishes it strikingly from that of later times. The language seems to be in a plastic, unformed state, and its writers, as it were, experiment with it, bending it to constructions which now seem indefensible. Old distinctions of case and mood have disappeared from noun and verb, without custom having yet decided what prepositions or auxiliary verbs shall most fittingly convey their meaning. The laxity of word-order which was permitted in older states of the language by the *formal* expression of relations was often continued though the inflections which expressed the relations had disappeared. Partial analogy was followed in allowing forms to be identified in one case, because, in another, such identification was accidentally produced, as for instance the past participles of *write* and *take* were often made *wrote* and *took*, because the contracted participles of *bind* and *break* were *bound* and *broke*. Finally, because, in dropping inflections, the former distinctions even between parts of speech had disappeared, so that *iron*, *e.g.*, was at once noun, adjective and verb, *clean*, adjective, verb and adverb, it appeared as if any word whatever might be used in any grammatical relation, where it conveyed the idea of the speaker. Thus, as has been pointed out by Dr Abbott, "you can *happy* your friend, *malice* or *foot* your enemy, or *fall* an axe on his neck. You can speak and act *easy*, *free*, *excellent*, you can talk of *fair* instead of beauty (fairness), and a *pale* instead of a *paleness*. A *he* is used for a man, and a lady is described by a gentleman as 'the fairest *she* he has yet beheld.' An adverb can be used as a verb, as 'they *askance* their eyes'; as a noun, 'the *backward* and abyss of time'; or as an adjective, a '*seldom* pleasure.'"[1] For, as he also says, "clearness was preferred to grammatical correctness, and brevity both to correctness and clearness. Hence it was common to place words in the order in which they came uppermost in the mind without much regard to syntax, and the result was a forcible and perfectly unambiguous but ungrammatical sentence, such as

> The prince that feeds great natures they will slay him.
> *Ben Jonson.*

or, as instances of brevity,

> Be guilty of my death since of my crime.
> *Shakespeare.*
>
> It cost more to get than to lose in a day.
> *Ben Jonson.*"

These characteristics, together with the presence of words now obsolete or archaic, and the use of existing words in senses different from our own, as general for specific, literal for metaphorical, and vice versa, which are so apparent to every reader of the 16th-century literature, make it useful to separate *Early Modern* or *Tudor* English from the subsequent and still existing stage, since the consensus of usage has declared in favour of individual senses and constructions which are alone admissible in ordinary language.

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[1] *A Shakspearian Grammar*, by Dr E. A. Abbott. To this book we are largely indebted for its admirable summary of the characters of Tudor English.

The beginning of the Tudor period was contemporaneous with the Renaissance in art and literature, and the dawn of modern discoveries in geography and science. The revival of the study of the classical writers of Greece and Rome, and the translation of their works into the vernacular, led to the introduction of an immense number of new words derived from these languages, either to express new ideas and objects or to indicate new distinctions in or grouping of old ideas. Often also it seemed as if scholars were so pervaded with the form as well as the spirit of the old, that it came more natural to them to express themselves in words borrowed from the old than in their native tongue, and thus words of Latin origin were introduced even when English already possessed perfectly good equivalents. As has already been stated, the French words of Norman and Angevin introduction, being principally Latin words in an altered form, when used as English supplied models whereby other Latin words could be converted into English ones, and it is after these models that the Latin words introduced during and since the 16th century have been fashioned. There is nothing in the *form* of the words *procession* and *progression* to show that the one was used in England in the 11th, the other not till the 16th century. Moreover, as the formation of new words from Latin had gone on in French as well as in English since the Renaissance, we often cannot tell whether such words, *e.g.* as *persuade* and *persuasion*, were borrowed from their French equivalents or formed from Latin in England independently. With some words indeed it is impossible to say whether they were formed in England directly from Latin, borrowed from contemporary late French, or had been in England since the Norman period, even *photograph*, *geology* and *telephone* have the form that they would have had if they had been living words in the mouths of Greeks, Latins, French and English from the beginning, instead of formations of the 19th century.[1] While every writer was thus introducing new words according to his notion of their being needed, it naturally happened that a large number were not accepted by contemporaries or posterity; a long list might be formed of these mintages of the 16th and 17th centuries, which either never became current coin, or circulated only as it were for a moment. The revived study of Latin and Greek also led to modifications in the spelling of some words which had entered Middle English in the French form. So Middle English *doute*, *dette*, were changed to *doubt*, *debt*, to show a more immediate connexion with Latin *dubitum*, *debitum*; the actual derivation from the French being ignored. Similarly, words containing a Latin and French *t*, which might be traced back to an original Greek *θ*, were remodelled upon the Greek, *e.g. theme*, *throne*, for Middle English *teme*, *trone*, and, by false association with Greek, *anthem*, Old English *antefne*, Latin *antiphona*; *Anthony*, Latin *Antonius*; *Thames*, Latin *Tamesis*, apparently after *Thomas*.

The voyages of English navigators in the latter part of the 16th century introduced a considerable number of Spanish words, and American words in Spanish forms, of which *negro*, *potato*, *tobacco*, *cargo*, *armadillo*, *alligator*, *galleon* may serve as examples.

The date of 1611, which nearly coincides with the end of Shakespeare's literary work, and marks the appearance of the Authorized Version of the Bible (a compilation from the various 16th-century versions), may be taken as marking the close of Tudor English. The language was thenceforth Modern in structure, style and expression, although the spelling did not settle down to present usage till about the revolution of 1688. The latter date also marks the disappearance from literature of a large number of words, chiefly of such as were derived from Latin during the 16th and 17th centuries. Of these nearly all that survived 1688 are still in use; but a long list might be made out of those that appear for the last time before that date. This sifting of the literary vocabulary and gradual fixing of the literary spelling, which went on between 1611, when the language became modern in structure, and 1689, when it became modern also in form, suggests for this period the name of Seventeenth-Century Transition. The distinctive features of Modern English have already been anticipated by way of contrast with preceding stages of the language. It is only necessary to refer to the fact that the vocabulary is now much more composite than at any previous period. The immense development of the physical sciences has called for a corresponding extension of terminology which has been supplied from Latin and especially Greek; and although these terms are in the first instance *technical*, yet, with the spread of education and general diffusion of the rudiments and appliances of science, the boundary line between *technical* and *general*, indefinite at the best, tends more and more to melt away—this in addition to the fact that words still technical become general in figurative or metonymic senses. *Ache*, *diamond*, *stomach*, *comet*, *organ*, *tone*, *ball*, *carte*, are none the less familiar because once technical words. Commercial, social, artistic or literary contact has also led to the adoption of numerous words from modern European languages, especially French, Italian, Portuguese, Dutch (these two at a less recent period): thus from French *soirée*, *séance*, *dépôt*, *débris*, *programme*, *prestige*; from Italian *bust*, *canto*, *folio*, *cartoon*, *concert*, *regatta*, *ruffian*; from Portuguese *caste*, *palaver*; from Dutch *yacht*, *skipper*, *schooner*, *sloop*. Commercial intercourse and colonization have extended far beyond Europe, and given us words more or fewer from Hindostani, Persian, Arabic, Turkish, Malay, Chinese, and from American, Australian, Polynesian and African languages.[2] More important even than these, perhaps, are the dialect words that from time to time obtain literary recognition, restoring to us obsolete Old English forms, and not seldom words of Celtic or Danish origin, which have been preserved in local dialects, and thus at length find their way into the standard language.

As to the actual proportion of the various elements of the language, it is probable that original English words do not now form more than a fourth or perhaps a fifth of the total entries in a full English dictionary; and it may seem strange, therefore, that we still identify the language with that of the 9th century, and class it as a member of the *Low German* division. But this explains itself, when we consider that of the total words in a dictionary only a small portion are used by any one individual in speaking or even in writing; that this portion includes the great majority of the Anglo-Saxon words, and but a minority of the others. The latter are in fact almost all *names*—the vast majority names of *things* (nouns), a smaller number names of *attributes* and *actions* (adjectives and verbs), and, from their very nature, names of the things, attributes and actions which come less usually or, it may be, very rarely under our notice. Thus in an ordinary book, a novel or story, the foreign elements will amount to from 10 to 15% of the whole; as the subject becomes more recondite or technical their number will increase; till in a work on chemistry or abstruse mathematics the proportion may be 40%. But after all, it is not the question whence words *may* have been taken, but *how they are used* in a language that settles its character. If new words when adopted conform themselves to the manner and usage of the adopting language, it makes absolutely no difference whether they are taken over from some other language, or invented off at the ground. In either case they are *new* words to begin with; in either case also, if they are needed, they will become as thoroughly native, *i.e.* familiar from childhood to those who use them, as those that possess the longest native pedigree. In this respect English is still the same language it was in the days of Alfred; and, comparing its history with that of other Low German tongues, there is no reason to believe that its grammar or structure would have been very different, however different its vocabulary might have been, if the Norman Conquest had never taken place.

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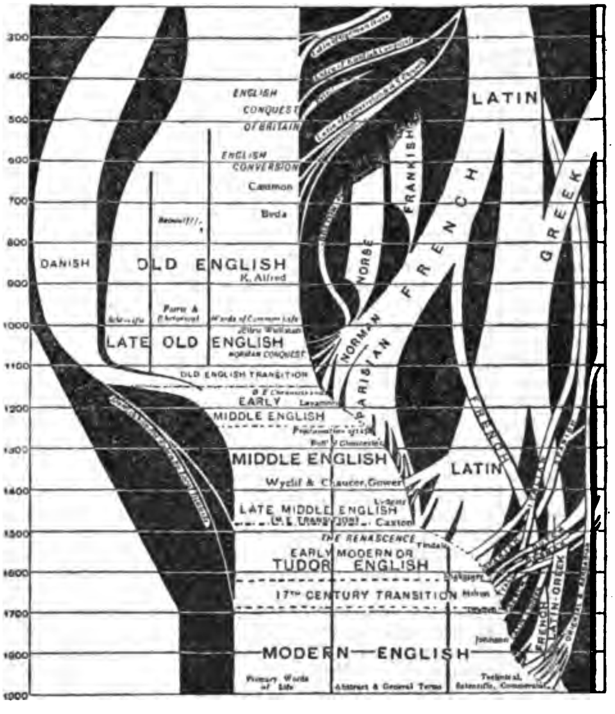
[1] *Evangelist*, *astronomy*, *dialogue*, are words that have so lived, of which their form is the result. *Photograph*, *geology*, &c., take this form *as if* they had the same history.

[2] See extended lists of the foreign words in English in Dr Morris's *Historical Outlines of English Accidence*, p. 33.

A general broad view of the sources of the English vocabulary and of the dates at which the various foreign elements flowed into the language, as well as of the great change produced in it by the Norman Conquest, and consequent influx of French and Latin elements, is given in the accompanying chart. The transverse lines represent centuries, and it will be seen how limited a period after all is occupied by modern English, how long the language had been in the country before the Norman Conquest, and how much of this is prehistoric and without any literary remains. Judging by what has happened during the historic period, great changes may and indeed *must* have taken place between the first arrival of the Saxons and the days of King Alfred, when literature practically begins. The chart also illustrates the continuity of the main stock of the vocabulary, the body of primary "words of common life," which, notwithstanding numerous losses and more numerous additions, has preserved its corporate identity through all the periods. But the "poetic and rhetorical," as well as the "scientific" terms of Old English have died out, and a new vocabulary of "abstract and general terms" has arisen from French, Latin and Greek, while a still newer "technical, commercial and scientific" vocabulary is composed of words not only from these, but from every civilized and many uncivilized languages.



The preceding sketch has had reference mainly to the grammatical changes which the language has undergone; distinct from, though intimately connected with these (as where the confusion or loss of inflections was a consequence of the weakening of final sounds) are the great phonetic changes which have taken place between the 8th and 19th centuries, and which result in making modern English words very different from their Anglo-Saxon originals, even where no element has been lost, as in words like *stone, mine, doom, day, nail, child, bridge, shoot*, Anglo-Saxon *stán, mín, dóm, dæg, nægel, cild, brycg, scéot*. The history of English sounds (see PHONETICS) has been treated at length by Dr A. J. Ellis and Dr Henry Sweet; and it is only necessary here to indicate the broad facts, which are the following. (1) In an accented closed syllable, original short vowels have remained nearly unchanged; thus the words *at, men, bill, God, dust* are pronounced now nearly as in Old English, though the last two were more like the Scotch *o* and North English *u* respectively, and in most words the short *a* had a broader sound like the provincial *a* in *man*. (2) Long accented vowels and diphthongs have undergone a regular sound shift towards closer and more advanced positions, so that the words *bán, hær, soece* or *séce, stól* (*bahn* or *bawn, hēr, sōk* or *saik, stōle*) are now *bōne, hair, seek, stool*; while the two high vowels *ú* (=*oo*) and *í* (*ee*) have become diphthongs, as *hús, scír*, now *house, shire*, though the old sound of *u* remains in the north (*hoose*), and the original *i* in the pronunciation *sheer*, approved by Walker, "as in machine, and shire, and magazine." (3) Short vowels in an open syllable have usually been lengthened as in *nă-ma, cŏ-fa*, now *name, cove*; but to this there are exceptions, especially in the case of *ĭ* and *ŭ*. (4) Vowels in terminal unaccented syllables have all sunk into short obscure *ĕ*, and then, if final, disappeared; so *oxa, seo, wudu* became *ox-e, se-e, wud-e*, and then *ox, see, wood*; *oxan, lufod*, now *oxen, loved, lov'd; settan, setton*, later *setten, sette, sett*, now *set*. (5) The back consonants, *c, g, sc*, in connexion with front vowels, have often become palatalized to *ch, j, sh*, as *circe, rycg, fisc*, now *church, ridge, fish*. A medial or final *g* has passed through a guttural or palatal continuant to *w* or *y*, forming a diphthong or new vowel, as in *boga, laga, dæg, heg, drig*, now *bow, law, day, hay, dry*. *W* and *h* have disappeared before *r* and *l*, as in *write*, (*w*)*lisp*, (*h*)*ring*; *h* final (=*gh*) has become *f, k, w* or nothing, but has developed the glides *u* or *i* before itself, these combining with the preceding vowel to form a diphthong, or merging with it into a simple vowel-sound, as *ruh, hoh, boh, deah, heah, hleah*, now *rough, hough, bough, dough, high, laugh*=*ruf, hok, bōw, dō, hī, lāf*. *R* after a vowel has practically disappeared in standard English, or at most become vocalized, or combined with the vowel, as in *hear, bar, more, her*. These and other changes have taken place gradually, and in accordance with well-known phonetic laws; the details as to time and mode may be studied in special works. It may be mentioned that the total loss of grammatical *gender* in English, and the almost complete disappearance of *cases*, are purely phonetic phenomena. *Gender* (whatever its remote origin) was practically the use of adjectives and pronouns with certain distinctive terminations, in accordance with the *genus, genre, gender* or *kind* of nouns to which they were attached; when these distinctive terminations were uniformly levelled to final *ĕ*, or other weak sounds, and thus ceased to distinguish nouns into kinds, the distinctions into genders or kinds having no other existence disappeared. Thus when *þæt gode hors, þone godan hund, þa godan bóc*, became, by phonetic weakening, *þe gōde hors, þe gode hownd, þe gode boke*, and later still the *good horse*, the *good hound*, the *good book*, the words *horse, hound, book* were no longer grammatically different kinds of nouns; grammatical gender had ceased to exist. The concord of adjectives has entirely disappeared; the concord of the pronouns is now regulated by *rationality* and *sex*, instead of grammatical gender, which has no existence in English. The man *who* lost *his* life; the bird *which* built *its* nest.

Our remarks from the end of the 14th century have been confined to the standard or literary form of English, for of the other dialects from that date (with the exception of the northern

English in Scotland, where it became in a social and literary sense a distinct language), we have little history. We know, however, that they continued to exist as local and popular forms of speech, as well from occasional specimens and from the fact that they exist still as from the statements of writers during the interval. Thus Puttenham in his *Arte of English Poesie* (1589) says:—

> "Our maker [*i.e.* poet] therfore at these dayes shall not follow Piers Plowman, nor Gower, nor Lydgate, not yet Chaucer, for their language is now not of use with us: neither shall he take the termes of Northern-men, such as they use in dayly talke, whether they be noble men or gentle men or of their best clarkes, all is a [=one] matter; nor in effect any speach used beyond the river of Trent, though no man can deny but that theirs is the purer English Saxon at this day, yet it is not so Courtly nor so currant as our *Southerne* English is, no more is the far Westerne mans speach: ye shall therefore take the usual speach of the Court, and that of London and the shires lying about London within lx myles, and not much above. I say not this but that in every shyre of England there be gentlemen and others that speake but specially write as good Southerne as we of Middlesex or Surrey do, but not the common people of every shire, to whom the gentlemen, and also their learned clarkes do for the most part condescend, but herein we are already ruled by th' English Dictionaries and other bookes written by learned men."—*Arber's Reprint*, p. 157.

In comparatively modern times there has been a revival of interest in these forms of English, several of which following in the wake of the revival of Lowland Scots in the 18th and 19th centuries, have produced a considerable literature in the form of local poems, tales and "folk-lore." In these respects Cumberland, Lancashire, Yorkshire, Devon, Somerset and Dorset, the "far north" and "far west" of Puttenham, where the dialect was felt to be so independent of literary English as not to be branded as a mere vulgar corruption of it, stand prominent. More recently the dialects have been investigated philologically, a department in which, as in other departments of English philology, the elder Richard Garnett must be named as a pioneer. The work was carried out zealously by Prince Louis Lucien Bonaparte and Dr A. J. Ellis, and more recently by the English Dialect Society, founded by the Rev. Professor Skeat, for the investigation of this branch of philology. The efforts of this society resulted in the compilation and publication of glossaries or word-books, more or less complete and trustworthy, of most of the local dialects, and in the production of grammars dealing with the phonology and grammatical features of a few of these, among which that of the Windhill dialect in Yorkshire, by Professor Joseph Wright, and that of West Somerset, by the late F. T. Elworthy, deserve special mention. From the whole of the glossaries of the Dialect Society, and from all the earlier dialect works of the 18th and 19th centuries, amplified and illustrated by the contributions of local collaborators in nearly every part of the British Isles, Professor Joseph Wright has constructed his *English Dialect Dictionary*, recording the local words and senses, with indication of their geographical range, their pronunciation, and in most cases with illustrative quotations or phrases. To this he has added an *English Dialect Grammar*, dealing very fully with the phonology of the dialects, showing the various sounds which now represent each Old English sound, and endeavouring to define the area over which each modern form extends; the accidence is treated more summarily, without going minutely into that of each dialect-group, for which special dialect grammars must be consulted. The work has also a very full and valuable index of every word and form treated.

The researches of Prince L. L. Bonaparte and Dr Ellis were directed specially to the classification and mapping of the existing dialects,[1] and the relation of these to the dialects of Old and Middle English. They recognized a *Northern* dialect lying north of a line drawn from Morecambe Bay to the Humber, which, with the kindred Scottish dialects (already investigated and classed),[2] is the direct descendant of early northern English, and a *South-western* dialect occupying Somerset, Wilts, Dorset, Gloucester and western Hampshire, which, with the *Devonian* dialect beyond it, are the descendants of early southern English and the still older West-Saxon of Alfred. This dialect must in the 14th century have been spoken everywhere south of Thames; but the influence of London caused its extinction in Surrey, Sussex and Kent, so that already in Puttenham it had become "far western." An *East Midland* dialect, extending from south Lincolnshire to London, occupies the cradle-land of the standard English speech, and still shows least variation from it. Between and around these typical dialects are ten others, representing the old Midland proper, or dialects between it and the others already mentioned. Thus "north of Trent" the *North-western* dialect of south Lancashire, Cheshire, Derby and Stafford, with that of Shropshire, represents the early West Midland English, of which several specimens remain; while the *North-eastern* of Nottingham and north Lincolnshire represents the dialect of the *Lay of Havelok*. With the *North Midland* dialect of south-west Yorkshire, these represent forms of speech which to the modern Londoner, as to Puttenham, are still decidedly northern, though actually intermediate between northern proper and midland, and preserving interesting traces of the midland pronouns and verbal inflections. There is an *Eastern* dialect in the East Anglian counties; a *Midland* in Leicester and Warwick shires; a *Western* in Hereford, Worcester and north Gloucestershire, intermediate between south-western and north-western, and representing the dialect of *Piers Plowman*. Finally, between the east midland and south-western, in the counties of Buckingham, Oxford, Berks, Hants, Surrey and Sussex, there is a dialect which must have once been south-western, but of which the most salient characters have been rubbed off by proximity to London and the East Midland speech. In east Sussex and Kent this *South-eastern* dialect attains to a more distinctive character. The *Kentish* form of early Southern English evidently maintained its existence more toughly than that of the counties immediately south of London. It was very distinct in the days of Sir Thomas More; and even, as we see from the dialect attributed to Edgar in *Lear*, was still strongly marked in the days of Shakespeare. In the south-eastern corner of Ireland, in the baronies of Forth and Bargy, in county Wexford, a very archaic form of English, of which specimens have been preserved,[3] was still spoken in the 18th century. In all probability it dated from the first English invasion. In many parts of Ulster forms of Lowland Scotch dating to the settlement under James I. are still spoken; but the English of Ireland generally seems to represent 16th and 17th century English, as in the pronunciation of *tea*, *wheat* (*tay*, *whait*), largely affected, of course, by the native Celtic. The subsequent work of the English Dialect Society, and the facts set forth in the *English Dialect Dictionary*, confirm in a general way the classification of Bonaparte and Ellis; but they bring out strongly the fact that only in a few cases can the boundary between dialects now be determined by precise lines. For every dialect there is a central region, larger or smaller, in which its characteristics are at a maximum; but towards the edges of the area these become mixed and blended with the features of the contiguous dialects, so that it is often impossible to define the point at which the one dialect ends and the other begins. The fact is that the various features of a dialect, whether its distinctive words, characteristic pronunciations or special grammatical features, though they may have the same centre, have not all the same circumference. Some of them extend to a certain distance round the centre; others to a much greater distance. The only approximately accurate way to map the area of any dialect, whether in England, France, Germany or elsewhere, is to take a well-chosen set of its characteristic features—words, senses, sounds or grammatical peculiarities, and draw a line round the area over which each of these extends; between the innermost and outermost of these there will often be a large border district. If the same process be followed with the contiguous dialects,

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[1] See description and map in *Trans. of Philol. Soc.*, 1875–1876, p. 570.

[2] *The Dialect of the Southern Counties of Scotland, its Pronunciation, Grammar and Historical Relations, with an Appendix on the present limits of the Gaelic and Lowland Scotch, and the Dialectal Divisions of the Lowland Tongue; and a Linguistical Map of Scotland*, by James A. H. Murray (London, 1873).

[3] *A Glossary (with some pieces of Verse) of the Old Dialect of the English Colony of Forth and Bargy*, collected by Jacob Poole, edited by W. Barnes, B.D. (London, 1867).

Digest. In the Occident the time for the Germanic "folk-laws" (*Leges Barbarorum*) had come, and a Canon law, ambitious of independence, was being constructed, when in the Orient the lord of church and state was "enucleating" all that was to live of the classical jurisprudence of pagan Rome. It was but a brief interval between Gothic and Lombardic domination that enabled him to give law to Italy: Gaul and Britain were beyond his reach.

The Anglo-Saxon laws that have come down to us (and we have no reason to fear the loss of much beyond some dooms of the Mercian Offa) are best studied as members of a large Teutonic family. Those that proceed from the Kent and Wessex of the 7th century are closely related to the continental folk-laws. Their next of kin seem to be the *Lex Saxonum* and the laws of the Lombards. Then, though the 8th and 9th centuries are unproductive, we have from Alfred (*c.* 900) and his successors a series of edicts which strongly resemble the Frankish capitularies—so strongly that we should see a clear case of imitation, were it not that in Frankland the age of legislation had come to its disastrous end long before Alfred was king. This, it may be noted, gives to English legal history a singular continuity from Alfred's day to our own. The king of the English was expected to publish laws at a time when hardly any one else was attempting any such feat, and the English dooms of Canute the Dane are probably the most comprehensive statutes that were issued in the Europe of the 11th century. No genuine laws of the sainted Edward have descended to us, and during his reign England seems but too likely to follow the bad example of Frankland, and become a loose congeries of lordships. From this fate it was saved by the Norman duke, who, like Canute before him, subdued a land in which kings were still expected to publish laws.

In the study of early Germanic law—a study which now for some considerable time has been scientifically prosecuted in Germany—the Anglo-Saxon dooms have received their due share of attention. A high degree of racial purity may be claimed on their behalf. Celtic elements have been sought for in them, but have never been detected. At certain points, notably in the regulation of the blood-feud and the construction of a tariff of atonements, the law of one rude folk will always be somewhat like the law of another; but the existing remains of old Welsh and old Irish law stand far remoter from the dooms of Æthelberht and Ine than stand the edicts of Rothari and Liutprand, kings of the Lombards. Indeed, it is very dubious whether distinctively Celtic customs play any considerable part in the evolution of that system of rules of Anglian, Scandinavian and Frankish origin which becomes the law of Scotland. Within England itself, though for a while there was fighting enough between the various Germanic folks, the tribal differences were not so deep as to prevent the formation of a common language and a common law. Even the strong Scandinavian strain seems to have rapidly blended with the Anglian. It amplified the language and the law, but did not permanently divide the country. If, for example, we can to-day distinguish between *law* and *right*, we are debtors to the Danes; but very soon *law* is not distinctive of eastern or *right* of western England. In the first half of the 12th century a would-be expounder of the law of England had still to say that the country was divided between the Wessex law, the Mercian law, and the Danes' law, but he had also to point out that the law of the king's own court stood apart from and above all partial systems. The local customs were those of shires and hundreds, and shaded off into each other. We may speak of more Danish and less Danish counties; it was a matter of degree; for rivers were narrow and hills were low. England was meant by nature to be the land of one law.

Then as to Roman law. In England and elsewhere Germanic law developed in an atmosphere that was charged with traditions of the old world, and many of these traditions had become implicit in the Christian religion. It might be argued that all that we call progress is due to the influence exercised by Roman civilization; that, were it not for this, Germanic law would never have been set in writing; and that theoretically unchangeable custom would never have been supplemented or superseded by express legislation. All this and much more of the same sort might be said; but the survival in Britain, or the reintroduction into England, of anything that we should dare to call Roman jurisprudence would be a different matter. Eyes, carefully trained, have minutely scrutinized the Anglo-Saxon legal texts without finding the least trace of a Roman rule outside the ecclesiastical sphere. Even within that sphere modern research is showing that the church-property-law of the middle ages, the law of the ecclesiastical "benefice," is permeated by Germanic ideas. This is true of Gaul and Italy, and yet truer of an England in which Christianity was for a while extinguished. Moreover, the laws that were written in England were, from the first, written in the English tongue; and this gives them a unique value in the eyes of students of Germanic folk-law, for even the very ancient and barbarous *Lex Salica* is a Latin document, though many old Frankish words are enshrined in it. Also we notice—and this is of grave importance—that in England there are no vestiges of any "Romani" who are being suffered to live under their own law by their Teutonic rulers. On the Continent we may see Gundobad, the Burgundian, publishing one law-book for the Burgundians and another for the Romani who own his sway. A book of laws, excerpted chiefly from the Theodosian code, was issued by Alaric the Visigoth for his Roman subjects before the days of Justinian, and this book (the so-called *Breviarium Alarici* or *Lex Romana Visigothorum*) became for a long while the chief representative of Roman law in Gaul. The Frankish king in his expansive realm ruled over many men whose law was to be found not in the *Lex Salica* or *Lex Ribuaria*, but in what was called the *Lex Romana*. "A system of personal law" prevailed: the *homo Romanus* handed on his Roman law to his children, while Frankish or Lombardic, Swabian or Saxon law would run in the blood of the *homo barbarus*. Of all this we hear nothing in England. Then on the mainland of Europe Roman and barbarian law could not remain in juxtaposition without affecting each other. On the one hand we see distinctively Roman rules making their way into the law of the victorious tribes, and on the other hand we see a decay and debasement of jurisprudence which ends in the formation of what modern historians have called a Roman "vulgar-law" (*Vulgarrecht*). For a short age which centres round the year 800 it seemed possible that Frankish kings, who were becoming Roman emperors, would be able to rule by their capitularies nearly the whole of the Christian Occident. The dream vanished before fratricidal wars, heathen invaders, centrifugal feudalism, and a centripetal church which found its law in the newly concocted forgeries of the Pseudo-Isidore (*c.* 850). The "personal laws" began to transmute themselves into local customs, and the Roman vulgar-law began to look like the local custom of those districts where the Romani were the preponderating element in the population. Meanwhile, the Norse pirates subdued a large tract of what was to be northern France—a land where Romani were few. Their restless and boundless vigour these Normans retained; but they showed a wonderful power of appropriating whatever of alien civilization came in their way. In their language, religion and law, they had become French many years before they subdued England. It is a plausible opinion that among them there lived some sound traditions of the Frankish monarchy's best days, and that Norman dukes, rather than German emperors or kings, of the French, are the truest spiritual heirs of Charles the Great.

In our own day German historians are wont to speak of English law as a "daughter" of French or Frankish law. This tendency derived its main impulse from H. Brunner's proof that the germ of trial by jury, which cannot be found in the Anglo-Saxon laws, can be found in the prerogative procedure of the Frankish kings. We must here remember that during a long age English lawyers wrote in French and even thought in French, and that to this day most of the technical terms of the law, more especially of the private law, are of French origin. Also it must be allowed that when English law has taken shape in the 13th century it is very like one of the *coutumes* of northern France. Even when linguistic difficulties have been surmounted, the Saxon M

The Norman age.

of Eike von Repgow will seem far less familiar to an Englishman than the so-called Establishments of St Louis. This was the outcome of a slow process which fills more than a century (1066–1189), and was in a great measure due to the reforming energy of Henry II., the French prince who, in addition to England, ruled a good half of France. William the Conqueror seems to have intended to govern Englishmen by English law. After the tyranny of Rufus, Henry I. promised a restoration of King Edward's law: that is, the law of the Confessor's time (*Lagam Eadwardi regis vobis reddo*). Various attempts were then made, mostly, so it would seem, by men of French birth, to state in a modern and practicable form the *laga Eadwardi* which was thus restored. The result of their labours is an intricate group of legal tracts which has been explored of late years by Dr Liebermann. The best of these has long been known as the *Leges Henrici Primi*, and aspires to be a comprehensive law-book. Its author, though he had some foreign sources at his command, such as the *Lex Ribuaria* and an epitome of the Breviary of Alaric, took the main part of his matter from the code of Canute and the older English dooms. Neither the Conqueror nor either of his sons had issued many ordinances: the invading Normans had little, if any, written law to bring with them, and had invaded a country where kings had been lawgivers. Moreover, there was much in the English system that the Conqueror was keenly interested in retaining—especially an elaborate method of taxing the land and its holders. The greatest product of Norman government, the grandest feat of government that the world had seen for a long time past, the compilation of *Domesday Book*, was a conservative effort, an attempt to fix upon every landholder, French or English, the amount of geld that was due from his predecessor in title. Himself the rebellious vassal of the French king, the duke of the Normans, who had become king of the English, knew much of disruptive feudalism, and had no mind to see England that other France which it had threatened to become in the days of his pious but incompetent cousin. The sheriffs, though called *vice-comites*, were to be the king's officers; the shire-moots might be called county courts, but were not to be the courts of counts. Much that was sound and royal in English public law was to be preserved if William could preserve it.

Royal justice.

The gulf that divides the so-called *Leges Henrici* (*c.* 1115) from the text-book ascribed to Ranulf Glanvill (*c.* 1188) seems at first sight very wide. The one represents a not easily imaginable chaos and clash of old rules and new; it represents also a stage in the development of feudalism which in other countries is represented chiefly by a significant silence. The other is an orderly, rational book, which through all the subsequent centuries will be readily understood by English lawyers. Making no attempt to tell us what goes on in the local courts, its author, who may be Henry II.'s chief justiciar, Ranulf Glanvill, or may be Glanvill's nephew, Hubert Walter, fixes our attention on a novel element which is beginning to subdue all else to its powerful operation. He speaks to us of the justice that is done by the king's own court. Henry II. had opened the doors of his French-speaking court to the mass of his subjects. Judges chosen for their ability were to sit there, term after term; judges were to travel in circuits through the land, and in many cases the procedure by way of "an inquest of the country," which the Norman kings had used for the ascertainment of their fiscal rights, was to be at the disposal of ordinary litigants. All this had been done in a piecemeal, experimental fashion by ordinances that were known as "assizes." There had not been, and was not to be, any enunciation of a general principle inviting all who were wronged to bring in their own words their complaints to the king's audience. The general prevalence of feudal justice, and of the world-old methods of supernatural probation (ordeals, battle, oaths sworn with oath-helpers), was to be theoretically respected; but in exceptional cases, which would soon begin to devour the rule, a royal remedy was to be open to any one who could frame his case within the compass of some carefully-worded and prescript formula. With allusion to a remote stage in the history of Roman law, a stage of which Henry's advisers can have known little or nothing, we may say that a "formulary system" is established which will preside over English law until modern times. Certain actions, each with a name of its own, are open to litigants. Each has its own formula set forth in its original (or, as we might say, originating) writ; each has its own procedure and its appropriate mode of trial. The litigant chooses his writ, his action, and must stand or fall by his choice. Thus a book about royal justice tends to become, and Glanvill's book already is, a commentary on original writs.

The precipitation of English law in so coherent a form as that which it has assumed in Glanvill's book is not to be explained without reference to the revival of Roman jurisprudence in Italy. Out of a school of Lombard lawyers at Pavia had come Lanfranc the Conqueror's adviser, and the Lombardists had already been studying Justinian's Institutes. Then at length the Digest came by its rights. About the year 1100 Irnerius was teaching at Bologna, and from all parts of the West men were eagerly flocking to hear the new gospel of civilization. About the year 1149 Vacarius was teaching Roman law in England. The rest of a long life he spent here, and faculties of Roman and Canon law took shape in the nascent university of Oxford. Whatever might be the fate of Roman law in England, there could be no doubt that the Canon law, which was crystallizing in the *Decretum Gratiani* (*c.* 1139) and in the decretals of Alexander III., would be the law of the English ecclesiastical tribunals. The great quarrel between Henry II. and Thomas of Canterbury brought this system into collision with the temporal law of England, and the king's ministers must have seen that they had much to learn from the methodic enemy. Some of them were able men who became the justices of Henry's court, and bishops to boot. The luminous *Dialogue of the Exchequer* (*c.* 1179), which expounds the English fiscal system, came from the treasurer, Richard Fitz Nigel, who became bishop of London; and the treatise on the laws of England came perhaps from Glanvill, perhaps from Hubert Walter, who was to be both primate and chief justiciar. There was healthy emulation of the work that was being done by Italian jurists, but no meek acceptance of foreign results.

Bracton.

A great constructive era had opened, and its outcome was a large and noble book. The author was Henry of Bratton (his name has been corrupted into Bracton), who died in 1268 after having been for many years one of Henry III.'s justices. The model for its form was the treatise of Azo of Bologna ("master of all the masters of the laws," an Englishman called him), and thence were taken many of the generalities of jurisprudence: maxims that might be regarded as of universal and natural validity. But the true core of the work was the practice of an English court which had yearly been extending its operations in many directions. For half a century past diligent record had been kept on parchment of all that this court had done, and from its rolls Bracton cited numerous decisions. He cited them as precedents, paying special heed to the judgments of two judges who were already dead, Martin Pateshull and William Raleigh. For this purpose he compiled a large Note Book, which was discovered by Prof. Vinogradoff in the British Museum in 1884. Thus at a very early time English "common law" shows a tendency to become what it afterwards definitely became, namely, "case law." The term "common law" was being taken over from the canonists by English lawyers, who used it to distinguish the general law of the land from local customs, royal prerogatives, and in short from all that was exceptional or special. Since statutes and ordinances were still rarities, all expressly enacted laws were also excluded from the English lawyers' notion of "the common law." The Great Charter (1215) had taken the form of a grant of "liberties and privileges," comparable to the grants that the king made to individual men and favoured towns. None the less, it was in that age no small body of enacted law, and, owing to its importance and solemnity, it was in after ages regarded as the first article of a statute book. There it was followed by the "provisions" issued at Merton in 1236, and by those issued at

Marlborough after the end of the Barons' War. But during Henry III.'s long reign the swift development of English law was due chiefly to new "original writs" and new "forms of action" devised by the chancery and sanctioned by the court. Bracton knew many writs that were unknown to Glanvill, and men were already perceiving that limits must be set to the inventive power of the chancery unless the king was to be an uncontrollable law-maker. Thus the common law was losing the power of rapid growth when Bracton summed the attained results in a book, the success of which is attested by a crowd of manuscript copies. Bracton had introduced just enough of Roman law and Bolognese method to save the law of England from the fate that awaited German law in Germany. His book was printed in 1569, and Coke owed much to Bracton.

The comparison that is suggested when Edward I. is called the English Justinian cannot be pressed very far. Nevertheless, as is well known, it is in his reign (1272–1307) that English institutions finally take the forms that they are to keep through coming centuries. We already see the parliament of the three estates, the convocations of the clergy, the king's council, the chancery or secretarial department, the exchequer or financial department, the king's bench, the common bench, the commissioners of assize and gaol delivery, the small group of professionally learned judges, and a small group of professionally learned lawyers, whose skill is at the service of those who will employ them. Moreover, the statutes that were passed in the first eighteen years of the reign, though their bulk seems slight to us nowadays, bore so fundamental a character that in subsequent ages they appeared as the substructure of huge masses of superincumbent law. Coke commented upon them sentence by sentence, and even now the merest smatterer in English law must profess some knowledge of *Quia emptores* and *De donis conditionalibus*. If some American states have, while others have not, accepted these statutes, that is a difference which is not unimportant to citizens of the United States in the 20th century. Then from the early years of Edward's reign come the first "law reports" that have descended to us: the oldest of them have not yet been printed; the oldest that has been printed belongs to 1292. These are the precursors of the long series of Year Books (Edw. II-Hen. VIII.) which runs through the residue of the middle ages. Lawyers, we perceive, are already making and preserving notes of the discussions that take place in court; French notes that will be more useful to them than the formal Latin records inscribed upon the plea rolls. From these reports we learn that there are already, as we should say, a few "leading counsel," some of whom will be retained in almost every important cause. Papal decretals had been endeavouring to withdraw the clergy from secular employment. The clerical element had been strong among the judges of Henry III.'s reign: Bracton was an archdeacon, Pateshull a dean, Raleigh died a bishop. Their places begin to be filled by men who are not in orders, but who have pleaded the king's causes for him—his serjeants or servants at law—and beside them there are young men who are "apprentices at law," and are learning to plead. Also we begin to see men who, as "attorneys at law," are making it their business to appear on behalf of litigants. The history of the legal profession and its monopoly of legal aid is intricate, and at some points still obscure; but the influence of the canonical system is evident: the English attorney corresponds to the canonical proctor, and the English barrister to the canonical advocate. The main outlines were being drawn in Edward I.'s day; the legal profession became organic, and professional opinion became one of the main forces that moulded the law.

The study of English law fell apart from all other studies, and the impulse that had flowed from Italian jurisprudence was ebbing. We have two comprehensive text-books from Edward's reign: the one known to us as *Fleta*, the other as *Britton*; both of them, however, quarry their materials from Bracton's treatise. Also we have two little books on procedure which are attributed to Chief-Justice Hengham, and a few other small tracts of an intensely practical kind. Under the cover of fables about King Alfred, the author of the *Mirror of Justices* made a bitter attack upon King Edward's judges, some of whom had fallen into deep disgrace. English legal history has hardly yet been purged of the leaven of falsehood that was introduced by this fantastic and unscrupulous pamphleteer. His enigmatical book ends that literate age which begins with Glanvill's treatise and the treasurer's dialogue. Between Edward I.'s day and Edward IV.'s hardly anything that deserves the name of book was written by an English lawyer.

14th and 15th centuries.

During that time the body of statute law was growing, but not very rapidly. Acts of parliament intervened at a sufficient number of important points to generate and maintain a persuasion that no limit, or no ascertainable limit, can be set to the legislative power of king and parliament. Very few are the signs that the judges ever permitted the validity of a statute to be drawn into debate. Thus the way was being prepared for the definite assertion of parliamentary "omnicompetence" which we obtain from the Elizabethan statesman Sir Thomas Smith, and for those theories of sovereignty which we couple with the names of Hobbes and Austin. Nevertheless, English law was being developed rather by debates in court than by open legislation. The most distinctively English of English institutions in the later middle ages are the Year-Books and the Inns of Court. Year by year, term by term, lawyers were reporting cases in order that they and their fellows might know how cases had been decided. The allegation of specific precedents was indeed much rarer than it afterwards became, and no calculus of authority so definite as that which now obtains had been established in Coke's day, far less in Littleton's. Still it was by a perusal of reported cases that a man would learn the law of England. A skeleton for the law was provided, not by the Roman rubrics (such as public and private, real and personal, possessory and proprietary, contract and delict), but by the cycle of original writs that were inscribed in the chancery's *Registrum Brevium*. A new form of action could not be introduced without the authority of Parliament, and the growth of the law took the shape of an explication of the true intent of ancient formulas. Times of inventive liberality alternated with times of cautious and captious conservatism. Coke could look back to Edward III.'s day as to a golden age of good pleading. The otherwise miserable time which saw the Wars of the Roses produced some famous lawyers, and some bold doctrines which broke new ground. It produced also Sir Thomas Littleton's (d. 1481) treatise on Tenures, which (though it be not, as Coke thought it, the most perfect work that ever was written in any human science) is an excellent statement of law in exquisitely simple language.

Legal education.

Meanwhile English law was being scholastically taught. This, if we look at the fate of native and national law in Germany, or France, or Scotland, appears as a fact of primary importance. From beginnings, so small and formless that they still elude research, the Inns of Court had grown. The lawyers, like other men, had grouped themselves in gilds, or gild-like "fellowships." The fellowship acquired property; it was not technically incorporate, but made use of the thoroughly English machinery of a trust. Behind a hedge of trustees it lived an autonomous life, unhampered by charters or statutes. There was a hall in which its members dined in common; there was the nucleus of a library; there were also dormitories or chambers in which during term-time lawyers lived celibately, leaving their wives in the country. Something of the college thus enters the constitution of these fellowships; and then something academical. The craft gild regulated apprenticeship; it would protect the public against incompetent artificers, and its own members against unfair competition. So the fellowship of lawyers. In course of time a lengthy and laborious course of education of the medieval sort had been devised. He who had pursued it to its end received a call to the bar of his inn. This call was in effect a degree. Like the doctor or master of a university, the full-blown barrister was competent to teach others, and was expected to read lectures to students. But further, in a manner that is still very dark, these societies had succeeded in making their degrees the only steps that led to practice in the king's courts. At the end of the middle ages (*c.* 1470) Sir John Fortescue rehearsed the praises of the laws of England in a book which is one of the earliest efforts of comparative politics. Contrasting England with France, he rightly connects limited monarchy, public and oral debate in the law courts, trial by jury, and the teaching of national law in schools that are thronged by wealthy and well-born youths. But nearly a century earlier, the assertion that English law affords as subtle and civilizing a discipline as any that is to be had from Roman law was made by a man no less famous than John Wycliffe. The heresiarch naturally loathed the Canon law; but he also spoke with reprobation of the "paynims' law," the "heathen men's law," the study of which in the two universities was being fostered by some of the bishops. That study, after inspiring Bracton, had come to little in England, though the canonist was compelled to learn something of Justinian, and there was a small demand for learned civilians in the court of admiralty, and in what we might call the king's diplomatic service. No medieval Englishman did anything considerable for Roman law. Even the canonists were content to read the books of French and Italian masters, though John Acton (*c.* 1340) and William Lyndwood (1430) wrote meritorious glosses. The Angevin kings, by appropriating to the temporal forum the whole province of ecclesiastical patronage, had robbed the decretists of an inexhaustible source of learning and of lucre. The work that was done by the legal faculties at Oxford and Cambridge is slight when compared with the inestimable services rendered to the cause of national continuity by the schools of English law which grew within the Inns of Court.

Chancery.

A danger threatened: the danger that a prematurely osseous system of common law would be overwhelmed by summary justice and royal equity. Even when courts for all ordinary causes had been established, a reserve of residuary justice remained with the king. Whatever lawyers and even parliaments might say, it was seen to be desirable that the king in council should with little regard for form punish offenders who could break through the meshes of a tardy procedure and should redress wrongs which corrupt and timid juries would leave unrighted. Papal edicts against heretics had made familiar to all men the notion that a judge should at times proceed *summarie et de plano et sine strepitu et figura justitiae.* And so extraordinary justice of a penal kind was done by the king's council upon misdemeanants, and extraordinary justice of a civil kind was ministered by the king's chancellor (who was the specially learned member of the council) to those who "for the love of God and in the way of charity," craved his powerful assistance. It is now well established that the chancellors started upon this course, not with any desire to introduce rules of "equity" which should supplement, or perhaps supplant, the rules of law, but for the purpose of driving the law through those accidental impediments which sometimes unfortunately beset its due course. The wrongs that the chancellor redressed were often wrongs of the simplest and most brutal kind: assaults, batteries and forcible dispossessions. However, he was warned off this field of activity by parliament; the danger to law, to lawyers, to trial by jury, was evident. But just when this was happening, a new field was being opened for him by the growing practice of conveying land to trustees. The English trust of land had ancient Germanic roots, and of late we have been learning how in far-off centuries our Lombard cousins were in effect giving themselves a power of testation by putting their lands in trust. In England, when the forms of action were crystallizing, this practice had not been common enough to obtain the protection of a writ; but many causes conspired to make it common in the 14th century; and so, with the general approval of lawyers and laity, the chancellors began to enforce by summary process against the trustee the duty that lay upon his conscience. In the next century it was clear that England had come by a new civil tribunal. Negatively, its competence was defined by the rule that when the common law offered a remedy, the chancellor was not to intervene. Positively, his power was conceived as that of doing what "good conscience" required, more especially in cases of "fraud, accident or breach of confidence." His procedure was the summary, the heresy-suppressing (not the ordinary and solemn) procedure of an ecclesiastical court; but there are few signs that he borrowed any substantive rules from legist or decretist, and many proofs that within the new field of trust he pursued the ideas of the common law. It was long, however, before lawyers made a habit of reporting his decisions. He was not supposed to be tightly bound by precedent. Adaptability was of the essence of the justice that he did.

The Tudor Age.

A time of strain and trial came with the Tudor kings. It was questionable whether the strong "governance" for which the weary nation yearned could work within the limits of a parliamentary system, or would be compatible with the preservation of the common law. We see new courts appropriating large fields of justice and proceeding *summarie et de plano*; the star chamber, the chancery, the courts of requests, of wards, of augmentations, the councils of the North and Wales; a little later we see the high commission. We see also that judicial torture which Fortescue had called the road to hell. The stream of law reports became intermittent under Henry VIII.; few judges of his or his son's reign left names that are to be remembered. In an age of humanism, alphabetically arranged "abridgments" of medieval cases were the best work of English lawyers: one comes to us from Anthony Fitzherbert (d. 1538), and another from Robert Broke (d. 1558). This was the time when Roman law swept like a flood over Germany. The modern historian of Germany will speak of "the Reception" (that is, the reception of Roman law), as no less important than the Renaissance and Reformation with which it is intimately connected. Very probably he will bestow hard words on a movement which disintegrated the nation and consolidated the tyranny of the princelings. Now a project that Roman law should be "received" in England occurred to Reginald Pole (d. 1558), a humanist, and at one time a reformer, who with good fortune might have been either king of England or pope of Rome. English law, said the future cardinal and archbishop, was barbarous; Roman law was the very voice of nature pleading for "civility" and good princely governance. Pole's words were brought to the ears of his majestic cousin, and, had the course of events been somewhat other than it was, King Henry might well have decreed a reception. The rôle of English Justinian would have perfectly suited him, and there are distinct traces of the civilian's Byzantinism in the doings of the Church of England's supreme head. The academic study of the Canon law was prohibited; regius professorships of the civil law were founded; civilians were to sit as judges in the ecclesiastical courts. A little later, the Protector Somerset was deeply interested in the establishment of a great school for civilians at Cambridge. Scottish law was the own sister of English law, and yet in Scotland we may see a reception of Roman jurisprudence which might have been more whole-hearted than it was, but for the drift of two British and Protestant kingdoms towards union. As it fell out, however, Henry could get what he wanted in church and state without any decisive supersession of English by foreign law. The omnicompetence of an act of parliament stands out the more clearly if it settles the succession to the throne, annuls royal marriages, forgives royal debts, defines religious creeds, attaints guilty or innocent nobles, or prospectively lends the force of statute to the king's proclamations. The courts of common law were suffered to work in obscurity, for jurors feared fines, and matter of state was reserved for council or star chamber. The Inns of Court were spared; their moots and readings did no perceptible harm, if little perceptible good.

Yet it is no reception of alien jurisprudence that must be chronicled, but a marvellous resuscitation of English medieval law. We may see it already in the Commentaries of Edward Plowden (d. 1585) who reported cases at length and lovingly. Bracton's great book was put in print, and was a key to much that had been forgotten or misunderstood. Under Parker's patronage, even the Anglo-Saxon dooms were brought to light; they seemed to tell of a Church of England that had not yet been

Coke.

enslaved by Rome. The new national pride that animated Elizabethan England issued in boasts touching the antiquity, humanity, enlightenment of English law. Resuming the strain of Fortescue, Sir Thomas Smith, himself a civilian, wrote concerning the Commonwealth of England a book that claimed the attention of foreigners for her law and her polity. There was dignified rebuke for the French jurist who had dared to speak lightly of Littleton. And then the common law took flesh in the person of Edward Coke (1552–1634). With an enthusiastic love of English tradition, for the sake of which many offences may be forgiven him, he ranged over nearly the whole field of law, commenting, reporting, arguing, deciding,—disorderly, pedantic, masterful, an incarnate national dogmatism tenacious of continuous life. Imbued with this new spirit, the lawyers fought the battle of the constitution against James and Charles, and historical research appeared as the guardian of national liberties. That the Stuarts united against themselves three such men as Edward Coke, John Selden and William Prynne, is the measure of their folly and their failure. Words that, rightly or wrongly, were ascribed to Bracton rang in Charles's ears when he was sent to the scaffold. For the modern student of medieval law many of the reported cases of the Stuart time are storehouses of valuable material, since the lawyers of the 17th century were mighty hunters after records. Prynne (d. 1669), the fanatical Puritan, published ancient documents with fervid zeal, and made possible a history of parliament. Selden (d. 1654) was in all Europe among the very first to write legal history as it should be written. His book about tithes is to this day a model and a masterpiece. When this accomplished scholar had declared that he had laboured to make himself worthy to be called a common lawyer, it could no longer be said that the common lawyers were *indoctissimum genus doctissimorum hominum*. Even pliant judges, whose tenure of office depended on the king's will, were compelled to cite and discuss old precedents before they could give judgment for their master; and even at their worst moments they would not openly break with medieval tradition, or declare in favour of that "modern police-state" which has too often become the ideal of foreign publicists trained in Byzantine law.

Hale.

The current of legal doctrine was by this time so strong and voluminous that such events as the Civil War, the Restoration and the Revolution hardly deflected the course of the stream. In retrospect, Charles II. reigns so soon as life has left his father's body, and James II. ends a lawless career by a considerate and convenient abdication. The statute book of the restored king was enriched by leaves excerpted from the acts of a lord protector; and Matthew Hale (d. 1676), who was, perhaps, the last of the great record-searching judges, sketched a map of English law which Blackstone was to colour. Then a time of self-complacency came for the law, which knew itself to be the perfection of wisdom, and any proposal for drastic legislation would have worn the garb discredited by the tyranny of the Puritan Cæsar. The need for the yearly renewal of the Mutiny Act secured an annual session of parliament. The mass of the statute law made in the 18th century is enormous; but, even when we have excluded from view such acts as are technically called "private," the residuary matter bears a wonderfully empirical, partial and minutely particularizing character. In this "age of reason," as we are wont to think it, the British parliament seems rarely to rise to the dignity of a general proposition, and in our own day the legal practitioner is likely to know less about the statutes of the 18th century than he knows about the statutes of Edward I., Henry VIII. and Elizabeth. Parliament, it should be remembered, was endeavouring directly to govern the nation. There was little that resembled the permanent civil service of to-day. The choice lay between direct parliamentary government and royal "prerogative"; and lengthy statutes did much of that work of detail which would now be done by virtue of the powers that are delegated to ministers and governmental boards. Moreover, extreme and verbose particularity was required in statutes, for judges were loath to admit that the common law was capable of amendment. A vague doctrine, inherited from Coke, taught that statutes might be so unreasonable as to be null, and any political theory that seemed to derive from Hobbes would have been regarded with not unjust suspicion. But the doctrine in question never took tangible shape, and enough could be done to protect the common law by a niggardly exposition of every legislating word. It is to be remembered that some main features of English public law were attracting the admiration of enlightened Europe. When Voltaire and Montesquieu applauded, the English lawyer had cause for complacency.

The common law was by no means stagnant. Many rules which come to the front in the 18th century are hardly to be traced farther. Especially is this the case in the province of mercantile law, where the earl of Mansfield's (d. 1793) long presidency over the king's bench marked an epoch. It is too often forgotten that, until Elizabeth's reign, England was a thoroughly rustic kingdom, and that trade with England was mainly in the hands of foreigners. Also in medieval fairs, the assembled merchants declared their own "law merchant," which was considered to have a supernational validity. In the reports of the common law courts it is late in the day before we read of some mercantile usages which can be traced far back in the statutes of Italian cities. Even on the basis of the excessively elaborated land law—a basis which Coke's Commentary on Littleton seemed to have settled for ever—a lofty and ingenious superstructure could be reared. One after another delicate devices were invented for the accommodation of new wants within the law; but only by the assurance that the old law could not be frankly abolished can we be induced to admire the subtlety that was thus displayed. As to procedure, it had become a maze of evasive fictions, to which only a few learned men held the historical clue. By fiction the courts had stolen business from each other, and by fiction a few comparatively speedy forms of action were set to tasks for which they were not originally framed. Two fictitious persons, John Doe and Richard Roe, reigned supreme. On the other hand, that healthy and vigorous institution, the Commission of the Peace, with a long history behind it, was giving an important share in the administration of justice to numerous country gentlemen who were thus compelled to learn some law. A like beneficial work was being done among jurors, who, having ceased to be regarded as witnesses, had become "judges of fact." No one doubted that trial by jury was the "palladium" of English liberties, and popularity awaited those who would exalt the office of the jurors and narrowly limit the powers of the judge.

Equity.

But during this age the chief addition to English jurisprudence was made by the crystallization of the chancellor's equity. In the 17th century the chancery had a narrow escape of sharing the fate that befell its twin sister the star chamber. Its younger sister the court of requests perished under the persistent attacks of the common lawyers. Having outlived troubles, the chancery took to orderly habits, and administered under the name of "equity" a growing group of rules, which in fact were supplemental law. Stages in this process are marked by the chancellorships of Nottingham (1673–1675) and Hardwicke (1737–1756). Slowly a continuous series of Equity Reports began to flow, and still more slowly an "equity bar" began to form itself. The principal outlines of equity were drawn by men who were steeped in the common law. By way of ornament a Roman maxim might be borrowed from a French or Dutch expositor, or a phrase which smacked of that "nature-rightly" school which was dominating continental Europe; but the influence exercised by Roman law upon English equity has been the subject of gross exaggeration. Parliament and the old courts being what they were, perhaps it was only in a new court that the requisite new law could be evolved. The result was not altogether satisfactory. Freed from contact with the plain man in the jury-box, the chancellors were tempted to forget how plain and rough good law should be, and to screw up the legal standard of reasonable conduct to a height hardly attainable except by those whose purses could command the constant advice of a family solicitor. A court which started with the idea of doing summary justice for the poor became a court which did a highly refined, but tardy justice, suitable only to the rich.

Blackstone.

About the middle of the century William Blackstone, then a disappointed barrister, began to give lectures on English law at Oxford (1758), and soon afterwards he began to publish (1765) his *Commentaries*. Accurate enough in its history and doctrine to be an invaluable guide to professional students and a useful aid to practitioners, his book set before the unprofessional public an artistic picture of the laws of England such as had never been drawn of any similar system. No nation but the English had so eminently readable a law-book, and it must be doubtful whether any other lawyer ever did more important work than was done by the first professor of English law. Over and over again the *Commentaries* were edited, sometimes by distinguished men, and it is hardly too much to say that for nearly a century the English lawyer's main ideas of the organization and articulation of the body of English law were controlled by Blackstone. This was far from all. The Tory lawyer little thought that he was giving law to colonies that were on the eve of a great and successful rebellion. Yet so it was. Out in America, where books were few and lawyers had a mighty task to perform, Blackstone's facile presentment of the law of the mother country was of inestimable value. It has been said that among American lawyers the *Commentaries* "stood for the law of England," and this at a time when the American daughter of English law was rapidly growing in stature, and was preparing herself for her destined march from the Atlantic to the Pacific Ocean. Excising only what seemed to savour of oligarchy, those who had defied King George retained with marvellous tenacity the law of their forefathers. Profound discussions of English medieval law have been heard in American courts; admirable researches into the recesses of the Year-Books have been made in American law schools; the names of the great American judges are familiar in an England which knows little indeed of foreign jurists; and the debt due for the loan of Blackstone's *Commentaries* is being fast repaid. Lectures on the common law delivered by Mr Justice Holmes of the Supreme Court of the United States may even have begun to turn the scale against the old country. No chapter in Blackstone's book nowadays seems more antiquated than that which describes the modest territorial limits of that English law which was soon to spread throughout Australia and New Zealand and to follow the dominant race in India.

Bentham.

Long wars, vast economic changes and the conservatism generated by the French Revolution piled up a monstrous arrear of work for the English legislature. Meanwhile, Jeremy Bentham (d. 1832) had laboured for the overthrow of much that Blackstone had lauded. Bentham's largest projects of destruction and reconstruction took but little effect. Profoundly convinced of the fungibility and pliability of mankind, he was but too ready to draw a code for England or Spain or Russia at the shortest notice; and, scornful as he was of the past and its historic deposit, a code drawn by Bentham would have been a sorry failure. On the other hand, as a critic and derider of the system which Blackstone had complacently expounded he did excellent service. Reform, and radical reform, was indeed sadly needed throughout a system which was encumbered by noxious rubbish, the useless leavings of the middle ages: trial by battle and compurgation, deodands and benefit of clergy, John Doe and Richard Roe. It is perhaps the main fault of "judge-made law" (to use Bentham's phrase) that its destructive work can never be cleanly done. Of all vitality, and therefore of all patent harmfulness, the old rule can be deprived, but the moribund husk must remain in the system doing latent mischief. English law was full of decaying husks when Bentham attacked it, and his persistent demand for reasons could not be answered. At length a general interest in "law reform" was excited; Romilly and Brougham were inspired by Bentham, and the great changes in constitutional law which cluster round the Reform Act of 1832 were accompanied by many measures which purged the private, procedural and criminal law of much, though hardly enough, of the medieval dross. Some credit for rousing an interest in law, in definitions of legal terms, and in schemes of codification, is due to John Austin (d. 1859) who was regarded as the jurist of the reforming and utilitarian group. But, though he was at times an acute dissector of confused thought, he was too ignorant of the English, the Roman and every other system of law to make any considerable addition to the sum of knowledge; and when Savigny, the herald of evolution, was already in the field, the day for a "Nature-Right"—and Austin's projected "general jurisprudence" would have been a Nature-Right—was past beyond recall. The obsolescence of the map of law which Blackstone had inherited from Hale, and in which many outlines were drawn by medieval formulas, left intelligent English lawyers without a guide, and they were willing to listen for a while to what in their insularity they thought to be the voice of cosmopolitan science. Little came of it all. The revived study of Germanic law in Germany, which was just beginning in Austin's day, seems to be showing that the scheme of Roman jurisprudence is not the scheme into which English law will run without distortion.

Recent changes.

In the latter half of the 19th century some great and wise changes were made by the legislature. Notably in 1875 the old courts were merged in a new Supreme Court of Judicature, and a concurrent administration of law and equity was introduced. Successful endeavours have been made also to reduce the bulk of old statute law, and to improve the form of acts of parliament; but the emergence of new forces whose nature may be suggested by some such names as "socialism" and "imperialism" has distracted the attention of the British parliament from the commonplace law of the land, and the development of obstructive tactics has caused the issue of too many statutes whose brevity was purchased by disgraceful obscurity. By way of "partial codification" some branches of the common law (bills of exchange, sale of goods, partnership) have been skilfully stated in statutes, but a draft criminal code, upon which much expert labour was expended, lies pigeon-holed and almost forgotten. British India has been the scene of some large legislative exploits, and in America a few big experiments have been made in the way of code-making, but have given little satisfaction to the bulk of those who are competent to appreciate their results. In England there are large portions of the law which, in their present condition, no one would think of codifying: notably the law of real property, in which may still be found numerous hurtful relics of bygone centuries. So omnipresent are statutes throughout the whole field of jurisprudence that the opportunity of doing any great feat in the development of law can come but seldom to a modern court. More and more, therefore, the fate of English law depends on the will of parliament, or rather of the ministry. The quality of legal text-books has steadily improved; some of them are models of clear statement and good arrangement; but no one has with any success aspired to be the Blackstone of a new age.

Law reporting.

The Council of Law Reporting was formed in the year 1863. The council now consists of three *ex-officio* members—the attorney-general, the solicitor-general and the president of the Incorporated Law Society, and ten members appointed by the three Inns of Court, the Incorporated Law Society and the council itself on the nomination of the general council of the bar. The practitioner and the student now get for a subscription of four guineas a year the reports in all the superior courts and the House of Lords, and the judicial committee of the privy council issued in monthly parts a king's printer's copy of the statutes, and weekly notes, containing short notes of current decisions and announcements of all new rules made under the Judicature Acts and other acts of parliament, and other legal information. In addition the subscriber receives the chronological index of the statutes published from time to time by the Stationery Office, and last, but not least, the Digests of decided cases published by the council from time to time. In 1892 a Digest was published containing the cases and statutes for twenty-five years, from 1865 to 1890, and this was supplemented by one for the succeeding ten years, from 1891 to 1900. The digesting is now carried on continuously by means of "Current Indexes," which are published monthly and annually, and consolidated into a digest at stated intervals (say) of five years. The Indian appeals series, which is not required by the general practitioner, is supplied separately at one guinea a year.

Legal education.

In the 16th and 17th centuries the corporate life of the Inns of Court in London became less and less active. The general decay of the organization of crafts and gilds showed itself among lawyers as among other craftsmen. Successful barristers, sharing in the general prosperity of the country, became less and less able and willing to devote their time to the welfare of their profession as a whole. The Inns of Chancery, though some of their buildings still remain—picturesque survivals in their "suburbs"—ceased to be used as places for the education of students. The benchers of the Inns of Court, until the revival towards the middle of the 19th century, had wholly ceased to concern themselves with the systematic teaching of law. The modern system of legal education may be said to date from the establishment, in 1852, of the council of legal education, a body of twenty judges and barristers appointed by the four Inns of Court to control the legal education of students preparing to be called to the bar. The most important feature is the examination which a student must pass before he can be called. The examination (which by degrees has been made "stiffer") serves the double purpose of fixing the compulsory standard which all must reach, and of guiding the reading of students who may desire, sooner or later, to carry their studies beyond this standard. The subjects in which the examination is held are divided into Roman law; Constitutional law and legal history; Evidence, Procedure and Criminal law; Real and Personal Property; Equity; and Common law. The council of legal education also appoint a body of readers and assistant readers, practising barristers, who deliver lectures and hold classes.

Meanwhile the custom remains by which a student reads for a year or more as a pupil in the chambers of some practising barrister. In the 18th century it first became usual for students to read with a solicitor or attorney, and after a short time the modern practice grew up of reading in the chambers of a conveyancer, equity draftsman or special pleader, or, in more recent times, in the chambers of a junior barrister. Before the modern examination system, a student required to have a certificate from the barrister in whose chambers he had been a pupil before he could be "called," but the only relic of the old system now is the necessity of "eating dinners," six (three for university men) in each of the four terms for three years, at one of the Inns of Court.

The education of solicitors suffered from the absence of any professional organization until the Incorporated Law Society was established in 1825 and the following years. So far as any professional education is provided for solicitors or required from them, this is due to the efforts of the Law Society. As early as 1729 it was required by statute that any person applying for admission as attorney or solicitor should submit to examination by one of the judges, who was to test his fitness and capacity in consideration of a fee of one shilling. At the same time regular preliminary service under articles was required, that is to say, under a contract by which the clerk was bound to serve for five years. The examination soon became, perhaps always was, an empty form. The Law Society, however, soon showed zeal for the education of future solicitors. In 1833 lectures were instituted. In 1836 the first regular examinations were established, and in 1860 the present system of examinations—preliminary, intermediate and final—came into effect. Of these only the last two are devoted to law, and both are of a strictly professional character. The final examination is a fairly severe test of practical acquaintance with all branches of modern English law. The Law Society makes some provision for the teaching of students, but this teaching is designed solely to assist in preparation for the examinations.

At the universities of Oxford and Cambridge there has, since 1850, been an attempt to promote the study of law. The curriculum of legal subjects in which lectures are given and examinations held is calculated to give a student a sound fundamental knowledge of general principles, as well as an elementary acquaintance with the rules of modern English law. Jurisprudence, Roman law, Constitutional law and International law are taught, as well as the law of Real and Personal Property, the Law of Contract and Tort, Criminal law, Procedure and Evidence. But the law tripos and the law schools suffer from remoteness from the law courts, and from the exclusively academical character of the teaching. Law is also taught, though not on a very large scale, at Manchester and at Liverpool. London University has encouraged the study of law by its examinations for law degrees, at which a comparatively high standard of knowledge is required; and at University College, London, and King's College, London, teaching is given in law and jurisprudence.

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ENGLISH LITERATURE. The following discussion of the evolution of English literature, *i.e.* of the contribution to literature made in the course of ages by the writers of England, is planned so as to give a comprehensive view, the details as to particular authors and their work, and special consideration of the greater writers, being given in the separate articles devoted to them. It is divided into the following sections: (1) Earliest times to Chaucer; (2) Chaucer to the end of the middle ages; (3) Elizabethan times; (4) the Restoration period; (5) the Eighteenth century; (6) the Nineteenth century. The object of these sections is to form connecting links among the successive literary ages, leaving the separate articles on individual great writers to deal with their special interest; attention being paid in the main to the gradually developing characteristics of the product, *quâ* literary. The precise delimitation of what may narrowly be called "English" literature, *i.e.* in the English language, is perhaps impossible, and separate articles are devoted to American literature (*q.v.*), and to the vernacular literatures of Scotland (see SCOTLAND; and CELT: *Literature*), Ireland (see CELT: *Literature*), and Wales (see CELT: *Literature*); see also CANADA: *Literature*. Reference may also be made to such general articles on particular forms as NOVEL; ROMANCE; VERSE, &c.

I. EARLIEST TIMES TO CHAUCER

English literature, in the etymological sense of the word, had, so far as we know, no existence until Christian times. There is no evidence either that the heathen English had adopted the Roman alphabet, or that they had learned to employ their native monumental script (the runes) on materials suitable for the writing of continuous compositions of considerable length.

It is, however, certain that in the pre-literary period at least one species of poetic art had attained a high degree of development, and that an extensive body of poetry was handed down—not, indeed, with absolute fixity of form or substance—from generation to generation. This unwritten poetry was the work of minstrels who found their audiences in the halls of kings and nobles. Its themes were the exploits of heroes belonging to the royal houses of Germanic Europe, with which its listeners claimed kinship. Its metre was the alliterative long line, the lax rhythm of which shows that it was intended, not to be sung to regular melodies, but to be recited—probably with some kind of instrumental accompaniment. Of its beauty and power we may judge from the best passages in *Beowulf* (*q.v.*); for there can be little doubt that this poem gained nothing and lost much in the process of literary redaction.

The conversion of the people to Christianity necessarily involved the decline of the minstrelsy that celebrated the glories of heathen times. Yet the descendants of Woden, even when they were devout Christians, would not easily lose all interest in the achievements of their kindred of former days. Chaucer's knowledge of "the song of Wade" is one proof among others that even so late as the 14th century the deeds of Germanic heroes had not ceased to be recited in minstrel verse. The paucity of the extant remains of Old English heroic poetry is no argument to the contrary. The wonder is that any of it has survived at all. We may well believe that the professional reciter would, as a rule, be jealous of any attempt to commit to writing the poems which he had received by tradition or had himself composed. The clergy, to whom we owe the writing and the preservation of the Old English MSS., would only in rare instances be keenly interested in secular poetry. We possess, in fact, portions of four narrative poems, treating of heroic legend—*Beowulf*, *Widsith*, *Finnesburh* and *Waldere*. The second of these has no poetical merit, but great archaeological interest. It is an enumeration of the famous kings known to German tradition, put into the mouth of a minstrel (named Widsith, "far-travelled"), who claims to have been at many of their courts and to have been rewarded by them for his song. The list includes historical persons such as Ermanaric and Alboin, who really lived centuries apart, but (with the usual chronological vagueness of tradition) are treated as contemporaries. The extant fragment of *Finnesburh* (50 lines) is a brilliant battle piece, belonging to a story of which another part is introduced episodically in *Beowulf*. *Waldere*, of which we have two fragments (together 68 lines) is concerned with Frankish and Burgundian traditions based on events of the 5th century; the hero is the "Waltharius" of Ekkehart's famous Latin epic. The English poem may possibly be rather a literary composition than a genuine example of minstrel poetry, but the portions that have survived are hardly inferior to the best passages of *Beowulf*.

It may reasonably be assumed that the same minstrels who entertained the English kings and nobles with the recital of ancient heroic traditions would also celebrate in verse the martial deeds of their own patrons and their immediate ancestors. Probably there may have existed an abundance of poetry commemorative of events in the conquest of Britain and the struggle with the Danes. Two examples only have survived, both belonging to the 10th century: The *Battle of Brunanburh*, which has been greatly over-praised by critics who were unaware that its striking phrases and compounds are mere traditional echoes; and the *Battle of Maldon*, the work of a truly great poet, of which unhappily only a fragment has been preserved.

One of the marvels of history is the rapidity and thoroughness with which Christian civilization was adopted by the English. Augustine landed in 597; forty years later was born an Englishman, Aldhelm, who in the judgment of his contemporaries throughout the Christian world was the most accomplished scholar and the finest Latin writer of his time. In the next generation England produced in Bede (Bæda) a man who in solidity and variety of knowledge, and in literary power, had for centuries no rival in Europe. Aldhelm and Bede are known to us only from their Latin writings, though the former is recorded to have written vernacular poetry of great merit. The extant Old English literature is almost entirely Christian, for the poems that belong to an earlier period have been expurgated and interpolated in a Christian sense. From the writings that have survived, it would seem as if men strove to forget that England had ever been heathen. The four deities whose names are attached to the days of the week are hardly mentioned at all. The names Thunor and Tiw are sometimes used to translate the Latin Jupiter and Mars; Woden has his place (but not as a god) in the genealogies of the kings, and his name occurs once in a magical poem, but that is all. Bede, as a historian, is obliged to tell the story of the conversion; but the only native divinities he mentions are the goddesses Hrēth and Eostre, and all we learn about them is that they gave their names to Hrēthemōnath (March) and Easter. That superstitious practices of heathen origin long survived among the people is shown by the acts of church councils and by a few poems of a magical nature that have been preserved; but, so far as can be discovered, the definite worship of the ancient gods quickly died out. English heathenism perished without leaving a record.

The Old English religious poetry was written, probably without exception, in the cloister, and by men who were familiar with the Bible and with Latin devotional literature. Setting aside the wonderful *Dream of the Rood*, it gives little evidence of high poetic genius, though much of it is marked by a degree of culture and refinement that we should hardly have expected. Its material and thought are mainly derived from Latin sources; its expression is imitated from the native heroic poetry. Considering that a great deal of Latin verse was written by Englishmen in the 7th and succeeding centuries, and that in one or two poems the line is actually composed of an English and a Latin hemistich rhyming together, it seems strange that the Latin influence on Old English versification should have been so small. The alliterative long line is throughout the only metre employed, and although the laws of alliteration and rhythm were less rigorously obeyed in the later than in the earlier poetry, there is no trace of approximation to the structure of Latin verse. It is true that, owing to imitation of the Latin hymns of the church, rhyme came gradually to be more and more frequently used as an ornament of Old English verse; but it remained an ornament only, and never became an essential feature. The only poem in which rhyme is employed throughout is one in which sense is so completely sacrificed to sound that a translation would hardly be possible. It was not only in metrical respects that the Old English religious poetry remained faithful to its native models. The imagery and the diction are mainly those of the old heroic poetry, and in some of the poems Christ and the saints are presented, often very incongruously, under the aspect of Germanic warriors. Nearly all the religious poetry that has any considerable religious value seems to have been written in Northumbria during the 8th century. The remarkably vigorous poem of *Judith*, however, is certainly much later, and the *Exodus*, though early, seems to be of southern origin. For a detailed account of the Old English sacred poetry, the reader is referred to the articles on CÆDMON and CYNEWULF, to one or other of whom nearly every one of the poems, except those of obviously late date, has at some time been attributed.

The Riddles (*q.v.*) of the Exeter Book resemble the religious poetry in being the work of scholars, but they bear much more decidedly the impress of the native English character. Some of them rank among the most artistic and pleasing productions of Old English poetry. The Exeter Book contains also several pieces of a gnomic character, conveying proverbial instruction in morality and worldly wisdom. Their morality is Christian, but it is not unlikely that some of the wise sayings they contain may have come down by tradition from heathen times. The very curious *Dialogue of Solomon and Saturn* may be regarded as belonging to the same class.

The most original and interesting portion of the Old English literary poetry is the group of dramatic monologues—*The Banished Wife's Complaint*, *The Husband's Message*, *The Wanderer*, *The Seafarer*, *Deor* and *Wulf and Eadwacer*. The date of these compositions is uncertain, though their occurrence in the Exeter Book shows that they cannot be later than the 10th century. That they are all of one period is at least unlikely, but they are all marked by the same peculiar tone of pathos. The monodramatic form renders it difficult to obtain a clear idea of the situation of the supposed speakers. It is not improbable that most of these poems may relate to incidents of heroic legend, with which the original readers were presumed to be acquainted. This, however, can be definitely affirmed only in the case of the two short pieces—*Deor* and *Wulf and Eadwacer*—which have something of a lyric character, being the only examples in Old English of strophic structure and the use of the refrain. *Wulf and Eadwacer*, indeed, exhibits a still further development in the same direction, the monotony of the long line metre being varied by the admission of short lines formed by the suppression of the second hemistich. The highly developed art displayed in this remarkable poem gives reason for believing that the existing remains of Old English poetry very inadequately represent its extent and variety.

While the origins of English poetry go back to heathen times, English prose may be said to have had its effective beginning in the reign of Alfred. It is of course true that vernacular prose of some kind was written much earlier. The English laws of Æthelberht of Kent, though it is perhaps unlikely that they were written down, as is commonly supposed, in the lifetime of Augustine (died A.D. 604), or even in that of the king (d. 616), were well known to Bede; and even in the 12th-century transcript that has come down to us, their crude and elliptical style gives evidence of their high antiquity. Later kings of Kent and of Wessex followed the example of publishing their laws in the native tongue. Bede is known to have translated the beginning of the gospel of John (down to vi. 9). The early part of the Anglo-Saxon Chronicle (*q.v.*) is probably founded partly on prose annals of pre-Alfredian date. But although the amount of English prose written between the beginning of the 7th and the middle of the 9th century may have been considerable, Latin continued to be regarded as the appropriate vehicle for works of any literary pretension. If the English clergy had retained the scholarship which they possessed in the days of Aldhelm and Bede, the creation of a vernacular prose literature would probably have been longer delayed; for while Alfred certainly was not indifferent to the need of the laity for instruction, the evil that he was chiefly concerned to combat was the ignorance of their spiritual guides.

Of the works translated by him and the scholars whom he employed, *St Gregory's Pastoral Care* and his *Dialogues* (the latter rendered by Bishop Werferth) are expressly addressed to the priesthood; if the other translations were intended for a wider circle of readers, they are all (not excepting the secular *History of Orosius*) essentially religious in purpose and spirit. In the interesting preface to the *Pastoral Care*, in the important accounts of Northern lands and peoples inserted in the *Orosius*, and in the free rendering and amplification of the *Consolation* of Boethius and of the *Soliloquies* of Augustine, Alfred appears as an original writer. Other fruits of his activity are his Laws (preceded by a collection of those of his 7th-century predecessor, Ine of Wessex), and the beginnings of the Anglo-Saxon Chronicle. The Old English prose after Alfred is entirely of clerical authorship; even the Laws, so far as their literary form is concerned, are hardly to be regarded as an exception. Apart from the Chronicle (see ANGLO-SAXON CHRONICLE), the bulk of this literature consists of translations from Latin and of homilies and saints' lives, the substance of which is derived from sources mostly accessible to us in their original form; it has therefore for us little importance except from the philological point of view. This remark may be applied, in the main, even to the writings of Ælfric, notwithstanding the great interest which attaches to his brilliant achievement in the development of the capacities of the native language for literary expression. The translation of the gospels, though executed in Ælfric's time (about 1000), is by other hands. The sermons of his younger contemporary, Archbishop Wulfstan, are marked by earnestness and eloquence, and contain some passages of historical value.

From the early years of the 11th century we possess an encyclopaedic manual of the science of the time—chronology, astronomy, arithmetic, metre, rhetoric and ethics—by the monk Byrhtferth, a pupil of Abbo of Fleury. It is a compilation, but executed with intelligence. The numerous works on medicine, the properties of herbs, and the like, are in the main composed of selections from Latin treatises; so far as they are original, they illustrate the history of superstition rather than that of science. It is interesting to observe that they contain one or two formulas of incantations in Irish.

Two famous works of fiction, the romance of *Apollonius of Tyre* and the *Letter of Alexander*, which in their Latin form had much influence on the later literature of Europe, were Englished in the 11th century with considerable skill. To the same period belongs the curious tract on *The Wonders of the East*. In these works, and some minor productions of the time, we see that the minds of Englishmen were beginning to find interest in other than religious subjects.

The crowding of the English monasteries by foreigners, which was one of the results of the Norman Conquest, brought about a rapid arrest of the development of the vernacular literature. It was not long before the boys trained in the monastic schools ceased to learn to read and write their native tongue, and learned instead to read and write French. The effects of this change are visible in the rapid alteration of the literary language. The artificial tradition of grammatical correctness lost its hold; the archaic literary vocabulary fell into disuse; and those who wrote English at all wrote as they spoke, using more and more an extemporized phonetic spelling based largely on French analogies. The 12th century is a brilliant period in the history of Anglo-Latin literature, and many works of merit were written in French (see ANGLO-NORMAN). But vernacular literature is scanty and of little originality. The *Peterborough Chronicle*, it is true, was continued till 1154, and its later portions, while markedly exemplifying the changes in the language, contain some really admirable writing. But it is substantially correct to say that from this point until the age of Chaucer vernacular prose served no other purpose than that of popular religious edification. For light on the intellectual life of the nation during this period we must look mainly to the works written in Latin. The homilies of the 12th century are partly modernized transcripts from Ælfric and other older writers, partly translations from French and Latin; the remainder is mostly commonplace in substance and clumsy in expression. At the beginning of the 13th century the *Ancren Riwle* (*q.v.*), a book of counsel for nuns, shows true literary genius, and is singularly interesting in its substance and spirit; but notwithstanding the author's remarkable mastery of English expression, his culture was evidently French rather than English. Some minor religious prose works of the same period are not without merit. But these examples had no literary following. In the early 14th century the writings of Richard Rolle and his school attained great popularity. The profound influence which they exercised on later religious thought, and on the development of prose style, has seldom been adequately recognized. The *Ayenbite of Inwyt* (see MICHEL, DAN), a wretchedly unintelligent translation (finished in 1340) from Frère Lorens's *Somme des vices et des vertus*, is valuable to the student of language, but otherwise worthless.

The break in the continuity of literary tradition, induced by the Conquest, was no less complete with regard to poetry than with regard to prose. The poetry of the 13th and the latter part of the 12th century was uninfluenced by the written works of Old English poets, whose archaic diction had to a great extent become unintelligible. But there is no ground to suppose that the succession of popular singers and reciters was ever interrupted. In the north-west, indeed, the old recitative metre seems to have survived in oral tradition, with little more alteration than was rendered necessary by the changes in the language, until the middle of the 14th century, when it was again adopted by literary versifiers. In the south this metre had greatly degenerated in strictness before the Conquest, but, with gradually increasing laxity in the laws of alliteration and rhythm, it continued long in use. It is commonly believed, with great intrinsic probability but with scanty actual evidence, that in the Old English period there existed, beside the alliterative long line, other forms of verse adapted not for recitation but for singing, used in popular lyrics and ballads that were deemed too trivial for written record. The influence of native popular poetic tradition, whether in the form of recited or of sung verse, is clearly discernible in the earliest Middle English poems that have been preserved. But the authors of these poems were familiar with Latin, and probably spoke French as easily as their mother tongue; and there was no longer any literary convention to restrain them from adopting foreign metrical forms. The artless verses of the hermit Godric, who died in 1170, exhibit in their metre the combined influence of native rhythm and of that of Latin hymnology. The *Proverbs of Alfred*, written about 1200, is (like the later *Proverbs of Hendyng*) in style and substance a gnomic poem of the ancient Germanic type, containing maxims some of which may be of immemorial antiquity; and its rhythm is mainly of native origin. On the other hand, the solemn and touching meditation known as the *Moral Ode*, which is somewhat earlier in date, is in a metre derived from contemporary Latin verse—a line of seven accents, broken by a caesura, and with feminine end-rhymes. In the *Ormulum* (see Orm) this metre (known as the septenarius) appears without rhyme, and with a syllabic regularity previously without example in English verse, the line (or distich, as it may be called with almost equal propriety) having invariably fifteen syllables. In various modified forms, the septenarius was a favourite measure throughout the Middle English period. In the poetry of the 13th century the influence of French models is conspicuous. The many devotional lyrics, some of which, as the *Luve Ron* of Thomas of Hales, have great beauty, show this influence not only in their varied metrical form, but also in their peculiar mystical tenderness and fervour. The *Story of Genesis and Exodus*, the substance of which is taken from the Bible and Latin commentators, derives its metre chiefly from French. Its poetical merit is very small. The secular poetry also received a new impulse from France. The brilliant and sprightly dialogue of the *Owl and Nightingale*, which can hardly be dated later than about 1230, is a "contention" of the type familiar in French and Provencal literature. The "Gallic" type of humour may be seen in various other writings of this period, notably in the *Land of Cockaigne*, a vivacious satire on monastic self-indulgence, and in the fabliau of *Dame Siviz*, a story of Eastern origin, told with almost Chaucerian skill. Predominantly, though not exclusively French in metrical structure, are the charming love poems collected in a MS. (Harl. 2253) written about 1320 in Herefordshire, some of which (edited in T. Wright's *Specimens of Lyric Poetry*) find a place in modern popular anthologies. It is noteworthy that they are accompanied by some French lyrics very similar in style. The same MS. contains, besides some religious poetry, a number of political songs of the time of Edward II. They are not quite the earliest examples of their kind; in the time of the Barons' War the popular cause had had its singers in English as well as in French. Later, the victories of Edward III. down to the taking of Guisnes in 1352, were celebrated by the Yorkshireman Laurence Minot in alliterative verse with strophic arrangement and rhyme.

At the very beginning of the 13th century a new species of composition, the metrical chronicle, was introduced into English literature. The huge work of Layamon, a history (mainly legendary) of Britain from the time of the mythical Brutus till after the mission of Augustine, is a free rendering of the Norman-French *Brut* of Wace, with extensive additions from traditional sources. Its metre seems to be a degenerate survival of the Old English alliterative line, gradually modified in the course of the work by assimilation to the regular syllabic measure of the French original. Unquestionable evidence of the knowledge of the poem on the part of later writers is scarce, but distinct echoes of its diction appear in the chronicle ascribed to Robert of Gloucester, written in rhymed septenary measures about 1300. This work, founded in its earlier part on the Latin historians of the 12th century, is an independent historical source of some value for the events of the writer's own times. The succession of versified histories of England was continued by Thomas Bek of Castleford in Yorkshire (whose work still awaits an editor), and by Robert Mannyng of Brunne (Bourne, Lincolnshire). Mannyng's chronicle, finished in 1338, is a translation, in its earlier part from Wace's *Brut*; and in its later part from an Anglo-French chronicle (still extant) written by Peter Langtoft, canon of Bridlington.

Not far from the year 1300 (for the most part probably earlier rather than later) a vast mass of hagiological and homiletic verse was produced in divers parts of England. To Gloucester belongs an extensive series of Lives of Saints, metrically and linguistically closely resembling Robert of Gloucester's Chronicle, and perhaps wholly or in part of the same authorship. A similar collection was written in the north of England, as well as a large body of homilies showing considerable poetic skill, and abounding in *exempla* or illustrative stories. Of *exempla* several prose collections had already been made in Anglo-French, and William of Wadington's poem *Manuel des pechiés*, which contains a great number of them, was translated in 1303 by Robert Mannyng already mentioned, with some enlargement of the anecdotic element, and frequent omissions of didactic passages. The great rhyming chronicle of Scripture history entitled *Cursor Mundi* (*q.v.*) was written in the north about this time. It was extensively read and transcribed, and exercised a powerful influence on later writers down to the end of the 14th century. The remaining homiletic verse of this period is too abundant to be referred to in detail; it will be enough to mention the sermons of William of Shoreham, written in strophic form, but showing little either of metrical skill or poetic feeling. To the next generation belongs the *Pricke of Conscience* by Richard Rolle, the influence of which was not less powerful than that of the author's prose writings.

Romantic poetry, which in French had been extensively cultivated, both on the continent and in England from the early years of the 12th century, did not assume a vernacular form till about 1250. In the next hundred years its development was marvellously rapid. Of the vast mass of metrical romances produced during this period no detailed account need here be attempted (see Romance, and articles, &c. referred to; Arthurian Romance). Native English traditions form the basis of *King Horn*, *Guy of Warwick*, *Bevis of Hamtoun* and *Havelok*, though the stories were first put into literary form by Anglo-Norman poets. The popularity of these home-grown tales (with which may be classed the wildly fictitious *Coer de Lion*) was soon rivalled by that of importations from France. The English rendering of *Floris and Blancheflur* (a love-romance of Greek origin) is found in the same MS. that contains the earliest copy of *King Horn*. Before the end of the century, the French "matter of Britain" was represented in English by the Southern *Arthur and Merlin* and the Northern *Tristrem* and *Ywaine and Gawin*, the "matter of France" by *Roland and Vernagu* and *Otuel*; the *Alexander* was also translated, but in this instance the immediate original was an Anglo-French and not a continental poem. The tale of Troy did not come into English till long afterwards. The Auchinleck MS., written about 1330, contains no fewer than 14 poetical romances; there were many others in circulation, and the number continued to grow. About the middle of the 14th century, the Old English alliterative long line, which for centuries had been used only in unwritten minstrel poetry, emerges again in literature. One of the earliest poems in this revived measure, *Wynnere and Wastour*, written in 1352, is by a professional reciter-poet, who complains bitterly that original minstrel poetry no longer finds a welcome in the halls of great nobles, who prefer to listen to those who recite verses not of their own making. About the same date the metre began to be employed by men of letters for the translation of romance—*William of Palerne* and *Joseph of Arimathea* from the French, *Alexander* from Latin prose. The later development of alliterative poetry belongs mainly to the age of Chaucer.

The extent and character of the literature produced during the first half of the 14th century indicate that the literary use of the native tongue was no longer, as in the preceding age, a mere condescension to the needs of the common people. The rapid disuse of French as the ordinary medium of intercourse among the middle and higher ranks of society, and the consequent substitution of English for French as the vehicle of school instruction, created a widespread demand for vernacular reading. The literature which arose in answer to this demand, though it consisted mainly of translations or adaptations of foreign works, yet served to develop the appreciation of poetic beauty, and to prepare an audience in the near future for a poetry in which the genuine thought and feeling of the nation were to find expression.

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II. CHAUCER TO THE RENAISSANCE

The age of Chaucer is of peculiar interest to the student of literature, not only because of its brilliance and productiveness but also because of its apparent promise for the future In this, as in other aspects, Chaucer (*c.* 1340–1400) is its most notable literary figure. Beginning as a student and imitator of the best French poetry of his day, he was for a time, like most of his French contemporaries, little more than a skilful maker of elegant verses, dealing with conventional material in a conventional way, arranging in new figures the same flowers and bowers, sunsets and song-birds, and companies of fair women and their lovers, that had been arranged and rearranged by every poet of the court circle for a hundred years, and celebrated in sweet phrases of almost unvarying sameness. Even at this time, to be sure, he was not without close and loving observation of the living creatures of the real world, and his verses often bring us flowers dewy and fragrant and fresh of colour as they grew in the fields and gardens about London, and birds that had learned their music in the woods; but his poetry was still not easily distinguishable from that of Machault, Froissart, Deschamps, Transoun and the other "courtly makers" of France. But while he was still striving to master perfectly the technique of this pretty art of trifling, he became acquainted with the new literature of Italy, both poetry and prose. Much of the new poetry moved, like that of France, among the conventionalities and artificialities of an unreal world of romance, but it was of wider range, of fuller tone, of far greater emotional intensity, and, at its best, was the fabric, not of elegant ingenuity, but of creative human passion,—in Dante, indeed, a wonderful visionary structure in which love and hate, and pity and terror, and the forms and countenances of men were more vivid and real than in the world of real men and real passions. The new prose—which Chaucer knew in several of the writings of Boccaccio—was vastly different from any that he had ever read in a modern tongue. Here were no mere brief anecdotes like those *exempla* which in the middle ages illustrated vernacular as well as Latin sermons, no cumbrous, slow-moving treatises on the Seven Deadly Sins, no half-articulate, pious meditations, but rapid, vivid, well-constructed narratives ranging from the sentimental beauty of stories like Griselda and the Franklin's Tale to coarse mirth and malodorous vulgarity equal to those of the tales told later by Chaucer's Miller and Reeve and Summoner. All these things he studied and some he imitated. There is scarcely a feature of the verse that has not left some trace in his own; the prose he did not imitate as prose, but there can be little doubt that the subject matter of Boccaccio's tales and novels, as well as his poems, affected the direction of Chaucer's literary development, and quickened his habit of observing and utilizing human life, and that the narrative art of the prose was influential in the transformation of his methods of narration.

This transformation was effected not so much through the mere superiority of the Italian models to the French as through the stimulus which the differences between the two gave to his reflections upon the processes and technique of composition, for Chaucer was not a careless, happy-go-lucky poet of divine endowment, but a conscious, reflective artist, seeking not merely for fine words and fine sentiments, but for the proper arrangement of events, the significant exponent of character, the right tone, and even the appropriate background and atmosphere,—as may be seen, for example, in the transformations he wrought in the *Pardoner's Tale*. It is therefore in the latest and most original of the *Canterbury Tales* that his art is most admirable, most distinguished by technical excellences. In these we find so many admirable qualities that we almost forget that he had any defects. His diction is a model of picturesqueness, of simplicity, of dignity, and of perfect adaptation to his theme: his versification is not only correct but musical and varied, and shows a progressive tendency towards freer and more complex melodies; his best tales are not mere repetitions of the ancient stories they retell, but new creations, transformed by his own imaginative realization of them, full of figures having the dimensions and the vivacity of real life, acting on adequate motives, and moving in an atmosphere and against a background appropriate to their characters and their actions. In the tales of the Pardoner, the Franklin, the Summoner, the Squire, he is no less notable as a consummate artist than as a poet.

Chaucer, however, was not the only writer of his day remarkable for mastery of technique. Gower, indeed, though a man of much learning and intelligence, was neither a poet of the first rank nor an artist. Despite the admirable qualities of clearness, order and occasional picturesqueness which distinguish his work, he lacked the ability which great poets have of making their words mean more than they say, and of stirring the emotions even beyond the bounds of this enhanced meaning; and there is not, perhaps, in all his voluminous work in English, French and Latin, any indication that he regarded composition as an art requiring consideration or any care beyond that of conforming to the chosen rhythm and finding suitable rhymes.

There were others more richly endowed as poets and more finely developed as artists. There was the beginner of the *Piers Plowman* cycle,[1] the author of the Prologue and first eight passus of the A-text, a man of clear and profound observation, a poet whose imagination brought before him with distinctness and reality visual images of the motley individuals and masses of men of whom he wrote, an artist who knew how to organize and direct the figures of his dream-world, the movement of his ever-unfolding vision. There was the remarkable successor of this man, the author of the B-text, an almost prophetic figure, a great poetic idealist, and, helpless though he often was in the direction of his thought, an absolute master of images and words that seize upon the heart and haunt the memory. Besides these, an unknown writer far in the north-west had, in *Gawayne and the Grene Knight*, transformed the medieval romance into a thing of speed and colour, of vitality and mystery, no less remarkable for its fluent definiteness of form than for the delights of hall-feast and hunt, the graceful comedy of temptation, and the lonely ride of the doomed Gawayne through the silence of the forest and the deep snow. In the same region, by its author's power of visual imagination, the Biblical paraphrase, so often a mere humdrum narrative, had been transformed, in *Patience*, into a narrative so detailed and vivid that the reader is almost ready to believe that the author himself, rather than Jonah, went down into the sea in the belly of the great fish, and sat humbled and rebuked beside the withered gourd-vine. And there also, by some strange chance, blossomed, with perhaps only a local and temporary fragrance until its rediscovery in the 19th century, that delicate flower of loneliness and aspiration, *Pearl*, a wonder of elaborate art as well as of touching sentiment.

All these writings are great, not only relatively, but absolutely. There is not one of them which would not, if written in our own time, immediately mark its author as a man of very unusual ability. But the point of special concern to us at the present moment is not so much that they show remarkable poetic power, as that they possess technical merits of a very high order. And we are accustomed to believe that, although genius is a purely personal and incommunicable element, technical gains are a common possession; that after Marlowe had developed the technique of blank verse, this technique was available for all; that after Pope had mastered the heroic couplet and Gray the ode, and Poe the short story, all men could write couplets and odes and short stories of technical correctness; that, as Tennyson puts it,

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[1] *Piers Plowman* has been so long attributed as a whole to Langland (*q.v.*), that in spite of modern analytical criticism it is most conveniently discussed under that name.

> "All can grow the flower now,
> For all have got the seed."

But this was singularly untrue of the technical gains made by Chaucer and his great contemporaries. *Pearl* and *Patience* were apparently unknown to the 15th century, but *Gawayne* and *Piers Plowman* and Chaucer's works were known and were influential in one way or another throughout the century. *Gawayne* called into existence a large number of romances dealing with the same hero or with somewhat similar situations, some of them written in verse suggested by the remarkable verse of their model, but the resemblance, even in versification, is only superficial. *Piers Plowman* gave rise to satirical allegories written in the alliterative long line and furnished the figures and the machinery for many satires in other metres, but the technical excellence of the first *Piers Plowman* poem was soon buried for centuries under the tremendous social significance of itself and its successors. And Chaucer, in spite of the fact that he was praised and imitated by many writers and definitely claimed as master by more than one, not only transmitted to them scarcely any of the technical conquests he had made, but seems also to have been almost without success in creating any change in the taste of the public that read his poems so eagerly, any demand for better literature than had been written by his predecessors.

Wide and lasting Chaucer's influence undoubtedly was. Not only was all the court-poetry, all the poetry of writers who pretended to cultivation and refinement, throughout the century, in England and Scotland, either directly or indirectly imitative of his work, but even the humblest productions of unpretentious writers show at times traces of his influence. Scotland was fortunate in having writers of greater ability than England had (see SCOTLAND: *Literature*). In England the three chief followers of Chaucer known to us by name are Lydgate, Hoccleve (see OCCLEVE) and Hawes. Because of their praise of Chaucer and their supposed personal relations to him, Lydgate and Hoccleve are almost inseparable in modern discussions, but 15th century readers and writers appear not to have associated them very closely. Indeed, Hoccleve is rarely mentioned, while Lydgate is not only mentioned continually, but continually praised as Chaucer's equal or even superior. Hoccleve was not, to be sure, as prolific as Lydgate, but it is difficult to understand why his work, which compares favourably in quality with Lydgate's, attracted so much less attention. The title of his greatest poem, *De regimine principum*, may have repelled readers who were not princely born, though they would have found the work full of the moral and prudential maxims and illustrative anecdotes so dear to them; but his attack upon Sir John Oldcastle as a heretic ought to have been decidedly to the taste of the orthodox upper classes, while his lamentations over his misspent youth, his tales and some of his minor poems might have interested any one. Of a less vigorous spirit than Lydgate, he was, in his mild way, more humorous and more original. Also despite his sense of personal loss in Chaucer's death and his care to transmit to posterity the likeness of his beloved master, he seems to have been less slavish than Lydgate in imitating him. His memory is full of Chaucer's phrases, he writes in verse-forms hallowed by the master's use, and he tries to give to his lines the movement of Chaucer's decasyllables, but he is comparatively free from the influence of those early allegorical works of the Master which produced in the 15th century so dreary a flock of imitations.

Lydgate's productivity was enormous,—how great no man can say, for, as was the case with Chaucer also, his fame caused many masterless poems to be ascribed to him, but, after making all necessary deductions, the amount of verse that has come down to us from him is astonishing. Here it may suffice to say that his translations are predominantly epic (140,000 lines), and his original compositions predominantly allegorical love poems or didactic poems. If there is anything duller than a dull epic it is a dull allegory, and Lydgate has achieved both. This is not to deny the existence of good passages in his epics and ingenuity in his allegories, but there is no pervading, persistent life in either. His epics, like almost all the narrative verse of the time, whether epic, legend, versified chronicle or metrical romance, seem designed merely to satisfy the desire of 15th century readers for information, the craving for facts—true or fictitious—the same craving that made possible the poems on alchemy, on hunting, on manners and morals, on the duties of parish priests, on the seven liberal arts. His allegories, like most allegories of the age, are ingenious rearrangements of old figures and old machinery, they are full of what had once been imagination but had become merely memory assisted by cleverness. The great fault of all his work, as of nearly all the literature of the age, is that it is merely a more or less skilful manipulation of what the author had somewhere read or heard, and not a faithful transcript of the author's own peculiar sense or conception of what he had seen or heard or read. The fault is not that the old is repeated, that a twice-told tale is retold, but that it is retold without being re-imagined by the teller of the tale, without taking on from his personality something that was not in it before. Style, to be sure, was a thing that Lydgate and his fellows tried to supply, and some of them supplied it abundantly according to their lights. But style meant to them external decoration, classical allusions, personifications, an inverted or even dislocated order of words, and that famous "ornate diction," those "aureate terms," with which they strove to surpass the melody, picturesqueness and dignity which, for all its simplicity, they somehow dimly discerned in the diction of Chaucer.

Stephen Hawes, with his allegorical treatise on the seven liberal sciences, came later than these men, only to write worse. He was a disciple of Lydgate rather than of Chaucer, and is not only lacking in the vigour and sensitiveness which Lydgate sometimes displays, but exaggerates the defects of his master. If it be a merit to have conceived the pursuit of knowledge under the form of the efforts of a knight to win the hand of his lady, it is almost the sole merit to which Hawes can lay claim. Two or three good situations, an episode of low comedy, and the epitaph of the Knight with its famous final couplet, exhaust the list of his credits. The efforts that have been made to trace through Hawes the line of Spenser's spiritual ancestry seem not well advised. The resemblances that have been pointed out are such as arise inevitably from the allegories and from the traditional material with which both worked. There is no reason to believe that Spenser owed his general conception to Hawes, or that the *Faëry Queene* would have differed in even the slightest detail from its present form if the *Pastime of Pleasure* had never been written. The machinery of chivalric romance had already been applied to spiritual and moral themes in Spain without the aid of Hawes.

It is obvious that the fundamental lack of all these men was imaginative power, poetic ability. This is a sufficient reason for failure to write good poetry. But why did not men of better ability devote themselves to literature in this age? Was it because of the perturbed conditions arising from the prevalence of foreign and civil wars? Perhaps not, though it is clear that if Sir Thomas Malory had perished in one of the many fights through which he lived, the chivalric and literary impulses which he perhaps received from the "Fadre of Curteisy," Richard Beauchamp, earl of Warwick, would have gone for nothing and we should lack the *Morte Darthur*. But it may very well be that the wars and the tremendous industrial growth of England fixed the attention of the strongest and most original spirits among the younger men and so withdrew them from the possible attractions of literature. But, after all, whatever general truth may lie in such speculations, the way of a young man with his own life is as incalculable as any of the four things which Agur son of Jakeh declared to be past finding out; local and special accidents rather than general communal influences are apt to shape the choice of boys of exceptional character, and we have many instances of great talents turning to literature or art when war or commerce or science was the dominant attraction of social life.

But even recognizing that the followers of Chaucer were not men of genius, it seems strange that their imitation of Chaucer was what it was. They not only entirely failed to see what his merits as an artist were and how greatly superior his mature work is to his earlier in point of technique; they even preferred the earlier and imitated it almost exclusively. Furthermore, his mastery of verse seemed to them to consist solely in writing verses of approximately four or five stresses and arranging them in couplets or in stanzas of seven or eight lines. Their preference for the early allegorical work can be explained by their lack of taste and critical discernment and by the great vogue of allegorical writing in England and France. Men who are just beginning to think about the distinction between literature and ordinary writing usually feel that it consists in making literary expression differ as widely as possible from simple direct speech. For this reason some sort of artificial diction is developed and some artificial word order devised. Allegory is used as an elegant method of avoiding unpoetical plainness, and is an easy means of substituting logic for imagination. The failure to reproduce in some degree at least the melody and smoothness of Chaucer's decasyllabic verse, and the particular form which that failure took in Lydgate, are to be explained by the fact that Lydgate and his fellows never knew how Chaucer's verse sounded when properly read. It is a mistake to suppose that the disappearance of final unaccented *e* from many words or its instability in many others made it difficult for Lydgate and his fellows to write melodious verse. Melodious verse has been written since the disappearance of all these sounds, and the possibility of a choice between a form with final *e* and one without it is not a hindrance but an advantage to a poet, as Goethe, Schiller, Heine and innumerable German poets have shown by their practice. The real difficulty with these men was that they pronounced Chaucer's verse as if it were written in the English of their own day. As a matter of fact all the types of verse discovered by scholars in Lydgate's poems can be discovered in Chaucer's also if they be read with Lydgate's pronunciation. Chaucer did not write archaic English, as some have supposed,—that is, English of an earlier age than his own,—it would have been impossible for him to do so with the unfailing accuracy he shows; he did, however, write a conservative, perhaps an old-fashioned, English, such as was spoken by the conservative members of the class of society to which he was attached and for which he wrote. An English with fewer final *e*'s was already in existence among the less conservative classes, and this rapidly became standard English in consequence of the social changes which occurred during his own life. We know that a misunderstanding of Chaucer's verse existed from the 16th century to the time of Thomas Tyrwhitt; it seems clear that it began even earlier, in Chaucer's own lifetime.

There are several poems of the 15th century which were long ascribed to Chaucer. Among them are:—the *Complaint of the Black Knight*, or *Complaint of a Lover's Life*, now known to be Lydgate's; the *Mother of God*, now ascribed to Hoccleve; the *Cuckoo and the Nightingale*, by Clanvowe; *La Belle Dame sans merci*, a translation from the French of Alain Chartier by Richard Ros; *Chaucer's Dream, or the Isle of Ladies*; the *Assembly of Ladies*; the *Flower and the Leaf*; and the *Court of Love*. The two poems of Lydgate and Hoccleve are as good as Chaucer's poorest work. The *Assembly of Ladies* and the *Flower and the Leaf* are perhaps better than the *Book of the Duchess*, but not so good as the *Parliament of Fowls*. The *Flower and the Leaf*, it will be remembered, was very dear to John Keats, who, like all his contemporaries, regarded it as Chaucer's. An additional interest attaches to both it and the *Assembly of Ladies*, from the fact that the author may have been a woman; Professor Skeat is, indeed, confident that he knows who the woman was and when she wrote. These poems, like the *Court of Love*, are thoroughly conventional in material, all the figures and poetical machinery may be found in dozens of other poems in England and France, as Professor Neilson has shown for the *Court of Love* and Mr Marsh for the *Flower and the Leaf*; but there are a freshness of spirit and a love of beauty in them that are not common; the conventional birds and flowers are there, but they seem, like those of Chaucer's *Legend*, to have some touch of life, and the conventional companies of ladies and gentlemen ride and talk and walk with natural grace and ease. The *Court of Love* is usually ascribed to a very late date, as late even as the middle of the 16th century. If this is correct, it is a notable instance of the persistence of a Chaucerian influence. An effort has been made, to be sure, to show that it was written by Scogan and that the writing of it constituted the offence mentioned by Chaucer in his *Envoy to Scogan*, but it has been clearly shown that this is impossible, both because the language is later than Scogan's time and because nothing in the poem resembles the offence clearly described by Chaucer.

Whatever may be true of the authorship of the *Assembly of Ladies* and the *Flower and the Leaf*, there were women writers in England in the middle ages. Juliana of Norwich wrote her *Revelations of Divine Love* before 1400. The much discussed Dame Juliana Berners, the supposed compiler of the treatise on hunting in the *Book of St Albans*, may be mythical, though there is no reason why a woman should not have written such a book; and a shadowy figure that disappears entirely in the sunlight is the supposed authoress of the *Nut Brown Maid*, for if language is capable of definite meaning, the last stanza declares unequivocally that the poem is the work of a man. But there is a poem warning young women against entering a nunnery which may be by a woman, and there is an interesting entry among the records of New Romney for 1463–1464, "Paid to Agnes Forde for the play of the Interlude of our Lord's Passion, 6s. 8d.," which is apparently the earliest mention of a woman dramatist in England. Finally, Margaret, countess of Richmond, the mother of Henry VII., not only aided scholars and encouraged writers, but herself translated the (spurious) fourth book of St Thomas à Kempis's *Imitatio Christi*. Another Margaret, the duchess of Burgundy, it will be remembered, encouraged Caxton in his translation and printing. Women seem, indeed, to have been especially lovers of books and patrons of writers, and Skelton, if we may believe his *Garland of Laurel*, was surrounded by a bevy of ladies comparable to a modern literary club; Erasmus's Suffragette Convention may correspond to no reality, but the Learned Lady arguing against the Monk for the usefulness and pleasure derived from books was not an unknown type. Women were capable of many things in the middle ages. English records show them to have been physicians, churchwardens, justices of the peace and sheriffs, and, according to a satirist, they were also priests.

The most original and powerful poetry of the 15th century was composed in popular forms for the ear of the common people and was apparently written without conscious artistic purpose. Three classes of productions deserve special attention,—songs and carols, popular ballads and certain dramatic compositions. The songs and carols belong to a species which may have existed in England before the Norman Conquest, but which certainly was greatly modified by the musical and lyric forms of France. The best of them are the direct and simple if not entirely artless expressions of personal emotion, and even when they contain, as they sometimes do, the description of a person, a situation, or an event, they deal with these things so subjectively, confine themselves so closely to the rendering of the emotional effect upon the singer, that they lose none of their directness or simplicity. Some of them deal with secular subjects, some with religious, and some are curious and delightful blendings of religious worship and aspiration with earthly tenderness for the embodiments of helpless infancy and protecting motherhood which gave Christianity so much of its power over the affections and imagination of the middle ages. Even those which begin as mere expressions of joy in the Yule-tide eating and drinking and merriment catch at moments hints of higher joys, of finer emotions, and lift singer and hearer above the noise and stir of earth. Hundreds of songs written and sung in the 15th century must have perished; many, no doubt, lived only a single season and were never even written down; but chance has preserved enough of them to make us wonder at the age which could produce such masterpieces of tantalizing simplicity.

The lyrics which describe a situation form a logical, if not a real transition to those which narrate an episode or an event. The most famous of the latter, the *Nut Brown Maid*, has often been called a ballad, and "lyrical ballad" it is in the sense established by Coleridge and Wordsworth, but its affinities are rather with the song or carol than with the folk-ballad, and, like Henryson's charming *Robin and Malkin*, it is certainly the work of a man of culture and of conscious artistic purpose and methods. Unaccompanied, as it is, by any other work of the same author, this poem, with its remarkable technical merits, is an even more astonishing literary phenomenon than the famous single sonnet of Blanco White. It can hardly be doubted that the author learned his technique from the songs and carols.

The folk-ballad, like the song or carol, belongs in some form to immemorial antiquity. It is doubtless a mistake to suppose that any ballad has been preserved to us that is a purely communal product, a confection of the common knowledge, traditions and emotions of the community wrought by subconscious processes into a song that finds chance but inevitable utterance through one or more individuals as the whole commune moves in its molecular dance. But it is equally a mistake to argue that ballads are essentially metrical romances in a state of decay. Both the matter and the manner of most of the best ballads forbid such a supposition, and it can hardly be doubted that in some of the folk-ballads of the 15th century are preserved not only traditions of dateless antiquity, but formal elements and technical processes that actually are derived from communal song and dance. By the 15th century, however, communal habits and processes of composition had ceased, and the traditional elements, formulae and technique had become merely conventional aids and guides for the individual singer. Ancient as they were, conventional as, in a sense, they also were, they exercised none of the deadening, benumbing influence of ordinary conventions. They furnished, one may say, a vibrant framework of emotional expression, each tone of which moved the hearers all the more powerfully because it had sung to them so many old, unhappy, far-off things, so many battles and treacheries and sudden griefs; a framework which the individual singer needed only to fill out with the simplest statement of the event which had stirred his own imagination and passions to produce, not a work of art, but a song of universal appeal. Not a work of art, because there are scarcely half a dozen ballads that are really works of art, and the greatest ballads are not among these. There is scarcely one that is free from excrescences, from dulness, from trivialities, from additions that would spoil their greatest situations and their greatest lines, were it not that we resolutely shut our ears and our eyes, as we should, to all but their greatest moments. But at their best moments the best ballads have an almost incomparable power, and to a people sick, as we are, of the ordinary, the usual, the very trivialities and impertinences of the ballads only help to define and emphasize these best moments. In histories of English literature the ballads have been so commonly discussed in connexion with their rediscovery in the 18th century, that we are apt to forget that some of the very best were demonstrably composed in the 15th and that many others of uncertain date probably belong to the same time.

Along with the genuine ballads dealing with a recent event or a traditional theme there were ballads in which earlier romances are retold in ballad style. This was doubtless inevitable in view of the increasing epic tendency of the ballad and the interest still felt in metrical romances, but it should not mislead us into regarding the genuine folk-ballad as an out-growth of the metrical romance.

Besides the ordinary epic or narrative ballad, the 15th century produced ballads in dramatic form, or, perhaps it were better to say, dramatized some of its epic ballads. How commonly this was done we do not know, but the scanty records of the period indicate that it was a widespread custom, though only three plays of this character (all concerning Robin Hood) have come down to us. These plays had, however, no further independent development, but merely furnished elements of incident and atmosphere to later plays of a more highly organized type. With these ballad plays may also be mentioned the Christmas plays (usually of St George) and the sword-dance plays, which also flourished in the 15th century, but survive for us only as obscure elements in the masques and plays of Ben Jonson and in such modern rustic performances as Thomas Hardy has so charmingly described in *The Return of the Native*.

The additions which the 15th century made to the ancient cycles of Scripture plays, the so-called Mysteries, are another instance of a literary effort which spent itself in vain (see DRAMA). The most notable of these are, of course, the world renowned comic scenes in the *Towneley* (or *Wakefield*) *Plays*, in the pageants of Cain, of Noah and of the Shepherds. In none of these is the 15th century writer responsible for the original comic intention; in the pageants of Cain and of the Shepherds fragments of the work of a 14th century writer still remain to prove the earlier existence of the comic conception, and that it was traditional in the Noah pageant we know from the testimony of Chaucer's Miller; but none the less the 15th century writer was a comic dramatist of original power and of a skill in the development of both character and situation previously unexampled in England. The inability of Lydgate to develop a comic conception is strikingly displayed if one compares his *Pageant for Presentation before the King at Hereford* with the work of this unknown artist. But in our admiration for this man and his famous episode of Mak and the fictitious infant, we are apt to forget the equally fine, though very different qualities shown in some of the later pageants of the *York Plays*. Such, for example, is the final pageant, that of the *Last Judgment*, a drama of slow and majestic movement, to be sure, but with a large and fine conception of the great situation, and a noble and dignified elocution not inadequate to the theme.

The *Abraham and Isaac* play of the Brome MS., extant as a separate play and perhaps so performed, which has been so greatly admired for its cumulative pathos, also belongs demonstrably to this century. It is not, as has been supposed, an intermediate stage between French plays and the Chester *Abraham and Isaac*, but is derived directly from the latter by processes which comparison of the two easily reveals. Scripture plays of a type entirely different from the well-known cyclic mysteries, apparently confined to the Passion and Resurrection and the related events, become known to us for the first time in the records of this century. Such plays seem to have been confined to the towns of the south, and, as both their location and their structure suggest, may have been borrowed from France. In any event, the records show that they flourished greatly and that new versions were made from time to time.

Another form of the medieval drama, the Morality Play, had its origin in the 15th century,—or else very late in the 14th. The earliest known examples of it in England date from about 1420. These are the *Castle of Perseverance* and the *Pride of Life*. Others belonging to the century are *Mind, Will and Understanding, Mankind* and Medwall's *Nature*. There are also parts of two pageants in the *Ludus Coventriae* (c. 1460) that are commonly classed as Moralities, and these, together with the existence of a few personified abstractions in other plays, have led some critics to suppose that the Morality was derived from the Mystery by the gradual introduction of personified abstractions in the place of real persons. But the two kinds of plays are fundamentally different, different in subject and in technique; and no replacement of real persons by personifications can change a Mystery into a Morality. Moreover, the Morality features in Mysteries are later than the origin of the Morality itself and are due to the influence of the latter. The Morality Play is merely a dramatized allegory, and derives its characters and its peculiar technique from the application of the dramatic method to the allegory, the favourite literary form of the middle ages. None of the 15th century Moralities is literature of the first rank, though both the *Castle of Perseverance* and *Pride of Life* contain passages ringing with a passionate sincerity that communicates itself to the hearer or reader. But it was not until the beginning of the 16th century that a Morality of permanent human interest appeared in *Everyman*, which, after all, is a translation from the Dutch, as is clearly proved by the fact that in the two prayers near the end of the play the Dutch has complicated but regular stanzas, whereas the English has only irregularly rhymed passages.

Besides the Mysteries and Moralities, the 15th century had also Miracle Plays, properly so called, dealing with the lives, martyrdoms and miracles of saints. As we know these only from records of their performance or their mere existence—no texts have been preserved to us, except the very curious *Play of the Sacrament*—it is impossible to speak of their literary or dramatic qualities. The Miracle Play as a form was, of course, not confined to the 15th century. Notwithstanding the assertions of historians of literature that it died out in England soon after its introduction at the beginning of the 12th century, its existence can be demonstrated from *c.* 1110 to the time of Shakespeare. But records seem to indicate that it flourished especially during this period of supposed barrenness.

What was the nature of the "Komedy of Troylous and Pandor," performed before Henry VIII. on the 6th of January 1516 we have no means of knowing. It is very early indeed to assume the influence of either classical or Italian drama, and although we have no records of similar plays from the 15th century, it must be remembered that our records are scanty, that the middle ages applied the dramatic method to all sorts of material, and that it is therefore not impossible that secular plays like this were performed at court at a much earlier date. The record at any rate does not indicate that it was a new type of play, and the Griselda story had been dramatized in France, Italy and the Netherlands before 1500.

That not much good prose was written in the 15th century is less surprising than that so little good verse was written. The technique of verse composition had been studied and mastered in the preceding age, as we have seen, but the technique of prose had apparently received no serious consideration. Indeed, it is doubtful if any one thought of prose as a possible medium of artistic expression. Chaucer apparently did not, in spite of the comparative excellence of his Preface to the *Astrolabe* and his occasional noteworthy successes with the difficulties of the philosophy of Boethius; Wycliffe is usually clumsy; and the translators of Mandeville, though they often give us passages of great charm, obviously were plain men who merely translated as best they could. There was, however, a comparatively large amount of prose written in the 15th century, mainly for religious or educational purposes, dealing with the same sorts of subjects that were dealt with in verse, and in some cases not distinguishable from the verse by any feature but the absence of rhyme. The vast body of this we must neglect; only five writers need be named: John Capgrave, Reginald Pecock, Sir John Fortescue, Caxton and Malory. Capgrave, the compiler of the first chronicle in English prose since the Conquest, wrote by preference in Latin; his English is a condescension to those who could not read Latin and has the qualities which belong to the talk of an earnest and sincere man of commonplace ability. Pecock and Fortescue are more important. Pecock (*c.* 1395–*c.* 1460) was a man of singularly acute and logical mind. He prided himself upon his dialectic skill and his faculty for discovering arguments that had been overlooked by others. His writings, therefore—or at least the *Repressor*—are excellent in general structure and arrangement, his ideas are presented clearly and simply, with few digressions or excrescences, and his sentences, though sometimes too long, are more like modern prose than any others before the age of Elizabeth. His style is lightened by frequent figures of speech, mostly illustrative, and really illustrative, of his ideas, while his intellectual ingenuity cannot fail to interest even those whom his prejudices and preconceptions repel. Fortescue, like Capgrave, wrote by preference in Latin, and, like Pecock, was philosophical and controversial. But his principal English work, the *Difference between an Absolute and a Limited Monarchy*, differs from Pecock's in being rather a pleading than a logical argument, and the geniality and glowing patriotism of its author give it a far greater human interest.

No new era in literary composition was marked by the activity of William Caxton as translator and publisher, though the printing-press has, of course, changed fundamentally the problem of the dissemination and preservation of culture, and thereby ultimately affected literary production profoundly. But neither Caxton nor the writers whose works he printed produced anything new in form or spirit. His publications range over the whole field of 15th century literature, and no doubt he tried, as his quaint prefaces indicate, to direct the public taste to what was best among the works of the past, as when he printed and reprinted the *Canterbury Tales*, but among all his numerous publications not one is the herald of a new era. The only book of permanent interest as literature which he introduced to the world was the *Morte Darthur* of Sir Thomas Malory, and this is a compilation from older romances (see ARTHURIAN LEGEND). It is, to be sure, the one book of permanent literary significance produced in England in the 15th century; it glows with the warmth and beauty of the old knight's conception of chivalry and his love for the great deeds and great men of the visionary past, and it continually allures the reader by its fresh and vivid diction and by a syntax which, though sometimes faulty, has almost always a certain naïve charm; "thystorye (*i.e.* the history) of the sayd Arthur," as Caxton long ago declared, "is so gloryous and shynyng, that he is stalled in the first place of the moost noble, beste and worthyest of the Crysten men"; it is not, however, as the first of a new species, but as the final flower of an old that this glorious and shining book retains its place in English literature.

Whatever may have been the effect of the wars and the growth of industrial life in England in withdrawing men of the best abilities from the pursuit of literature, neither these causes nor any other interfered with the activity of writers of lesser powers. The amount of writing is really astonishing, as is also its range. More than three hundred separate works (exclusive of the large number still ascribed to Lydgate and of the seventy printed by Caxton) have been made accessible by the Early English Text Society and other public or private presses, and it seems probable that an equal number remains as yet unpublished. No list of these writings can be given here, but it may not be unprofitable to indicate the range of interests by noting the classes of writing represented. The classification is necessarily rough, as some writings belong to more than one type. We may note, first, love poems, allegorical and unallegorical, narrative, didactic, lyrical and quasi-lyrical; poems autobiographical and exculpatory; poems of eulogy and appeal for aid; tales of entertainment or instruction, in prose and in verse; histories ancient and modern, and brief accounts of recent historical events, in prose and in verse; prose romances and metrical romances; legends and lives of saints, in prose and in verse; poems and prose works of religious meditation, devotion and controversy; treatises of religious instruction, in prose and in verse; ethical and philosophical treatises, and ethical and prudential treatises; treatises of government, of political economy, of foreign travel, of hygiene, of surgery, of alchemy, of heraldry, of hunting and hawking and fishing, of farming, of good manners, and of cooking and carving. Prosaic and intended merely to serve practical uses as many of these were, verse is the medium of expression as often as prose. Besides this large amount and variety of English compositions, it must be remembered that much was also written in Latin, and that Latin and French works of this and other centuries were read by the educated classes.

Although the intellectual and spiritual movement which we call the Italian Renaissance was not unknown in England in the 14th and 15th centuries, it is not strange that it exercised no perceptible influence upon English literature, except in the case of Chaucer. Chaucer was the only English man of letters before the 16th century who knew Italian literature. The Italians who visited England and the Englishmen who visited Italy were interested, not in literature, but in scholarship. Such studies as were pursued by Free, Grey, Flemming, Tilly, Gunthorpe and others who went to Italy, made them better grammarians and rhetoricians, and no doubt gave them a freer, wider outlook, but upon their return to England they were immediately absorbed in administrative cares, which left them little leisure for literary composition, even if they had had any inclination to write. They prepared the way, however, for the leaders of the great intellectual awakening which began in England with Linacre, Colet, More and their fellows, and which finally culminated in the age of Spenser, Bacon, Shakespeare, Jonson, Gilbert, Harvey and Harriott.

When the middle ages ceased in England it is impossible to say definitely. Long after the new learning and culture of the Renaissance had been introduced there, long after classical and Italian models were eagerly chosen and followed, the epic and lyric models of the middle ages were admired and imitated, and the ancient forms of the drama lived side by side with the new until the time of Shakespeare himself. John Skelton, although according to Erasmus " unum Britannicarum literarum lumen ac decus," and although possessing great originality and vigour both in diction and in versification when attacking his enemies or indulging in playful rhyming, was not only a great admirer of Lydgate, but equalled even the worst of his predecessors in aureate pedantries of diction, in complicated impossibilities of syntax, and in meaningless inversions of word-order whenever he wished to write elegant and dignified literature. And not a little of the absurd diction of the middle of the 16th century is merely a continuation of the bad ideals and practices of the refined writers of the 15th.

In fine, the 15th century has, aside from its vigorous, though sometimes coarse, popular productions, little that can interest the lover of literature. It offers, however, in richest profusion problems for the literary antiquarian and the student of the relations between social conditions and literary productivity,—problems which have usually been attacked only with the light weapons of irresponsible speculation, but which may perhaps be solved by a careful comparative study of many literatures and many periods. Moreover, although in the quality of its literary output it is decidedly inferior to the 14th century, the amount and the wide range of its productions indicate the gradual extension of the habit of reading to classes of society that were previously unlettered; and this was of great importance for the future of English literature, just as the innumerable dramatic performances throughout England were important in developing audiences for Marlowe and Shakespeare and Beaumont and Fletcher.

For bibliography see vol. ii. of the *Cambridge History of Literature* (1909); and Brandl's *Geschichte der mittelenglischen Literatur* (reprinted from Paul's *Grundriss der germanischen Philologie*). Interesting general discussions may be found in the larger histories of English Literature, such as Ten Brink's, Jusserand's, and (a little more antiquated) Courthope's and Morley's (J. M. Ma.)

III. Elizabethan Times

General Influences, and Prologue to 1579.—The history of letters in England from More's *Utopia* (1516), the first Platonic vision, to Milton's *Samson Agonistes* (1671), the latest classic tragedy, is one and continuous. That is the period of the English Renaissance, in the wider sense, and it covers all and more of the literature loosely called " Elizabethan." With all its complexity and subdivisions, it has as real a unity as the age of Pericles, or that of Petrarch and Boccaccio, or the period in Germany that includes both Lessing and Heine. It is peculiar in length of span, in variety of power, and in wealth of production, though its master-works on the greater scale are relatively few. It is distinct, while never quite cut off, from the middle age preceding, and also from the classical or " Augustan " age that followed. The coming of Dryden denoted a new phase; but it was still a phase of the Renaissance; and the break that declared itself about 1660 counts as nothing beside the break with the middle ages; for this implied the whole change in art, thought and temper, which re-created the European mind. It is true that many filaments unite Renaissance and middle ages, not only in the religious and purely intellectual region, but in that of art. The matter of Geoffrey of Monmouth, the tales of Arthur and of Troilus, the old fairy folklore of the South, the topic of the *Falls of Princes*, lived on; and so did the characteristic medieval form, allegory and many of the old metres of the 14th century. But then these things were transformed, often out of knowledge. Shakespeare's use of the histories of Macbeth, Lear and Troilus, and Spenser's of the allegoric romance, are examples. And when the gifts of the middle ages are not transformed, as in the *Mirror for Magistrates*, they strike us as survivals from a lost world.

So vital a change took long in the working. The English Renaissance of letters only came into full flower during the last twenty years of the 16th century, later than in any Southern land; but it was all the richer for delay, and would have missed many a life-giving element could it have been driven forward sooner. If the actual process of genius is beyond analysis, we can still notice the subjects which genius receives, or chooses, to work upon, and also the vesture which it chooses for them; and we can watch some of the forces that long retard but in the end fertilize these workings of genius.

General forces.

What, then, in England, were these forces? Two of them lie outside letters, namely, the political settlement, culminating in the later reign of Elizabeth, and the religious settlement, whereby the Anglican Church grew out of the English Reformation. A third force lay within the sphere of the Renaissance itself, in the narrower meaning of the term. It was culture—the prefatory work of culture and education, which at once prepared and put off the flowering of pure genius. " Elizabethan " literature took its complexion from the circumstance that all these three forces were in operation at once: The Church began to be fully articulate, just when the national feeling was at its highest, and the tides of classical and immigrant culture were strongest. Spenser's *Faerie Queene*, Hooker's *Ecclesiastical Polity* and Shakespeare's *Henry V.* came in the same decade (1590–1600). But these three forces, political, religious and educational, were of very different duration and value. The enthusiasm of 1590–1600 was already dying down in the years 1600–1610, when the great tragedies were written; and soon a wholly new set of political forces began to tell on art. The religious inspiration was mainly confined to certain important channels; and literature as a whole, from first to last, was far more secular than religious. But Renaissance culture, in its ramifications and consequences, tells all the time and over the whole field, from 1500 to 1660. It is this culture which really binds together the long and varied chronicle. Before passing to narrative, a short review of each of these elements is required.

Politics.

Down to 1579 the Tudor rule was hardly a direct inspiration to authors. The reign of Henry VII. was first duly told by Bacon, and that of Henry VIII. staged by Shakespeare and Fletcher, in the time of James I. Sir Thomas More found in Roper, and Wolsey in Cavendish, sound biographers, who are nearly the earliest in the language. The later years of Henry VIII. were full of episodes too tragically picturesque for safe handling in the lifetime of his children. The next two reigns were engrossed with the religious war; and the first twenty years of Elizabeth, if they laid the bases of an age of peace, well-being, and national self-confidence that was to prove a teeming soil for letters, were themselves poor in themes for patriotic art. The abortive treason of the northern earls was echoed only in a ringing ballad. But the voyagers, freebooters, and explorers reported their experiences, as a duty, not for fame; and these, though not till the golden age, were edited by Hakluyt, and fledged the poetic fancies that took wing from the " Indian Peru " to the " still-vext Bermoothes." Yet, in default of any true historian, the queen's wise delays and diplomacies that upheld the English power, and her refusal to launch on a Protestant or a national war until occasion compelled and the country was ready, were subjects as uninspiring to poets as the burning questions of the royal marriage or the royal title. But by 1580 the nation was filled with the sense of Elizabeth's success and greatness and of its own prosperity. No shorter struggle and no less achievement could have nursed the insolent, jubilant patriotism of the years that followed; a feeling that for good reasons was peculiar to England among the nations, and created the peculiar forms of the chronicle play and poem. These were borrowed neither from antiquity nor from abroad, and were never afterwards revived. The same exultation found its way into the current forms of ode and pastoral, of masque and allegory, and into many a dedication and interlude of prose. It was so strong as to outlive the age that gave it warrant. The passion for England, the passion of England for herself, animates the bulk of Drayton's *Poly-Olbion*, which was finished so late as 1622. But the public issues were then changing, the temper was darker; and the civil struggle was to speak less in poetry than in the prose of political theory and ecclesiastical argument, until its after-explosion came in the verse of Milton.

Religious change.

The English Reformation, so long political rather than doctrinal or imaginative, cost much writing on all sides; but no book like Calvin's *Institution* is its trophy, at once defining the religious change for millions of later men and marking a term of departure in the national prose. Still, the debating weapons, the axes and billhooks, of vernacular English were sharpened—somewhat jaggedly—in the pamphlet battles that dwarfed the original energies of Sir Thomas More and evoked those of Tyndale and his friends. The powers of the same style were proved for descriptive economy by Starkey's Dialogue between Pole and Lupset, and for religious appeal by the blunt sound rhetoric and forthright jests in the sermons of Latimer (died 1555). Foxe's reports of the martyrs are the type of early Protestant English (1563); but the reforming divines seldom became real men of letters even when their Puritanism, or discontent with the final Anglican settlement and its temper, began to announce itself. Their spirit, however, comes out in many a corner of poetry, in Gascoigne's *Steel Glass* as in Spenser's *Shepherd's Calendar*; and the English Reformation lived partly on its pre-natal memories of Langland as well as of Wycliffe. The fruit of the struggle, though retarded, was ample. Carrying on the work of Fisher and Cranmer, the new church became the nursing mother of English prose, and trained it more than any single influence,—trained it so well, for the purposes of sacred learning, translation and oratory, and also as a medium of poetic feeling, that in these activities England came to rival France. How late any religious writer of true rank arose may be seen by the lapse of over half a century between Henry VIII.'s Act of Supremacy and Hooker's treatise. But after Hooker the chain of eloquent divines was unbroken for a hundred years.

Classical culture.

Renaissance culture had many stages and was fed from many streams. At the outset of the century, in the wake of Erasmus, under the teaching of Colet and his friends, there spread a sounder knowledge of the Greek and Latin tongues, of the classic texts, and so of the ancient life and mind. This period of humanism in the stricter sense was far less brilliant than in Italy and France. No very great scholar or savant arose in Britain for a long time; but neo-Latin literature, the satellite of scholarship, shone brightly in George Buchanan. But scholarship was created and secured; and in at least one, rather solitary, work of power, the *Utopia* (which remained in Latin till 1551), the fundamental process was begun which appropriates the Greek mind, not only for purposes of schooling, but as a source of new and independent thinking. In and after the middle of the century the classics were again put forward by Cheke, by Wilson in his *Art of Rhetoric* (1553), and by Ascham in his letters and in his *Schoolmaster* (1570), as the true staple of humane education, and the pattern for a simple yet lettered English. The literature of translations from the classics, in prose and verse, increased; and these works, at first plain, business-like, and uninspired, slowly rose in style and power, and at last, like the translations from modern tongues, were written by a series of masters of English, who thus introduced Plutarch and Tacitus to poets and historians. This labour of mediation was encouraged by the rapid expansion and reform of the two universities, of which almost every great master except Shakespeare was a member; and even Shakespeare had ample Latin for his purpose.

Italy and France.

The direct impact of the classics on "Elizabethan" literature, whether through such translations or the originals, would take long to describe. But their indirect impact is far stronger, though in result the two are hard to discern. This is another point that distinguishes the English Renaissance from the Italian or the French, and makes it more complex. The knowledge of the thought, art and enthusiasms of Rome and Athens constantly came round through Italy or France, tinted and charged in the passage with something characteristic of those countries. The early playwrights read Seneca in Latin and English, but also the foreign Senecan tragedies. Spenser, when starting on his pastorals, studied the Sicilians, but also Sannazaro and Marot. Shakespeare saw heroic antiquity through Plutarch, but also, surely, through Montaigne's reading of antiquity. Few of the poets can have distinguished the original fountain of Plato from the canalized supply of the Italian Neoplatonists. The influence, however, of Cicero on the Anglican pulpit was immediate as well as constant; and so was that of the conciser Roman masters, Sallust and Tacitus, on Ben Jonson and on Bacon. Such scattered examples only intimate the existence of two great chapters of English literary history,—the effects of the classics and the effects of Italy. The bibliography of 16th-century translations from the Italian in the fields of political and moral speculation, poetry, fiction and the drama, is so large as itself to tell part of the story. The genius of Italy served the genius of England in three distinctive ways. It inspired the recovery, with new modulations, of a lost music and a lost prosody. It modelled many of the chief poetic forms, which soon were developed out of recognition; such were tragedy, allegory, song, pastoral and sonnet. Thirdly, it disclosed some of the master-thoughts upon government and conduct formed both by the old and the new Mediterranean world. Machiavelli, the student of ancient Rome and modern Italy, riveted the creed of Bacon. It might be said that never has any modern people so influenced another in an equal space of time—and letters, here as ever, are only the voice, the symbol, of a whole life and culture—if we forgot the sway of French in the later 17th and 18th centuries. And the power of French was alive also in the 16th. The track of Marot, of Ronsard and the Pleiad and Desportes, of Rabelais and Calvin and Montaigne, is found in England. Journeymen like Boisteau and Belleforest handed on immortal tales. The influence is noteworthy of Spanish mannerists, above all of Guevara upon sententious prose, and of the novelists and humorists, headed by Cervantes, upon the drama. German legend is found not only in Marlowe's *Faustus*, but in the by-ways of play and story. It will be long before the rich and coloured tangle of these threads has been completely unravelled with due tact and science. The presence of one strand may here be mentioned, which appears in unexpected spots.

Philosophy.

As in Greece, and as in the day of Coleridge and Shelley, the fabric of poetry and prose is shot through with philosophical ideas; a further distinction from other literatures like the Spanish of the golden age or the French of 1830. But these were not so much the ideas of the new physical science and of Bacon as of the ethical and metaphysical ferment. The wave of free talk in the circles of Marlowe, Greville and Raleigh ripples through their writings. Though the direct influence of Giordano Bruno on English writers is probably limited to a reminiscence in the *Faerie Queene* (Book vii.), he was well acquainted with Sidney and Greville, argued for the Copernican theory at Greville's house, lectured on the soul at Oxford, and published his epoch-marking Italian dialogues during his two years' stay (1583-1585) in London. The debates in the earlier schools of Italy on the nature and tenure of the soul are heard in the

Nosce Teipsum (1599) of Sir John Davies; a stoicism, "of the schools" as well as "of the blood," animates Cassius and also the French heroes of Chapman; and if the earlier drama is sown with Seneca's old maxims on sin and destiny, the later drama, at least in Shakespeare, is penetrated with the freer reading of life and conduct suggested by Montaigne. Platonism—with its *vox angelica* sometimes a little hoarse—is present from the youthful *Hymns* of Spenser to the last followers of Donne; sometimes drawn from Plato, it is oftener the Christianized doctrine codified by Ficino or Pico. It must be noted that this play of philosophic thought only becomes marked after 1580, when the preparatory tunings of English literature are over.

We may now quickly review the period down to 1580, in the departments of prose, verse and drama. It was a time which left few memorials of form.

Prose to 1580.

Early modern English prose, as a medium of art, was of slow growth. For long there was alternate strife and union (ending in marriage) between the Latin, or more rhetorical, and the ancestral elements of the language, and this was true both of diction and of construction. We need to begin with the talk of actual life, as we find it in the hands of the more naïf writers, in its idiom and gusto and unshapen power, to see how style gradually declared itself. In state letters and reports, in the recorded words of Elizabeth and Mary of Scotland and public men, in travels and memoirs, in Latimer, in the rude early versions of Cicero and Boëthius, in the more unstudied speech of Ascham or Leland, the material lies. At the other extreme there are the English liturgy (1549, 1552, 1559, with the final fusion of Anglican and Puritan eloquence), and the sermons of Fisher and Cranmer,—nearly the first examples of a sinuous, musical and Ciceronian cadence. A noble pattern for saga-narrative and lyrical prose was achieved in the successive versions (1526–1540–1568) of the Hebrew and Greek Scriptures, where a native simple diction of short and melodious clauses are prescribed by the matter itself. Prose, in fact, down to Shakespeare's time, was largely the work of the churchmen and translators, aided by the chroniclers. About the mid-century the stories, as well as the books of conduct and maxim, drawn from Italy and France, begin to thicken. Perverted symmetry of style is found in euphuistic hacks like Pettie. Painter's *Palace of Pleasure* (1566) provided the plots of Bandello and others for the dramatists. Hoby's version (1561) of Castiglione's *Courtier*, with its command of elate and subtle English, is the most notable imported book between Berners's *Froissart* (1523–1525) and North's *Plutarch* (1579). Ascham's *Schoolmaster* is the most typical English book of Renaissance culture, in its narrower sense, since *Utopia*. Holinshed's *Chronicle* (1577–1587) and the work of Halle, if pre-critical, were all the fitter to minister to Shakespeare.

Verse to 1580.

The lyric impulse was fledged anew at the court of Henry VIII. The short lines and harping burdens of Sir Thomas Wyatt's songs show the revival, not only of a love-poetry more plangent than anything in English since Chaucer, but also of the long-deadened sense of metre. In Wyatt's sonnets, octaves, terzines and other Italian measures, we can watch the painful triumphant struggles of this noble old master out of the slough of formlessness in which verse had been left by Skelton. Wyatt's primary deed was his gradual rediscovery of the iambic decasyllabic line duly accented—the line that had been first discovered by Chaucer for England; and next came its building into sonnet and stanza. Wyatt (d. 1542) ended with perfect formal accuracy; he has the honours of victory; and Henry Howard, earl of Surrey (d. 1547), a younger-hearted and more gracious but a lighter poet, carried on his labour, and caught some of Chaucer's as well as the Italian tunes. The blank verse of his two translated *Aeneids*, like all that written previous to Peele, gave little inkling of the latencies of the measure which was to become the cardinal one of English poetry. It was already the vogue in Italy for translations from the classics; and we may think of Surrey importing it like an uncut jewel and barely conscious of its value. His original poems, like those of Wyatt, waited for print till the eve of Elizabeth's reign, when they appeared, with those of followers like Grimoald, in Tottel's *Miscellany* (1557), the first of many such garlands, and the outward proof of the poetical revival dating twenty years earlier. But this was a false dawn. Only one poem of authentic power, Sackville's *Induction* (1563) to that dreary patriotic venture, *A Mirror for Magistrates*, was published for twenty years. In spirit medieval, this picture of the gates of hell and of the kings in bale achieves a new melody and a new intensity, and makes the coming of Spenser far less incredible. But poetry was long starved by the very ideal that nursed it—that of the all-sided, all-accomplished "courtier" or cavalier, to whom verse-making was but one of all the accomplishments that he must perfect, like fencing, or courting, or equestrian skill. Wyatt and Surrey, Sackville and Sidney (and we may add Hamlet, a true Elizabethan) are of this type. One of the first competent professional writers was George Gascoigne, whose remarks on metric, and whose blank verse satire, *The Steel Glass* (1576), save the years between Sackville and Spenser. Otherwise the gap is filled by painful rhymesters with rare flashes, such as Googe, Churchyard and Turberville.

Drama to 1580.

The English Renaissance drama, both comic and tragic, illustrates on the largest scale the characteristic power of the antique at this period—at first to reproduce itself in imitation, and then to generate something utterly different from itself, something that throws the antique to the winds. Out of the Morality, a sermon upon the certainty of death or the temptations of the soul, acted by personified qualities and supernatural creatures, had grown up, in the reign of Henry VII., the Interlude, a dialogue spoken by representative types or trades, who faintly recalled those in Chaucer's *Prologue*. These forms, which may be termed medieval, continued long and blended; sometimes heated, as in *Respublica*, with doctrine, and usually lightened by the comic play of a "Vice" or incarnation of sinister roguery. John Heywood was the chief maker of the pure interludes, and Bishop Bale of the Protestant medleys; his *King Johan*, a reformer's partisan tract in verse, contains the germs of the chronicle play. In the drama down to 1580 the native talent is sparse enough, but the historical interest is high. Out of a seeming welter of forms, the structure, the metres and the species that Kyd and Marlowe found slowly emerged. Comedy was first delivered from the interlude, and fashioned in essence as we know it, by the schoolmasters. Drawing on Plautus, they constructed duly-knitted plots, divided into acts and scenes and full of homely native fun, for their pupils to present. In *Thersites* (written 1537), the oldest of these pieces, and in Udall's *Ralph Roister Doister* (1552 at latest), the best known of them, the characters are lively, and indeed are almost individuals. In others, like *Misogonus* (written 1560), the abstract element and improving purpose remain, and the source is partly neo-Latin comedy, native or foreign. Romance crept in: serious comedy, with its brilliant future, the comedy of high sentiment and averted dangers mingled still with farce, was shadowed forth in *Damon and Pithias* and in the curious play *Common Conditions*; while the domestic comedy of intrigue dawned in Gascoigne's *Supposes*, adapted from Ariosto. Thus were displaced the ranker rustic fun of *Gammer Gurton's Needle* (written c. 1559) and other labours of "rhyming motherwits." But there was no style, no talk, no satisfactory metre. The verse of comedy waited for Greene, and its prose for Lyly. Structure, without style, was also the main achievement of the early tragedies. The Latin plays of Buchanan, sometimes biblical in topic, rest, as to their form, upon Euripides. But early English tragedy was shapen after the Senecan plays of Italy and after Seneca himself, all of whose dramas were translated by 1581. *Gorboduc, or Ferrex and Porrex*, acted about 1561, and written by Sackville and Norton, and Hughes' *Misfortunes of Arthur* (acted 1588), are not so much plays as wraiths of plays, with their chain of slaughters and revenges, their two-dimensional personages, and their lifeless maxims which fail to sweeten the bloodshot atmosphere. The Senecan form was not barren in itself, as its sequel in France was to show: it was only barren for England. After Marlowe it was driven to the study, and was still written (possibly under the impulse of Mary countess of Pembroke), by Daniel and Greville, with much reminiscence of the French Senecans. But it left its trail on the real drama. It set the pattern of a high tragical action, often motived by revenge, swayed by large ideas of fate and retribution, and told in blank metre; and it bequeathed, besides many moral sentences, such minor points of mechanism as the Ghost, the Chorus and the inserted play. There were many hybrid forms like *Gismond of Salern*, based on foreign story, alloyed with the mere personifications of the Morality, and yet contriving, as in the case of *Promos and Cassandra* (the foundation of *Measure for Measure*), to interest Shakespeare. Thus the drama by 1580 had some of its carpentry, though not yet a true style or versification. These were only to be won by escape from the classic tutelage. The ruder chronicle play also began, and the reigns of John and Henry V. amongst others were put upon the stage.

Spenser.

Verse from Spenser to Donne.—Sir Philip Sidney almost shares with Edmund Spenser the honours of announcing the new verse, for part of his *Astrophel and Stella* was written, if not known in unpublished form, about 1580–1581, and contains ten times the passion and poetry of *The Shepherd's Calendar* (1579). This work, of which only a few passages have the seal of Spenser's coming power, was justly acclaimed for its novelty of experiment in many styles, pastoral, satiric and triumphal, and in many measures: though it was criticized for its "rustic" and archaic diction—a "no language" that was to have more influence upon poetry than any of the real dialects of England. Spenser's desire to write high tragedy, avowed in his *October*, was not to be granted; his nine comedies are lost; and he became the chief non-dramatic poet of his time and country. Both the plaintive pessimism of Petrarch and du Bellay, with their favourite method of emblem, and the Platonic theory of the spiritual love and its heavenly begetting sank into him; and the *Hymns To Love* and *To Beauty* are possibly his earliest verses of sustained perfection and exaltation. These two strains of feeling Spenser never lost and never harmonized; the first of them recurs in his *Complaints* of 1591, above all in *The Ruins of Time*, the second in his *Amoretti* (1595) and *Colin Clout* and *Epithalamion*, which are autobiographical. These and a hundred other threads are woven into *The Faerie Queene*, an unfinished allegorical epic in honour of moral goodness, of which three books came out in 1590 and three more in 1596, while the fragment *Of Constancy* (so-called) is first found in the posthumous folio of 1609. This poem is the fullest reflex, outside the drama, of the soul and aspirations of the time. For its scenery and mechanism the *Orlando Furioso* of Ariosto furnishes the framework. In both poems tales of knightly adventure intertwine unconfused; in both the slaying of monsters, the capture of strong places, and the release of the innocent, hindered by wizard and sorcerer, or aided by magic sword and horn and mirror, constitute the quest; and in both warriors, ladies, dwarfs, dragons and figures from old mythology jostle dreamily together. To all this pomp Spenser strove to give a moral and often also a political meaning. Ariosto was not a *vates sacer*; and so Spenser took Tasso's theme of the holy war waged for the Sepulchre, and expanded it into a war between good and evil, as he saw them in the world; between chastity and lust, loyalty and detraction, England and Spain, England and Rome, Elizabeth and usurpers, Irish governor and Irish rebel, right and wrong. The title-virtues of his six extant books he affects to take from Aristotle; but Holiness, Temperance, Chastity, Justice, Friendship and Courtesy form a medley of medieval, puritanical and Greek ideals.

Spenser's moral sentiments, often ethereally noble, might well be contrasted, and that not always to their credit, with those more secular and naturalistic ones that rule in Shakespeare or in Bernardino Telesio and Giordano Bruno. But *The Faerie Queene* lives by its poetry; and its poetry lives independently of its creed. The idealized figures of Elizabeth, who is the Faerie Queene, and of the "magnificent" Prince Arthur, fail to bind the adventures together, and after two books the poem breaks down in structure. And indeed all through it relies on episode and pageant, on its prevailing and insuppressible loveliness of scene and tint, of phrasing and of melody, beside which the inner meaning is often an interruption. Spenser is not to be tired; in and out of his tapestry, with its "glooming light much like a shade," pace his figures on horseback, or in durance, with their clear and pictorial allegoric trappings; and they go either singly, or in his favourite masques or pageants, suggested by emblematical painting or civic procession. He is often duly praised for his lingering and liquid melodies and his gracious images, or blamed for their langour; but his ground-tone is a sombre melancholy—unlike that of Jaques—and his deepest quality as a writer is perhaps his angry power. Few of his forty and more thousand lines are unpoetical; in certainty of style, amongst English poets who have written profusely, he has no equals but Chaucer, Milton and Shelley. His "artificial" diction, drawn from middle English, from dialect or from false analogy, has always the intention and nearly always the effect of beauty; we soon feel that its absence would be unnatural, and it has taken its rank among the habitual and exquisite implements of English poetry. This equality of noble form is Spenser's strength, as dilution and diffusion of phrase, and a certain monotonous slowness of *tempo*, are beyond doubt his weaknesses. His chief technical invention, the nine-line stanza (*ababbcbcC*) was developed not from the Italian octave (*abababcc*), but by adding an alexandrine to the eight-line stave (*ababbcbc*) of Chaucer's *Monk's Tale.* It is naturally articulated twice—at the fifth line, where the turn of repeated rhyme inevitably charms, and at the ninth, which runs now to a crashing climax, now to a pensive and sighing close. In rhyming, Spenser, if not always accurate, is one of the most natural and resourceful of poets. His power over the heroic couplet or quatrain is shown in his fable, *Mother Hubbard's Tale*, and in his curious verse memoir, *Colin Clout*; both of which are medleys of satire and flattery. With formal tasks so various and so hard, it is wonderful how effortless the style of Spenser remains. His *Muiopotmos* is the lightest-handed of mock-heroics. No writer of his day except Marlowe was so faithful to the law of beauty.

Spenserians.

The mantle of Spenser fell, somewhat in shreds, upon poets of many schools until the Restoration. As though in thanks to his master Tasso, he lent to Edward Fairfax, the best translator of the *Jerusalem Delivered* (*Godfrey of Bulloigne*, 1600), some of his own ease and intricate melody. Harington, the witty translator of Ariosto (1591)and spoilt child of the court, owed less to Spenser. The allegorical colouring was nobly caught, if sometimes barbarized, in the *Christ's Victory and Triumph* of the younger Giles Fletcher (1610), and Spenser's emblematic style was strained, even cracked, by Phineas Fletcher in *The Purple Island* (1633), an aspiring fable, gorgeous in places, of the human body and faculties. Both of these brethren clipped and marred the stanza, but they form a link between Spenser and their student Milton. The allegoric form, long-winded and broken-backed, survived late in Henry More's and Joseph Beaumont's verse disquisitions on the soul. Spenser's pastoral and allusive manner was allowed by Drayton in his *Shepherd's Garland* (1593), and differently by William Browne in *Britannia's Pastorals* (1613–1616), and by William Basse; while his more honeyed descriptions took on a mawkish taste in the anonymous *Britain's Ida* and similar poems. His golden Platonic style was buoyantly echoed in *Orchestra* (1596), Sir John Davies' poem on the dancing spheres. He is continually traceable in 17th-century verse, blending with the alien currents of Ben Jonson and of Donne. He was edited and imitated in the age of Thomson, in the age of William Morris, and constantly between.

Drayton and Daniel.

The typical Elizabethan poet is Michael Drayton; who followed Spenser in pastoral, Daniel, Sidney, Spenser and Shakespeare in sonnet, Daniel again in chronicle and legend, and Marlowe in mythological story, and who yet remained himself. His *Endimion and Phoebe* in passages stands near *Hero and Leander*; his *England's Heroical Epistles* (1597) are in ringing rhetorical couplets; his *Odes* (1606), like the *Ballad of Agincourt* and the

Virginian Voyage, forestall and equal Cowper's or Campbell's; his *Nymphidia* (1627) was the most popular of burlesque fairy poems; and his pastorals are full of graces and felicities. The work of Drayton that is least read and most often mentioned is his *Poly-Olbion* (1612–1622), a vast and pious effort, now and then nobly repaid, to versify the scenery, legend, customs and particularities of every English county. The more recluse and pensive habit of Samuel Daniel chills his long chronicle poems; but with Chapman he is the clearest voice of Stoicism in Elizabethan letters; and his harmonious nature is perfectly expressed in a style of happy, even excellence, free alike from "fine madness" and from strain. Sonnet and epistle are his favoured forms, and in his *Musophilus* (1599) as well as in his admirable prose *Defence of Rhyme* (1602), he truly prophesies the hopes and glories of that *illustre volgare*, the literary speech of England. All this patriotic and historic verse, like the earlier and ruder *Albion's England* (1586) of William Warner, or Fitzgeoffrey's poem upon Drake, or the outbursts of Spenser, was written during or inspired by the last twenty years of the queen's reign; and the same is true of Shakespeare's and most of the other history plays, which duly eclipsed the formal, rusty-gray chronicle poem of the type of the *Mirror for Magistrates*, though editions (1559–1610) of the latter were long repeated. Patriotic verse outside the theatre, however, full of zeal, started at a disadvantage compared with love-sonnet, song, or mythic narrative, because it had no models before it in other lands, and remained therefore the more shapeless.

Sonnets.

The English love-sonnet, brought in by Wyatt and rifest between 1590 and 1600, was revived as a purely studious imitation by Watson in his *Hekatompathia* (1582), a string of translations in one of the exceptional measures that were freely entitled "sonnets." But from the first, in the hands of Sidney, whose *Astrophel and Stella* (1591) was written, as remarked above, about 1581, the sonnet was ever ready to pulse into feeling, and to flash into unborrowed beauty, embodying sometimes dramatic fancy and often living experience. These three fibres of imitation, imagination and confession are intertwisted beyond severance in many of the cycles, and now one, now another is uppermost. Incaution might read a personal diary into Thomas Lodge's *Phillis* (1593), which is often a translation from Ronsard. Literal judges have announced that Shakespeare's *Sonnets* are but his mode of taking exercise. But there is poetry in "God's plenty" almost everywhere; and few of the series fail of lovely lines or phrasing or even of perfect sonnets. This holds of Henry Constable's *Diana* (1592), of the *Parthenophil and Parthenophe* of Barnabe Barnes (1593), inebriate with poetry, and of the stray minor groups, *Alcilia*, *Licia*, *Cælia*; while the *Caelica* of Fulke Greville, Lord Brooke, in irregular form, is full of metaphysical passion struggling to be delivered. *Astrophel and Stella*, Drayton's *Idea* (1594–1619), Spenser's *Amoretti* and Shakespeare's *Sonnets* (printed 1609) are addressed to definite and probably to known persons, and are charged with true poetic rage, ecstatic or plaintive, desperate or solemn, if they are also intermingled with the mere word-play that mocks or beguiles the ebb of feeling, or with the purely plastic work that is done for solace. In most of these series, as in Daniel's paler but exquisitely-wrought *Delia* (1591–1592), the form is that of the three separate quatrains with the closing couplet for emotional and melodic climax; a scheme slowly but defiantly evolved, through traceable gradations, from that stricter one of Italy, which Drummond and Milton revived, and where the crisis properly coincides with the change from octave to sestet.

Mythic poems.

The amorous mythologic tale in verse derives immediately from contemporary Italy, but in the beginning from Ovid, whose *Metamorphoses*, familiar in Golding's old version (1555–1557), furnished descriptions, decorations and many tales, while his *Heroides* gave Chaucer and Boccaccio a model for the self-anatomy of tragic or plaintive sentiment. Within ten years, between 1588 and 1598, during the early sonnet-vogue, appeared Lodge's *Scillaes Metamorphosis*, Shakespeare's *Venus and Adonis* and *Rape of Lucrece*, Marlowe's *Hero and Leander* and Drayton's *Endimion and Phoebe*. Shakespeare owed something to Lodge, and Drayton to Marlowe. All these points describe a love-situation at length, and save in one instance they describe it from without. The exception is Marlowe, who achieves a more than Sicilian perfection; he says everything, and is equal to everything that he has to say. In *Venus and Adonis* the poet is enamoured less of love than of the tones and poses of lovers and of the beauty and gallant motion of animals, while in *The Rape of Lucrece* he is intent on the gradations of lust, shame and indignation, in which he has a spectator's interest. Virtuosity, or the delight of the executant in his own brilliant cunning, is the mark of most of these pieces.

Lyric.

If we go to the lyrics, the versified mythic tales and the sonnets of Elizabethan times for the kind of feeling that Molière's Alceste loved and that Burns and Shelley poured into song, we shall often come away disappointed, and think the old poetry heartless. But it is not heartless, any more than it is always impassioned or personal; it is decorative. The feeling is often that of the craftsman; it is not of the singer who spends his vital essence in song and commands an answering thrill so long as his native language is alive or understood. The arts that deal with ivories or enamelling or silver suggest themselves while we watch the delighted tinting and chasing, the sense for gesture and grouping (in *Venus and Adonis*), or the delicate beating out of rhyme in a madrigal, or the designing of a single motive, or two contrasted motives, within the panel of the sonnet. And soon it is evident how passion and emotion readily become plastic matter too, whether they be drawn from books or observation or self-scrutiny. This is above all the case in the sonnet; but it is found in the lyric as well. The result is a wonderful fertility of lyrical pattern, a wonderfully diffused power of lyrical execution, never to recur at any later time of English literature. Wyatt had to recover the very form of such verse from oblivion, and this he did in the school of translation and adaptation. Not only the decasyllabic, but the lyric, in short lines had almost died out of memory, and Wyatt brought it back. From his day to Spenser's there is not much lyric that is noteworthy, though in Gascoigne and others the impulse is seen. The introduction of Italian music, with its favourite metrical schemes, such as the madrigal, powerfully schooled and coloured lyric: in especial, the caressing double ending, regular in Italian but heavier in English, became common. The Italian poems were often translated in their own measure, line by line, and the musical setting retained. Their tunes, or other tunes, were then coupled with new and original poems; and both appeared together in the song-books of Dowland the lutanist, of Jones and Byrd (1588), and in chief (1601–1619) of Thomas Campion. The words of Campion's songs are not only supremely musical in the wider sense, but are chosen for their singing quality. Misled awhile by the heresy that rhyme was wrong, he was yet a master of lovely rhyming, as well as of a lyrical style of great range, gaily or gravely happy. But, as with most of his fellows, singing is rather his calling than his consolation. The lyrics that are sprinkled in plays and romances are the finest of this period, and perhaps, in their kind, of any period. Shakespeare is the greatest in this province also; but the power of infallible and unforgettable song is often granted to slighter, gentler playwrights like Greene and Dekker, while it is denied to men of weightier build and sterner purpose like Chapman and Jonson. The songs of Jonson are indeed at their best of absolute and antique finish; but the irrevocable dew of night or dawn seldom lies upon them as it lies on the songs of Webster or of Fletcher. The best lyrics in the plays are dramatic; they must be read in their own setting. While the action stops, they seize and dally with the dominant emotion of the scene, and yet relieve it. The songs of Lodge and Breton, of Drayton and Daniel, of Oxford and Raleigh, and the fervid brief flights of the Jesuit Southwell, show the omnipresence of the vital gift, whether among professional writers of the journalistic type, or among poets whose gift was not primarily song, or among men of action and quality or men of religion, who only wrote when they were stirred. Lullaby and valentine and compliment, and love-plaint ranging from gallantry to desperation, are all there;

and the Fortunate Hour, which visits commonly only a few men in a generation, and those but now and then in their lives, is never far off. But the master of melody, Spenser, left no songs, apart from his two insuperable wedding odes. And religious lyric is rarer before the reign of James. Much of the best lyric is saved for us by the various Miscellanies, *A Handful of Pleasant Delights* (1584), the *Phoenix Nest* (1593) and Davison's *Poetical Rhapsody* (1602); while other such collections, like *England's Helicon*(1600), were chiefly garlands of verse that was already in print.

There is plenty of satiric anger and raillery in the spirit of the time, but the most genuine part of it is drawn off into drama. Except for stray passages in Spenser, Drayton and others, formal satire, though profuse, was a literary unreal thing, a pose in the manner of Persius or Juvenal, and tiresome in expression. In this kind only Donne triumphed. The attempts of Lodge and Hall and Marston and John Davies of Hereford and Guilpin and Wither are for the most part simply weariful in different ways, and satire waited for Dryden and his age. The attempt, however, persisted throughout. Wyatt was the first and last who succeeded in the genial, natural Horatian style.

Meta-physical or fantastic schools.

Verse from Donne to Milton.—As the age of Elizabeth receded, some changes came slowly over non-dramatic verse. In Jonson, as in John Donne (1573–1631), one of the greater poets of the nation, and in many writers after Donne, may be traced a kind of Counter-Renaissance, or revulsion against the natural man and his claims to pleasure—a revulsion from which regret for pleasure lost is seldom far. Poetry becomes more ascetic and mystical, and this feeling takes shelter alike in the Anglican and in the Roman faith. George Herbert (*The Temple*, 1633), the most popular, quaint and pious of the school, but the least poetical; Crashaw, with his one ecstatic vision (*The Flaming Heart*)and occasional golden stanzas; Henry Vaughan, who wrote from 1646 to 1678, with his mystical landscape and magical cadences; and Thomas Traherne, his fellow-dreamer, are the best known of the religious Fantastics. But, earlier than most of these are Lord Herbert of Cherbury, and Habington with his *Castara* (1634), who show the same temper, if a fitful power and felicity. Such writers form the devouter section of the famous "metaphysical" or "fantastic" school, which includes, besides Donne its founder, pure amorists like Carew (whose touch on certain rhythms has no fellow), young academic followers like Cartwright and Cleveland (in whom survives the vein of satire that also marks the school), and Abraham Cowley, who wrote from 1633 to 1678, and was perhaps the most acceptable living poet about the middle of the century. In his *Life of Cowley* Johnson tramples on the "metaphysical" poets and their vices, and he is generally right in detail. The shock of cold quaintness, which every one of them continually administers, is fatal. Johnson only erred in ignoring all their virtues and all their historical importance.

In Donne poetry became deeply intellectualized, and in temper disquisitive and introspective. The poet's emotion is played with in a cat-and-mouse fashion, and he torments it subtly. Donne's passion is so real, if so unheard-of, and his brain so finely-dividing, that he can make almost any image, even the remotest, even the commonest, poetical. His satires, his *Valentine;* his *Litany*, and his lyric or odic pieces in general, have an insolent and sudden daring which is warranted by deep-seated power and is only equalled by a few of those tragedians who are his nearest of kin. The recurring contrast of "wit" or intelligence, and "will" or desire, their struggle, their mutual illumination, their fusion as into some third and undiscovered element of human nature, are but one idiosyncrasy of Donne's intricate soul, whose general progress, so far as his dateless poems permit of its discovery, seems to have been from a paganism that is unashamed but crossed with gusts of compunction, to a mystical and otherwordly temper alloyed with covetous regrets. The *Anatomy of the World* and other ambitious pieces have the same quality amid their outrageous strangeness. In Donne and his successors the merely ingenious and ransacking intellect often came to overbalance truth and passion; and hence arose conceits and abstract verbiage, and the difficulty of finding a perfect poem, however brief, despite the omnipresence of the poetic gift. The "fantastic" school, if it contains some of the rarest sallies and passages in English, is one of the least satisfactory. Its faults only exaggerate those of Sidney, Greville and Shakespeare, who often misuse homely or technical metaphor; and English verse shared, by coincidence not by borrowing, and with variations of its own, in the general strain and torture of style that was besetting so many poets of the Latin countries. Yet these poets well earn the name of metaphysical, not for their philosophic phrasing, but for the shuttle-flight of their fancy to and fro between the things of earth and the realities of spirit that lie beyond the screen of the flesh.

Rhythm.

Between Spenser and Milton many measures of lyrical and other poetry were modified. Donne's frequent use of roughly-accentual, almost tuneless lines is unexplained and was not often followed. Rhythm in general came to be studied more for its own sake, and the study was rewarded. The lovely cordial music of Carew's amorous iambics, or of Wither's trochees, or of Crashaw's odes, or of Marvell's octosyllables, has never been regained. The formal ode set in, sometimes regularly "Pindaric" in strophe-grouping, sometimes irregularly "Pindaric" as in Cowley's experiments. Above all, the heroic couplet, of the isolated, balanced, rhetorical order, such as Spenser, Drayton, Fairfax and Sylvester, the translator (1590–1606) of Du Bartas, had often used, began to be a regular instrument of verse, and that for special purposes which soon became lastingly associated with it. The flatteries of Edmund Waller and the Ovidian translations of Sandys dispute the priority for smoothness and finish, though the fame was Waller's for two generations; but Denham's overestimated *Cooper's Hill* (1642), Cowley's *Davideis* (1656), and even Ogilby's *Aeneid* made the path plainer for Dryden, the first sovereign of the rhetorical couplet which throve as blank verse declined. Sonnet and madrigal were the favoured measures of William Drummond of Hawthornden, a real and exquisite poet of the studio, who shows the general drift of verse towards sequestered and religious feeling. Drummond's *Poems* of 1616 and *Flowers of Zion* (1623) are full of Petrarch and Plato as well as of Christian resignation, and he kept alive the artistry of phrasing and versification in a time of indiscipline and conflicting forms. William Browne has been named as a Spenserian, but his *Britannia's* Pastorals (1613–1616), with their slowly-rippling and overflowing couplets which influenced Keats, were a medley of a novel kind. George Wither may equally rank among the lighter followers of Spenser, the easy masters of lyrical narrative, and the devotional poets. But his *Shepherd's Hunting* and other pieces in his volume of 1622 contain lovely landscapes, partly English and partly artificial, and stand far above his pious works, and still further above the dreary satires which he lived to continue after the Restoration.

Herrick.

Of poets yet unmentioned, Robert Herrick is the chief, with his two thousand lyrics and epigrams, gathered in *Hesperides and Noble Numbers* (1648). His power of song and sureness of cadence are not excelled within his range of topic, which includes flowers and maidens—whom he treats as creatures of the same race—and the swift decay of both their beauties, and secular regret over this decay and his own mortality and the transience of amorous pleasure, and the virtues of his friends, and country sports and lore, and religious compunction for his own paganism. The *Hesperides* are pure Renaissance work, in natural sympathy with the Roman elegiac writings and with the Pseudo-Anacreon. Cowley is best where he is nearest Herrick, and his posy of short lyrics outlives his "epic and Pindaric art." There are many writers who last by virtue of one or two poems; Suckling by his adept playfulness, Lovelace and Montrose by a few gallant stanzas, and many a nameless poet by many a consummate cadence.

The long poem.

It is the age of sudden flights and brief perfections. All the farther out of reach, yet never wholly despaired of or unattempted in England, was the "long poem," heroical and noble, the "phantom epic," that shadow of the ancient masterpieces, which had striven to life in Italy and France. Davenant's *Gondibert* (1651), Cowley's *Davideis* and Chamberlayne's *Pharonnida* (1659) attest the effort which Milton in 1658 resumed with triumph. These works have between them all the vices possible to epic verse, dulness and flatness, faintness and quaintness and incoherence. But there is some poetry in each of them, and in *Pharonnida* there is far more than enough poetry to save it.

Milton.

Few writers have found a flawless style of their own so early in life as John Milton (1608–1674). His youthful pieces show some signs of Spenser and the Caroline fantastics; but soon his vast poetical reading ran clear and lay at the service of his talent. His vision and phrasing of natural things were already original in the *Nativity Ode*, written when he was twenty; and, there also, his versification was already that of a master, of a renovator. The pensive and figured beauty of *L'Allegro* and *Il Penseroso*, two contrasted emblematic panels, the high innocent Platonism and golden blank verse of the *Comus* (1634); the birth of long-sleeping power in the *Lycidas* (1637), with its unapproached contrivance both in evolution and detail, where the precious essences of earlier myth and pastoral seem to be distilled for an offering in honour of the tombless friend;—the newness, the promise, the sureness of it all amid the current schools! The historian finds in these poems, with their echoes of Plato and Sannazzaro, of Geoffrey of Monmouth and St John, the richest and most perfect instance of the studious, decorative Renaissance style, and is not surprised to find Milton's scholars a century later in the age of Gray. The critic, while feeling that the strictly lyrical, spontaneous element is absent, is all the more baffled by the skill and enduring charm. The sonnets were written before or during Milton's long immersion (1637–1658) in prose and warfare, and show the same gifts. They are not cast in the traditional form of love-cycle, but are occasional poems; in metre they revert, not always strictly but once or twice in full perfection, to the Italian scheme; and they recall not Petrarch but the spiritual elegies or patriot exaltations of Dante or Guidiccioni.

Milton also had a medieval side to his brain, as the *History of Britain* shows. The heroic theme, which he had resolved from his youth up to celebrate, at last, after many hesitations, proved to be the fall of man. This, for one of his creed and for the audience he desired, was the greatest theme of all. Its scene was the Ptolemaic universe with the Christian heaven and hell inserted. The time, indicated by retrospect and prophecy, was the whole of that portion of eternity, from the creation of Christ to the doomsday, of which the history was sacredly revealed. The subject and the general span of the action went back to the popular mystery play; and Milton at first planned out *Paradise Lost* as such a play, with certain elements of classic tragedy embodied. But according to the current theory the epic, not the drama, was the noblest form of verse; and, feeling where his power lay, he adopted the epic. The subject, therefore, was partly medieval, partly Protestant,—for Milton was a true Protestant in having a variant of doctrine shared by no other mortal. But the ordering and presentment, with their overture, their interpolated episodes or narratives, their journeys between Olympus, Earth and hell, invocations, set similes, battles and divine thunderbolts, are those of the classical epic. Had Milton shared the free thought as well as the scholarship of the Renaissance, the poem could never have existed. With all his range of soul and skill, he had a narrower speculative brain than any poet of equal gift; and this was well for his great and peculiar task. But whatever Milton may fail to be, his heroic writing is the permanent and absolute expression of something that in the English stock is inveterate—the Promethean self-possession of the mind in defeat, its right to solitude there, its claim to judge and deny the victor. This is the spirit of his devils, beside whom his divinities, his unfallen angels (Abdiel excepted), and even his human couple with their radiance and beauty of line, all seem shadowy. The discord between Milton's doctrine and his sympathies in *Paradise Lost* (1667) has never escaped notice. The discord between his doctrine and his culture comes out in *Paradise Regained* (1671), when he has at once to reprobate and glorify Athens, the "mother of arts." In this afterthought to the earlier epic the action is slight, the Enemy has lost spirit, and the Christ is something of a pedagogue. But there is a new charm in its even, grey desert tint, sprinkled with illuminations of gold and luxury. In *Samson Agonistes* (1671) the ethical treatment as well as the machinery is Sophoclean, and the theology not wholly Christian. But the fault of Samson is forgotten in his suffering, which is Milton's own; and thus a cross-current of sympathy is set up, which may not be much in keeping with the story, but revives the somewhat exhausted interest and heightens a few passages into a bare and inaccessible grandeur.

The essential solitude of Milton's energies is best seen in his later style and versification. When he resumed poetry about 1658, he had nothing around him to help him as an artist in heroic language. The most recent memories of the drama were also the worst; the forms of Cowley and Davenant, the would-be epic poets, were impossible. Spenser's manner was too even and fluid as a rule for such a purpose, and his power was of an alien kind. Thus Milton went back, doubtless full of Greek and Latin memories, to Marlowe, Shakespeare and others among the greater dramatists (including John Ford); and their tragic diction and measure are the half-hidden bases of his own. The product, however, is unlike anything except the imitations of itself. The incongruous elements of the *Paradise Lost* and its divided sympathies are cemented, at least superficially, by its style, perhaps the surest for dignity, character and beauty that any Germanic language has yet developed. If dull and pedantic over certain stretches, it is usually infallible. It is many styles in one, and Time has laid no hand on it. In these three later poems its variety can be seen. It is perfect in personal invocation and appeal; in the complex but unfigured rhetoric of the speeches; in narrative of all kinds; for the inlaying work of simile or scenery or pageant, where the quick, pure impressions of Milton's youth and prime—possibly kept fresher by his blindness—are felt through the sometimes conventional setting; and for soliloquy and choric speech of a might unapproachable since Dante. To these calls his blank verse responds at every point. It is the seal of Milton's artistry, as of his self-confidence, for it greatly extends, for the epical purpose, all the known powers and liberties of the metre; and yet, as has often been shown, it does so not spasmodically but within fixed technical laws or rather habits. Latterly, the underlying metrical *ictus* is at times hard to detect. But Milton remains by far the surest and greatest instrumentalist, outside the drama, on the English unrhymed line. He would, however, have scorned to be judged on his form alone. His soul and temper are not merely unique in force. Their historic and representative character ensure attention, so long as the oppositions of soul and temper in the England of Milton's time remain, as they still are, the deepest in the national life. He is sometimes said to harmonize the Renaissance and the Puritan spirit; but he does not do this, for nothing can do it. The Puritan spirit is the deep thing in Milton; all his culture only gives immortal form to its expression. The critics have instinctively felt that this is true; and that is why their political and religious prepossessions have nearly always coloured, and perhaps must colour, every judgment passed upon him. Not otherwise can he be taken seriously, until historians are without public passions and convictions, or the strife between the hierarch and the Protestant is quenched in English civilization.

Drama.

Drama, 1580–1642.—We must now go back to the drama, which lies behind Milton, and is the most individual product of all English Literature. The nascent drama of genius can be found in the "University wits," who flourished between 1580 and 1595, and the chief of whom are Lyly, Kyd, Peele, Greene and Marlowe. John Lyly is the first practitioner in prose—of shapely comic plot and pointed talk—the artificial but actual talk of courtly masquers who rally one another with a bright and barren finish that is second nature. *Campaspe*, *Sapho and Phao*, *Midas*, and Lyly's other comedies, mostly written from 1580 to 1591, are frail vessels, often filled with compliment, mythological allegory, or topical satire, and enamelled with pastoral interlude and flower-like song. The work of Thomas Kyd, especially *The Spanish Tragedy* (written *c.* 1585), was the most violent effort to put new wine into the old Senecan bottles, and he probably wrote the lost pre-Shakespearian *Hamlet.* He transmitted to the later drama that subject of pious but ruinous revenge, which is used by Chapman, Marston, Webster and many others; and his chief play was translated and long acted in Germany. Kyd's want of modulation is complete, but he commands a substantial skill of dramatic mechanism, and he has more than the feeling for power; just as Peele and Greene have more than the feeling for luxury or grace. To the expression of luxury Peele's often stately blank verse is well fitted, and it is by far the most correct and musical before Marlowe's, as his *Arraignment of Paris* (1584) and his *David and Bethsabe* attest. Greene did something to create the blank verse of gentle comedy, and to introduce the tone of idyll and chivalry, in his *Friar Bacon and Friar Bungay* (1594). Otherwise these writers, with Nashe and Lodge, fall into the wake of Marlowe.

Marlowe.

Tamburlaine, in two parts (part i. *c.* 1587), *The Life and Death of Doctor Faustus, The Jew of Malta, Edward II.* (the first chronicle play of genius), and the incomplete poem *Hero and Leander* are Christopher Marlowe's title-deeds (1564–1593). He established tragedy, and inspired its master, and created for it an adequate diction and versification. His command of vibrant and heroic recitative should not obscure his power, in his greater passages, describing the descent of Helen, the passing of Mortimer, and the union of Hero and Leander, to attain a kind of Greek transparency and perfection. The thirst for ideal beauty, for endless empire, and for prohibited knowledge, no poet has better expressed, and in this respect Giordano Bruno is nearest him in his own time. This thirst is his own; his great cartoon-figures, gigantic rather than heroic, proclaim it for him: their type recurs through the drama, from Richard III. to Dryden's orotund heroes; but in *Faustus* and in *Edward II.* they become real, almost human beings. His constructive gift is less developed in proportion, though Goethe praised the planning-out of *Faustus.* The glory and influence of Marlowe on the side of form rest largely on his meteoric blank lines, which are varied not a little, and nobly harmonized into periods, and resonant with names to the point of splendid extravagance; and their sound is heard in Milton, whom he taught how to express the grief and despair of demons dissatisfied with their kingdom. Shakespeare did not excel Marlowe in Marlowe's own excellences, though he humanized Marlowe's Jew, launched his own blank verse on the tide of Marlowe's oratory, and modulated, in *Richard II.*, his master's type of chronicle tragedy.

Shakespeare.

As the middle ages receded, the known life of man upon this earth became of sovereign interest, and of this interest the drama is the freest artistic expression. If Marlowe is the voice of the impulse to explore, the plays of Shakespeare are the amplest freight brought home by any voyager. Shakespeare is not only the greatest but the earliest English dramatist who took humanity for his province. But this he did not do from the beginning. He was at first subdued to what he worked in; and though the dry pedantic tragedy was shattered and could not touch him, the gore and rant, the impure though genuine force of Kyd do not seem at first to have repelled him; if, as is likely, he had a hand in *Titus Andronicus.* He probably served with Marlowe and others of the school at various stages in the composition of the three chronicle dramas finally entitled *Henry VI.* But besides the high-superlative style that is common to them all, there runs through them the rhymed rhetoric with which Shakespeare dallied for some time, as well as the softer flute-notes and deeper undersong that foretell his later blank verse. In *Richard III.*, though it is built on the scheme and charged with the style of Marlowe, Shakespeare first showed the intensity of his original power. But after a few years he swept out of Marlowe's orbit into his own vaster and unreturning curve. In *King John* the lyrical, epical, satirical and pathetic chords are all present, if they are scarcely harmonized. Meantime, Lyly and Greene having displaced the uncouther comedy, Shakespeare learned all they had to teach, and shaped the comedy of poetic, chivalrous fancy and good-tempered high spirits, which showed him the way of escape from his own rhetoric, and enabled him to perfect his youthful, noble and gentle blank verse. This attained its utmost fineness in *Richard II.*, and its full cordiality and beauty in the other plays that consummate this period—*A Midsummer Night's Dream, The Merchant of Venice,* and one romantic tragedy, *Romeo and Juliet.* Behind them lay the earlier and fainter romances, with their chivalry and gaiety, *The Comedy of Errors, Love's Labour's Lost* and *The Two Gentlemen of Verona.* Throughout these years blank verse contended with rhyme, which Shakespeare after a while abandoned save for special purposes, as though he had exhausted its honey. The Italian Renaissance is felt in the scenery and setting of these plays. The *novella* furnishes the story, which passes in a city of the Southern type, with its absolute ruler, its fantastic by-laws on which the plot nominally turns, and its mixture of real life and marvel. The personages, at first fainter of feature and symmetrically paired, soon assume sharper outline: Richard II. and Shylock, Portia and Juliet, and Juliet's Nurse and Bottom are created. The *novella* has left the earth and taken wings: the spirit is now that of youth and Fancy (or love brooding among the shallows) with interludes of "fierce vexation," or of tragedy, or of kindly farce. And there is a visionary element, felt in the musings of Theseus upon the nature of poetry of the dream-faculty itself; an element which is new, like the use made of fairy folklore, in the poetry of England.

1594-1596.

1596-1600.

Tragedy is absent in the succeeding histories (1597–1599), and the comedies of wit and romance (1599–1600), in which Shakespeare perfected his style for stately, pensive or boisterous themes. Falstaff, the most popular as he is the wittiest of all imaginable comic persons, dominates, as to their prose or lower world, the two parts of *Henry IV.*, and its interlude or offshoot, *The Merry Wives of Windsor.* The play that celebrates Henry V. is less a drama than a pageant, diversified with mighty orations and cheerful humours, and filled with the love of Shakespeare for England. Here the most indigenous form of art invented by the English Renaissance reaches its climax. The Histories are peopled chiefly by men and warriors, of whom Hotspur, "dying in his excellence and flower," is perhaps more attractive than Henry of Agincourt. But in the "middle comedies," *As You Like It, Much Ado,* and *Twelfth Night,* the warriors are home at court, where women rule the scene and deserve to rule it; for their wit now gives the note; and Shakespeare's prose, the medium of their talk, has a finer grace and humour than ever before, euphuism lying well in subjection behind it.

1601-1608.

Mankind and this world have never been so sharply sifted or so sternly consoled, since Lucretius, as in Shakespeare's tragedies. The energy which created them evades, like that of the sun, our estimate. But they were not out of relation to their time, the first few years of the reign of James, with its conspiracies, its Somerset and Overbury horrors, its enigmatic and sombre figures like Raleigh, and its revulsion from Elizabethan buoyancy. In the same decade were written the chief tragedies of Jonson, Chapman, Dekker, Marston, Tourneur; and *The White Devil,* and *A Yorkshire Tragedy;* and *The Maid's Tragedy,* and *A Woman Killed with Kindness.* But, in spite of Shakespeare's affinities with these authors at many points, *Hamlet, Macbeth, Lear, Othello,* with the three Roman plays (written at intervals and not together), and the two quasi-antique plays *Troilus and Cressida,* and *Timon of Athens,* form a body of drama apart from anything else in the world. They reveal a new tragic philosophy, a new poetic style, a new dramatic technique and a new world of characters. In one way above all Shakespeare stands apart; he not only appropriates the ancient pattern of heroism, of right living and right dying, revealed by North's Plutarch; others did this also; but the intellectual movement of the time, though by no means fully reflected, is reflected in his tragedies far more than elsewhere. The new and troublous thoughts on man and conduct that were penetrating the general mind, the freedom and play of vision that Montaigne above all had stimulated, here find their fullest scope; and Florio's translation (1603) of Montaigne's *Essays*, coming out between the first and the second versions of Shakespeare's *Hamlet*, counted probably for more than any other book. The *Sonnets* (published 1609) are also full of far-wandering thoughts on truth and beauty and on good and evil. The story they reveal may be ranked with the situations of the stranger dramas like *Troilus* and *Measure for Measure*. But whether or no it is a true story, and the *Sonnets* in the main a confession, they would be at the very worst a perfect dramatic record of a great poet's suffering and friendship.

Last period.

Shakespeare's last period, that of his tragi-comedies, begins about 1608 with his contributions to *Pericles, Prince of Tyre*. For unknown reasons he was moved, about the time of his retirement home, to record, as though in justice to the world, the happy turns by which tragic disaster is at times averted. *Pericles*, *The Winter's Tale*, *Cymbeline*, and *The Tempest* all move, after a series of crimes, calumnies, or estrangements, to some final scene of enthralling beauty, where the lost reappear and love is recovered; as though after all the faint and desperate last partings—of Lear and Cordelia, of Hamlet and Horatio—which Shakespeare had imagined, he must make retrieval with the picture of young and happy creatures whose life renews hope even in the experienced. To this end he chose the loose action and free atmosphere of the *roman d'aventure*, which had already been adapted by Beaumont and Fletcher, who may herein have furnished Shakespeare with novel and successful theatrical effects, and who certainly in turn studied his handiwork. In *The Tempest* this tragi-comic scheme is fitted to the tales brought by explorers of far isles, wild men, strange gods and airy music. Even if it be true that in Prospero's words the poet bids farewell to his magic, he took part later nevertheless in the composition of *Henry VIII.*; and not improbably also in *The Two Noble Kinsmen*. His share in two early pieces, *Arden of Feversham* (1592) and *Edward III.*, has been urged, never established, and of many other dramas he was once idly accused.

Shakespeare's throne rests on the foundation of three equal and master faculties. One is that of expression and versification; the next is the invention and presentation of human character in action; the third is the theatrical faculty. The writing of Dante may seem to us more steadily great and perfect, when we remember Shakespeare's conceits, his experiments, his haste and impatience in his long wrestle with tragic language, his not infrequent sheer infelicities. But Dante is always himself, he had not to find words for hundreds of imaginary persons. Balzac, again, may have created and exhibited as many types of mankind, but except in soul he is not a poet. Shakespeare is a supreme if not infallible poet; his verse, often of an antique simplicity or of a rich, harmonious, romantic perfection, is at other times strained and shattered with what it tries to express, and attains beauty only through discord. He is also many persons in one; in his *Sonnets* he is even, it may be thought, himself. But he had furthermore to study a personality not of his own fancying—with something in it of Caliban, of Dogberry and of Cleopatra—that of the audience in a playhouse. He belongs distinctly to the poets like Jonson and Massinger who are true to their art as practical dramatists, not to the poets like Chapman whose works chance to be in the form of plays. Shakespeare's mastery of this art is approved now by every nation. But apart from the skill that makes him eternally actable—the skill of raising, straining and relieving the suspense, and bringing it to such an ending as the theatre will tolerate—he played upon every chord in his own hearers. He frankly enlisted Jew-hatred, Pope-hatred and France-hatred; he flattered the queen, and celebrated the Union, and stormed the house with his *fanfare* over the national soldier, Henry of Agincourt, and glorified England, as in *Cymbeline*, to the last. But in deeper ways he is the chief of playwrights. Unlike another master, Ibsen, he nearly always tells us, without emphasis, by the words and behaviour of his characters, which of them we are to love and hate, and when we are to love and when to hate those whom we can neither love nor hate wholly. Yet he is not to be bribed, and deals to his characters something of the same injustice or rough justice that is found in real life. His loyalty to life, as well as to the stage, puts the crown on his felicity and his fertility, and raises him to his solitude of dramatic greatness.

Jonson.

Shakespeare's method could not be imparted, and despite reverberations in Beaumont, Fletcher, Webster and others he left no school. But his friend Ben Jonson, his nearest equal in vigour of brain, though not in poetical intuition, was the greatest of dramatic influences down to the shutting of the theatres in 1642, and his comedies found fresh disciples even after 1660. He had "the devouring eye and the portraying hand"; he could master and order the contents of a mighty if somewhat burdensome memory into an organic drama, whether the matter lay in Roman historians or before his eyes in the London streets. He had an armoury of doctrine, drawn from the *Poetics* and Horace, which moulded his creative practice. This was also partly founded on a revulsion against the plays around him, with their loose build and moral improbabilities. But in spite of his photographic and constructive power, his vision is too seldom free and genial; it is that of the satirist who thinks that his office is to improve mankind by derisively representing it. And he does this by beginning with the "humour," or abstract idiosyncrasy or quality, and clothing it with accurately minute costume and gesture, so that it may pass for a man; and indeed the result is as real as many a man, and in his best-tempered and youthful comedy, *Every Man in his Humour* (acted 1598), it is very like life. In Jonson's monumental pieces, *Volpone or the Fox* (acted 1605) and *The Alchemist* (acted 1610), our laughter is arrested by the lowering and portentous atmosphere, or is loud and hard, startled by the enormous skill and energy displayed. Nor are the joy and relief of poetical comedy given for an instant by *The Silent Woman*, *Bartholomew Fair* (acted 1614), or *The Staple of News*, still less by topical plays like *Cynthia's Revels*, though their unfailing farce and rampant fun are less charged with contempt. The erudite tragedies, *Sejanus* (acted 1603) and *Catiline*, chiefly live by passages of high forensic power. Jonson's finer elegies, eulogies and lyrics, which are many, and his fragmentary *Sad Shepherd*, show that he also had a free and lovely talent, often smothered by doctrine and temper; and his verse, usually strong but full of knots and snags, becomes flowing and graciously finished. His prose is of the best, especially in his *Discoveries*, a series of ethical essays and critical maxims; its prevalently brief and emphatic rhythms suggesting those of Hobbes, and even, though less easy and civil and various, those of Dryden. The "sons" of Jonson, Randolph and Browne, Shadwell and Wilson, were heirs rather to his riot of "humours," his learned method and satiric aim, than to his larger style, his architectural power, or his relieving graces.

Romantic drama.

As a whole, the romantic drama (so to entitle the remaining bulk of plays down to 1642) is a vast stifled jungle, full of wild life and song, with strange growths and heady perfumes, with glades of sunshine and recesses of poisoned darkness; it is not a cleared forest, where single and splendid trees grow to shapely perfection. It has "poetry enough for anything"; passionate situations, and their eloquence; and a number, doubtless small considering its mass, of living and memorable personages. Moral keeping and constructive mastery are rarer still; and too seldom through a whole drama do we see human life and hear its voices, arranged and orchestrated by the artist. But it can be truly said in defence that while structure without poetry is void (as it tended at times to be in Ben Jonson), poetry without structure is still poetry, and that the romantic drama is like nothing else in this world for variety of accent and unexpectedness of beauty. We must read it through, as Charles Lamb did, to do it justice. The diffusion of its characteristic excellences is surprising. Of its extant plays it is hardly safe to leave one unopened, if we are searchers for whatsoever is lovely or admirable. The reasons for the lack of steadfast power and artistic conscience lay partly in the conditions of the stage. Playwrights usually wrote rapidly for bread, and sold their rights. The performances of each play were few. There was no authors' copyright, and dramas were made to be seen and heard, not to be read. There was no articulate dramatic criticism, except such as we find casually in Shakespeare, and in the practice and theory of Jonson, who was deaf or hostile to some of the chief virtues of the romantic playwrights.

Chapman.

The wealth of dramatic production is so great that only a broad classification is here offered. George Chapman stands apart, nearest to the greatest in high austerity of sentiment and in the gracious gravity of his romantic love-comedies. But the crude melodrama of his tragedies is void of true theatrical skill. His quasi-historical French tragedies on Bussy d'Ambois and Biron and Chabot best show his gift and also his insufferable interrupting quaintness. His versions of Homer (1598–1624), honoured alike by Jonson and by Keats, are the greatest verse translations of the time, and the real work of Chapman's life. Their virtues are only partially Homer's, but the general epic nobility and the majesty of single lines, which in length are the near equivalent of the hexameter, redeem the want of Homer's limpidity and continuity and the translator's imperfect knowledge of Greek. A vein of satiric ruggedness unites Jonson and Chapman with Marston and Hall, the professors of an artificial and disgusting invective; and the same strain spoils Marston's plays, and obscures his genuine command of the language of feverish and bitter sentiment. With these writers satire and contempt of the world lie at the root both of their comedy and tragedy.

Dekker and Heywood.

Middleton and Webster.

Beaumont and Fletcher.

Massinger.

The Many.

It is otherwise with most of the romantic dramatists, who may be provisionally grouped as follows. (*a*) Thomas Dekker and Thomas Heywood are writers-of-all-work, the former profuse of tracts and pamphlets, the latter of treatises and compilations. They are both unrhetorical and void of pose, and divide themselves between the artless comedy of bustling, lively, English humours and pathetic, unheroic tragedy. But Dekker has splendid and poetical dreams, in *Old Fortunatus* (1600) and *The Honest Whore*, both of luxury and of tenderness; while Heywood, as in his *English Traveller* and *Woman killed with Kindness* (acted 1603), excels in pictures of actual, chivalrous English gentlemen and their generosities. The fertility and volubility of these writers, and their modest carelessness of fame, account for many of their imperfections. With them may be named the large crowd of professional journeymen, who did not want for power, but wrote usually in partnership together, like Munday, Chettle and Drayton, or supplied, like William Rowley, underplots of rough, lively comedy or tragedy. (*b*) Amongst dramatists of primarily tragic and sombre temper, who in their best scenes recall the creator of Angelo, Iago and Timon, must be named Thomas Middleton (1570?–1627), John Webster, and Cyril Tourneur. Middleton has great but scattered force, and his verse has the grip and ring of the best period without a sign of the decadence. He is strong in high comedy, like *The Old Law*, that turns on some exquisite point of honour—"the moral sense of our ancestors"; in comedy that is merely graphic and vigorous; and in detached sketches of lowering wickedness and lust, like those in *The Changeling* and *Women beware Women*. He and Webster each created one unforgettable desperado, de Flores in *The Changeling* and Bosola in *The Duchess of Malfi* (whose "pity," when it came, was "nothing akin to him"). In Webster's other principal play, *Vittoria Corombona, or the White Devil* (produced about 1616), the title-character is not less magnificent in defiant crime than Goneril or Lady Macbeth. The style of Webster, for all his mechanical horrors, distils the essences of pity and terror, of wrath and scorn, and is profoundly poetical; and his point of view seems to be blank fatalism, without Shakespeare's ever-arching rainbow of moral sympathy. Cyril Tourneur, in *The Revenger's Tragedy*, is even more of a poet than Webster; he can find the phrase for half-insane wrath and nightmare brooding, but his chaos of impieties revolts the artistic judgment. These specialists, when all is said, are great men in their dark province. (*c*) The playwrights who may be broadly called romantic, of whom Beaumont, Fletcher and Massinger are the chief, while they share in the same sombre vein, have a wider range and move more in the daylight. The three just named left a very large body of drama, tragic, comic and tragi-comic, in which their several shares can partly be discerned by metrical or other tests. Beaumont (d. 1616) is nearest the prime, with his vein of Cervantesque mockery and his pure, beautifully-broken and cadenced verse, which is seen in his contributions to *Philaster* and *The Maid's Tragedy*. Fletcher (d. 1625) brings us closest to the actual gaieties and humours of Jacobean life; he has a profuse comic gift and the rare instinct for natural dialogue. His verse, with its flood of vehement and expansive rhetoric, heard at its best in plays like *Bonduca*, cannot cheat us into the illusion that it is truly dramatic; but it overflows with beauty, like his silvery but monotonous versification with its endecasyllabics arrested at the end. In Fletcher the decadence of form and feeling palpably begins. His personages often face about at critical instants and bely their natures by sudden revulsions. Wanton and cheap characters invite not only dramatic but personal sympathy, as though the author knew no better. There is too much fine writing about a chastity which is complacent rather than instinctive, and satisfied with its formal resistances and technical escapes; so that we are far from Shakespeare's heroines. These faults are present also in Philip Massinger (d. 1640), who offers in substantial recompense, not like Beaumont and Fletcher treasures of incessant vivacious episode and poetry and lyric interlude, but an often splendid and usually solid constructive skill, and a steady eloquence which is like a high table-land without summits. *A New Way to Pay Old Debts* (1632) is the most enduring popular comedy of the time outside Shakespeare's, and one of the best. Massinger's interweaving of impersonal or political conceptions, as in *The Bondman* and *The Roman Actor*, is often a triumph of arrangement; and though he wrote in the reign of Charles, he is saved by many noble qualities from being merely an artist of the decline. (*d*) A mass of plays, of which the authorship is unknown, uncertain or attached to a mere name, baffle classification. There are domestic tragedies, such as *Arden of Feversham*; scions of the vindictive drama, like *The Second Maiden's Tragedy*; historic or half-historic tragedies like *Nero*. There are chronicle histories, of which the last and one of the best is Ford's *Perkin Warbeck*, and melodramas of adventure such as Thomas Heywood poured forth. There are realistic citizen comedies akin to *The Merry Wives*, like Porter's refreshing *Two Angry Women of Abingdon*; there are Jonsonian comedies, vernacular farces, light intrigue-pieces like Field's and many more. Few of these, regarded as wholes, come near to perfection; few fail of some sally or scene that proves once more the unmatched diffusion of the dramatic or poetic instinct. (*e*) Outside the regular drama there are many varieties: academic plays, like *The Return from Parnassus* and *Lingua*, which are still mirthful; many pastoral plays or entertainments in the Italian style, like *The Faithful Shepherdess*; versified character-sketches, of which Day's *Parliament of Bees*, with its Theocritean grace and point, is the happiest; many masques and shows, often lyrically and scenically lovely, of which kind Jonson is the master, and Milton, in his *Comus*, the transfigurer; Senecan dramas made only to be read, like Daniel's and Fulke Greville's; and Latin comedies, like *Ignoramus*. All these species are only now being fully grouped, sifted and edited by scholars, but a number of the six or seven hundred dramas of the time remain unreprinted.

Ford and Shirley.

There remain two writers, John Ford and James Shirley, who kept the higher tradition alive till the Puritan ordinance crushed the theatre in 1642. Ford is another specialist, of grave, sinister and concentrated power (reflected in his verse and diction), to whom no topic, the incest of Annabella in *'Tis Pity She's a Whore*, or the high crazed heroism of Calantha in *The Broken Heart*, is beyond the pale, if only he can dominate it; as indeed he does, without complicity, standing above his subject. Shirley, a fertile writer, has the general characteristic gifts, in a somewhat dilute but noble form, of the more romantic playwrights, and claims honour as the last of them.

Prose from 1579 to 1660.—With all the unevenness of poetry, the sense of style, of a standard, is everywhere; felicity is never far off. Prose also is full of genius, but it is more disfigured than verse by aberration and wasted power. A central, classic, durable, adaptive prose had been attained by Machiavelli, and by Amyot and Calvin, before 1550. In England it was only to become distinct after 1660. Vocabulary, sentence-structure, paragraph, idiom and rhythm were in a state of unchartered freedom, and the history of their crystallization is not yet written. But in more than compensation there is a company of prose masters, from Florio and Hooker to Milton and Clarendon, not one of whom clearly or fully anticipates the modern style, and who claim all the closer study that their special virtues have been for ever lost. They seem farther away from us than the poets around them. The verse of Shakespeare is near to us, for its tradition has persisted; his prose, the most natural and noble of his age, is far away, for its tradition has not persisted. One reason of this difference is that English prose tried to do more work than that of France and Italy; it tried the work of poetry; and it often did that better than it did the normal work of prose. This overflow of the imaginative spirit gave power and elasticity to prose, but made its task of finding equilibrium the harder. Moreover, prose in England was for long a natural growth, never much affected by critical or academic canons as in France; and when it did submit to canons, the result was often merely manner. The tendons and sinews of the language, still in its adolescent power and bewilderment, were long unset; that is, the parts of speech—noun and verb, epithet and adverb—were in freer interchange than at any period afterwards. The build, length and cadence of a complex sentence were habitually elaborate; and yet they were disorganized, so that only the ear of a master could regulate them. The law of taste and measure, perhaps through some national disability, was long unperceived. Prose, in fact, could never be sure of doing the day's work in the right fashion. The cross-currents of pedantry in the midst of simplicity, the distrust of clear plain brevity, which was apt to be affected when it came, the mimicries of foreign fashions, and the quaintness and cumbrousness of so much average writing, make it easier to classify Renaissance prose by its interests than by its styles.

The novel.

Lyly and euphuism.

The Elizabethan novel was always unhappily mannered, and is therefore dead. It fed the drama, which devoured it. The tales of Boccaccio, Bandello, Cinthio, Margaret of Navarre, and others were purveyed, as remarked above, in the forgotten treasuries of Painter, Pettie, Fenton and Whetstone, and many of these works or their originals filled a shelf in the playwrights' libraries. The first of famous English novels, Lyly's *Euphues* (1578), and its sequel *Euphues and his England*, are documents of form. They are commended by a certain dapper shrewdness of observation and an almost witty priggery, not by any real beauty or deep feeling. Euphuism, of which Lyly was only the patentee, not the inventor, strikes partly back to the Spaniard Guevara, and was a model for some years to many followers like Lodge and Greene. It did not merely provide Falstaff with a pattern for mock-moral diction and vegetable similes. It genuinely helped to organize the English sentence, complex or co-ordinate, and the talk of Portia and Rosalind shows what could be made of it. By the arch-euphuists, clauses and clusters of clauses were paired for parallel or contrast, with the beat of emphatic alliteration on the corresponding parts of speech in each constituent clause. This was a useful discipline for prose in its period of groping. Sidney's incomposite and unfinished *Arcadia*, written 1580–1581, despite its painful forced antitheses, is sprinkled with lovely rhythms, with pleasing formal landscapes, and even with impassioned sentiment and situation, through which the writer's eager and fretted spirit shines. Both these stories, like those of Greene and Lodge, show by their somewhat affected, edited delineation of life and their courtly tone that they were meant in chief for the eyes of ladies, who were excluded alike from the stage and from its audience. Nashe's drastic and photographic tale of masculine life, *Jack Wilton, or The Unfortunate Traveller*, stands almost alone, but some of the gap is filled by the contemporary pamphlets, sometimes vivid, often full of fierce or maudlin declamation, of Nashe himself—by far the most powerful of the group—and of Greene, Dekker and Nicholas Breton. Thus the English novel was a minor passing form; the leisurely and amorous romance went on in the next century, owing largely to French influence and example.

Criticism.

In criticism, England may almost be counted with the minor Latin countries. Sidney, in his *Defence of Poesy* (1595, written about 1580), and Jonson, in his *Discoveries*, offer a well-inspired and lofty restatement of the current answers to the current questions, but could give no account of the actual creative writing of the time. To defend the "truth" of poetry—which was identified with all inventive writing and not only with verse—poetry was saddled with the work of science and instruction. To defend its character it was treated as a delightful but deliberate bait to good behaviour, a theory at best only true of allegory and didactic verse. The real relation of tragedy to spiritual things, which is admittedly shown, however hard its definition, in Shakespeare's plays, no critic for centuries tried to fathom. One of the chief quarrels turned on metric. A few lines that Sidney and Campion wrote on what they thought the system of Latin quantity are really musical. This theory, already raised by Ascham, made a stir, at first in the group of Harvey, Sidney, Dyer and Spenser, called the "Areopagus," an informal attempt to copy the Italian academies; and it was revived on the brink of the reign of James. But Daniel's firm and eloquent *Defence of Rhyming* (1602) was not needed to persuade the poets to continue rhyming in syllabic verse. The stricter view of the nature and classification of poetry, and of the dramatic unity of action, is concisely given, partly by Jonson, partly by Bacon in his *Advancement of Learning* and *De Augmentis*; and Jonson, besides passing his famed judgments on Shakespeare and Bacon, enriched our critical vocabulary from the Roman rhetoricians. Scholastic and sensible manuals, like Webbe's *Discourse of Poetry* and the *Art of English Poesy* (1589) ascribed to Puttenham, come in the rear.

Translators.

The translators count for more than the critics; the line of their great achievements from Berners' *Froissart* (1523–1525) to Urquhart's *Rabelais* (1653) is never broken long; and though their lives are often obscure, their number witnesses to that far-spread diffusion of the talent for English prose, which the wealth of English poetry is apt to hide. The typical craftsman in this field, Philemon Holland, translated Livy, Pliny, Suetonius, Plutarch's *Morals* and Camden's *Britannia*, and his fount of English is of the amplest and purest. North, in his translation, made from Amyot's classic French, of Plutarch's *Lives* (1579), disclosed one of the master-works of old example; Florio, in Montaigne's *Essays* (1603), the charter of the new freedom of mental exploration; and Shelton, in *Don Quixote* (1612), the chief tragi-comic creation of continental prose. These versions, if by no means accurate in the letter, were adequate in point of soul and style to their great originals; and the English dress of Tacitus (1591), Apuleius, Heliodorus, Commines, *Celestina* and many others, is so good and often so sumptuous a fabric, that no single class of prose authors, from the time of More to that of Dryden, excels the prose translators, unless it be the Anglican preachers. Their matter is given to them, and with it a certain standard of form, so that their natural strength and richness of phrase are controlled without being deadened. But the want of such control is seen in the many pamphleteers, who are the journalists of the time, and are often also playwrights or tale-tellers, divines or politicians. The writings, for instance, of the hectic, satiric and graphic Thomas Nashe, run at one extreme into fiction, and at the other into the virulent rag-sheets of the Marprelate controversy, which is of historical and social but not of artistic note, being only a fragment of that vast mass of disputatious literature, which now seems grotesque, excitable or dull.

Hooker.

Richard Hooker's *Laws of Ecclesiastical Polity* (1594–1597), an accepted defence of the Anglican position against Geneva and Rome, is the first theological work of note in the English tongue, and the first of note since Wycliffe written by an Englishman. It is a plea for reason as one of the safe and lawful guides to the faith; but it also speaks with admirable temper and large feeling to the ceremonial and aesthetic sense. The First Book, the scaffolding of the treatise, discusses the nature of law at large; but Hooker hardly has pure speculative power, and the language had not yet learnt to move easily in abstract trains of thought. In its elaboration of clause and period, in its delicate resonant eloquence, Hooker's style is Ciceronian; but his inversions and mazes of subordinate sentence somewhat rack the genius of English. Later divines like Jeremy Taylor had to disintegrate, since they could not wield, this admirable but over-complex eloquence. The sermons (1621–1631) of Donne have the mingled strangeness and intimacy of his verse, and their subtle flame, imaginative tenacity, and hold upon the springs of awe make them unique. Though without artificial symmetry, their sentences are intricately harmonized, in strong contrast to such pellet-like clauses as those of the learned Lancelot Andrewes, who was Donne's younger contemporary and the subject of Milton's Latin epitaph.

Bacon.

With Francis Bacon (1561–1626) English philosophy began its unbroken course and took its long-delayed rank in Europe. His prose, of which he is the first high and various master in English, was shaped and coloured by his bent as orator and pleader, by his immixture in affairs, by his speculative brain, and by his use and estimate of Latin. In his conscious craftsmanship, his intellectual confidence and curiosity, his divining faith in the future of science, and his resolve to follow the leadings of nature and experience unswervingly; in his habit of storing and using up his experience, and in his wide wordly insight, crystallized in maxim, he suggests a kind of Goethe, without the poetic hand or the capacity for love and lofty suffering. He saw all nature in a map, and wished to understand and control her by outwitting the "idols," or inherent paralysing frailties of the human judgment. He planned but could not finish a great cycle of books in order to realize this conception. The *De Augmentis Scientiarum* (1623) expanded from the English *Advancement of Knowledge* (1605) draws the map; the *Novum Organum* (1620) sets out the errors of scholasticism and the methods of inductive logic; the *New Atlantis* sketches an ideally equipped and moralized scientific community. Bacon shared with the great minds of his century the notion that Latin would outlast any vernacular tongue, and committed his chief scientific writings to a Latin which is alive and splendid and his own, and which also disciplined and ennobled his English. The *Essays* (1597, 1612, 1625) are his lifelong, gradually accumulated diary of his opinions on human life and business. These famous compositions are often sadly mechanical. They are chippings and basketings of maxims and quotations, and of anecdotes, often classical, put together inductively, or rather by "simple enumeration" of the pros and cons. Still they are the honest notes of a practical observer and statesman, disenchanted—why not?—with mankind, concerned with cause and effect rather than with right and wrong, wanting the finer faith and insight into men and women, but full of reality, touched with melancholy, and redeeming some arid, small and pretentious counsels by many that are large and wise. Though sometimes betraying the workshop, Bacon's style, at its best, is infallibly expressive; like Milton's angels, it is "dilated or condensed" according to its purposes. In youth and age alike, Bacon commanded the most opposite patterns and extremes of prose—the curt maxim, balanced in antithesis or triplet, or standing solitary; the sumptuous, satisfying and brocaded period; the movements of exposition, oratory, pleading and narrative. The *History of Henry VII.* (1622), written after his fall from office, is in form as well as insight and mastery of material the one historical classic in English before Clarendon. Bacon's musical sense for the value and placing of splendid words and proper names resembles Marlowe's. But the master of mid-Renaissance prose is Shakespeare; with him it becomes the voice of finer and more impassioned spirits than Bacon's—the voice of Rosalind and Hamlet. And the eulogist of both men, Ben Jonson, must be named in their company for his senatorial weight and dignity of ethical counsel and critical maxim.

Hobbes.

As the Stuart rule declined and fell, prose became enriched from five chief sources: from philosophy, whether formal or unmethodical; from theology and preaching and political dispute; from the poetical contemplation of death; from the observation of men and manners; and from antiquarian scholarship and history. As in France, where the first three of these kinds of writings flourished, it was a time rather of individual great writers than of any admitted pattern or common ideal of prose form, although in France this pattern was always clearlier defined. The mental energy, meditative depth, and throbbing brilliant colour of the English drama passed with its decay over into prose. But Latin was still often the supplanter. the treatise of Lord Herbert of Cherbury, *De Veritate*, of note in the early history of Deism, and much of the writing of the ambidextrous Thomas Hobbes, are in Latin. In this way Latin disciplined English once more, though it often tempted men of genius away from English. The *Leviathan* (1651) with its companion books on *Human Nature* and *Liberty*, and Hobbes' explosive dialogue on the civil wars, *Behemoth* (1679), have the bitter concision of Tacitus and the clearness of a half-relief in bronze. Hobbes' speculations on the human animal, the social contract, the absolute power of the sovereign, and the subservience owed to the sovereign by the Church or "Kingdom of Darkness," enraged all parties, and left their track on the thought and controversial literature of the century. With Ben Jonson and the jurist Selden (whose English can be judged from his *Table Talk*), Hobbes anticipates the brief and clear sentence-structure of the next age, though not its social ease and amenity of form. But his grandeur is not that of a poet, and the poetical prose is the most distinctive kind of this period.

Funeral prose.

It is eloquent above all on death and the vanity of human affairs; its solemn tenor prolongs the reflections of Claudio, of Fletcher's Philaster, or of Spenser's Despair. It is exemplified in Bacon's Essay *Of Death*, in the anonymous descant on the same subject wrongly once ascribed to him, in Donne's plea for suicide, in Raleigh's *History of the World*, in Drummond's *Cypress Grove* (1623), in Jeremy Taylor's sermons and *Holy Dying* (1651), and in Sir Thomas Browne's *Urn-Burial* (1658) and *Letter to a Friend*. Its usual vesture is a long purple period, freely Latinized, though Browne equally commands the form of solemn and monumental epigram. He is also free from the dejection that wraps round the other writers on the subject, and a holy quaintness and gusto relieve his ruminations. The *Religio Medici* (1642), quintessentially learned, wise and splendid, is the fullest memorial of his power. Amongst modern prose writers, De Quincey is his only true rival in musical sensibility to words.

Jeremy Taylor.

Jeremy Taylor, the last great English casuist and schoolman, and one of the first pleaders for religious tolerance (in his *Liberty of Prophesying*, 1647), is above all a preacher; tender, intricate, copious, inexhaustible in image and picturesque quotation. From the classics, from the East, from the animal world, from the life of men and children, his illustrations flow, without end or measure. He is a master of the lingering cadence, which soars upward and onward on its coupled clauses, as on balanced iridescent wings, and is found long after in his scholar Ruskin.

Burton.

Imaginative force of another kind pervades Robert Burton's *Anatomy of Melancholy* (1621), where the humorous medium refracts and colours every ray of the recluse's far-travelled spirit. The mass of Latin citation, woven, not quilted, into Burton's style, is another proof of the vitality of the cosmopolitan language. Burton and Browne owe much to the pre-critical learning of their time, which yields up such precious savours to their fancy, that we may be thankful for the delay of more precise science and scholarship. Fancy, too, of a suddener and wittier sort, preserves some of the ample labours of Thomas Fuller, which are scattered over the years 1631–1662; and the *Lives* and *Compleat Angler* (1653) of Izaak Walton are unspoilt, happy or pious pieces of idyllic prose. No adequate note on the secular or sacred learning of the time can here be given; on Camden, with his vast erudition, historical, antiquarian and comparatively critical (*Britannia*, in Latin, 1586); or on Ussher, with his patristic and chronological learning, one of the many *savants* of the Anglican church. Other divines of the same camp pleaded, in a plainer style than Taylor, for freedom of personal judgment and against the multiplying of "vitals in religion"; the chief were Chillingworth, one of the closest of English apologists, in his *Religion of Protestants* (1638), and John Hales of Eton. The Platonists, or rather Plotinists, of Cambridge, who form a curious digression in the history of modern philosophy, produced two writers, John Smith and Henry More, of an exalted and esoteric prose, more directly inspired by Greece than any other of the time; and their champion of erudition, Cudworth, in his *True Intellectual System*, gave some form to their doctrine.

Clarendon.

Above the vast body of pamphlets and disputatious writing that form the historian's material stands Edward Hyde, Earl of Clarendon's *History of the Rebellion*, printed in 1702–1704, thirty years after his death. Historical writing hitherto, but for Bacon's *Henry VII.*, had been tentative though profuse. Raleigh's vast disquisition upon all things, *The History of the World* (1614), survives by passages and poetic splendours; gallantly written second-hand works like Knolles's *History of the Turks*, and the rhetorical *History of the Long Parliament* by May, had failed to give England rank with France and Italy. Clarendon's book, one of the greatest of memoirs and most vivid of portrait-galleries, spiritually unappreciative of the other side, but full of a subtle discrimination of character and political motive, brings its author into line with Retz and Saint-Simon, the watchers and recorders and sometimes the makers of contemporary history. Clarendon's *Life*, above all the picture of Falkland and his friends, is a personal record of the delightful sort in which England was thus far infertile. He is the last old master of prose, using and sustaining the long, sinuous sentence, unworkable in weaker hands. He is the last, for Milton's polemic prose, hurled from the opposite camp, was written between 1643 and 1660. Whether reviling bishops or royal privilege or indissoluble monogamy, or recalling his own youth and aims; or claiming liberty for print in *Areopagitica* (1644); in his demonic defiances, or angelic calls to arms, or his animal eruptions of spite and hatred, Milton leaves us with a sense of the motive energies that were to be transformed into *Paradise Lost* and *Samson*. His sentences are ungainly and often inharmonious, but often irresistible; he rigidly withstood the tendencies of form, in prose as in verse, that Dryden was to represent, and thus was true to his own literary dynasty.

Milton's prose.

The Authorized Version.

A special outlying position belongs to the Authorized Version (1611) of the Bible, the late fruit of the long toil that had begun with Tyndale's, and, on the side of style, with the Wycliffite translations. More scholarly than all the preceding versions which it utilized, it won its incomparable form, not so much because of the "grand style that was in the air," which would have been the worst of models, as because the style had been already tested and ennobled by generations of translators. Its effect on poetry and letters was for some time far smaller than its effect on the national life at large, but it was the greatest translation—being of a whole literature, or rather of two literatures—in an age of great translations.

Some other kinds of writing soften the transition to Restoration prose. The vast catalogue of Characters numbers hundreds of titles. Deriving from Theophrastus, who was edited by Casaubon in 1592, they are yet another Renaissance form that England shared with France. But in English hands, failing a La Bruyère—in Hall's, in Overbury's, even in those of the gay and skilful Earle (*Microcosmographie*, 1628)—the Character is a mere list of the attributes and oddities of a type or calling. It is to the Jonsonian drama of humours what the Pensée, or detached remark, practised by Bishop Hall and later by Butler and Halifax, is to the Essay. These works tended long to be commonplace or didactic, as the popular *Resolves* of Owen Feltham shows. Cowley was the first essayist to come down from the desk and talk as to his equals in easy phrases of middle length. A time of dissension was not the best for this kind of peaceful, detached writing. The letters of James Howell, the autobiography of Lord Herbert of Cherbury, and the memoirs of Kenelm Digby belong rather to the older and more mannered than to the more modern form, though Howell's English is in the plainer and quicker movement.

IV. Restoration Period

French influence.

Literature from 1660 to 1700.—The Renaissance of letters in England entered on a fresh and peculiar phase in the third quarter of the century. The balance of intellectual and artistic power in Europe had completely shifted since 1580. Inspiration had died down in Italy, and its older classics were no longer a stimulus. The Spanish drama had flourished, but its influence though real was scattered and indirect. The Germanic countries were slowly emerging into literature; England they scarcely touched. But the literary empire of France began to declare itself both in Northern and Southern lands, and within half a century was assured. Under this empire the English genius partly fell, though it soon asserted its own equality, and by 1720 had so reacted upon France as more than to repay the debt. Thus between 1660 and 1700 is prepared a temporary dual control of European letters. But in the age of Dryden France gave England more than it received; it gave more than it had ever given since the age of Chaucer. During Charles II.'s days Racine, Molière, La Fontaine and Bossuet ran the best of their course. Cavalier exiles like Waller, Cowley and Hobbes had come back from the winter of their discontent in Paris, and Saint-Evremond, the typical *bel esprit* and critic, settled long in England. A vast body of translations from the French is recounted, including latterly the works of the Protestant refugees printed in the free Low Countries or in England. Naturally this influence told most strongly on the social forms of verse and prose—upon comedy and satire, upon criticism and maxim and epigram, while it also affected theology and thought. And this meant the Renaissance once more, still unexhausted, only working less immediately and in fresh if narrower channels. Greek literature, Plato and Homer and the dramatists, became dimmer; the secondary forms of Latin poetry came to the fore, especially those of Juvenal and the satirists, and the *pedestris sermo*, epistolary and critical, of Horace. These had some direct influence, as Dryden's translation of them, accompanying his Virgil and Lucretius, may show. But they came commended by Boileau, their chief modernizer, and in their train was the fashion of gallant, epigrammatic and social verse. The tragedy of Corneille and Racine, developed originally from the Senecan drama, contended with the traditions of Shakespeare and Fletcher, and was reinforced by that of the correcter Jonson, in shaping the new theatre of England. The French codifiers, who were often also the distorters, of Aristotle's *Poetics* and Horace's *Ars poëtica*, furnished a canonical body of criticism on the epic and the drama, to which Dryden is half a disciple and half a rebel. All this implied at once a loss of the larger and fuller inspirations of poetry, a decadence in its great and primary forms, epic, lyric and tragic, and a disposition, in default of such creative power, to turn and take stock of past production. In England, therefore, it is the age of secondary verse and of nascent, often searching criticism.

Science and Letters.

The same critical spirit was also whetted in the fields of science and speculation, which the war and the Puritan rule had not encouraged. The activities of the newly-founded Royal Society told directly upon literature, and counted powerfully in the organization of a clear, uniform prose—the "close, naked, natural way of speaking," which the historian of the Society, Sprat, cites as part of its programme. And the style of Sprat, as of scientific masters like Newton and Ray the botanist, itself attests the change. A time of profound and peaceful and fruitful scientific labour began; the whole of Newton's *Principia* appeared in 1687; the dream of Bacon came nearer, and England was less isolated from the international work of knowledge. The spirit of method and observation and induction spread over the whole field of thought and was typified in John Locke, whose *Essay concerning Human Understanding* came out in English in 1690, and who applied the same deeply sagacious and cautious calculus to education and religion and the "conduct of the understanding." But his works, though their often mellow and dignified style has been ignorantly underrated, also show the change in philosophic writing since Hobbes. The old grandeur and pugnacity are gone; the imaginative play of science, or quasi-science, on the literature of reflection is gone; the eccentrics, the fantasts, the dreamers are gone, or only survive in curious transitional writers like Joseph Glanvil (*Scepsis scientifica*, 1665) or Thomas Burnet (*Sacred Theory of the Earth*, 1684). This change was in part a conscious and an angry change, as is clear from the attacks made in Samuel Butler's *Hudibras* (1663–1668) upon scholastic verbiage, astrology, fanatical sects and their disputes, poetic and "heroic" enthusiasm and intellectual whim.

Courtly and social influences.

Before the Restoration men of letters, with signal exceptions like Milton and Marvell, had been Cavalier, courtly and Anglican in their sympathies. The Civil War had scattered them away from the capital, which, despite Milton's dream in *Areopagitica* of its humming and surging energies, had ceased to be, what it now again became, the natural haunt and Rialto of authors. The taste of the new king and court served to rally them. Charles II. relished *Hudibras*, used and pensioned Dryden, sat under Barrow and South and heard them with appreciation, countenanced science, visited comedies, and held his own in talk by mother-wit. Letters became the pastime, and therefore one of the more serious pursuits, of men of quality, who soon excelled in song and light scarifying verse and comedy, and took their own tragedies and criticisms gravely. Poetry under such auspices became gallant and social, and also personal and partisan; and satire was soon its most vital form, with the accessories of compliment, rhymed popular argumentation and elegy. The social and conversational instinct was the master-influence in prose. It produced a subtle but fundamental change in the attitude of author to reader. Prose came nearer to living speech, it became more civil and natural and persuasive, and this not least in the pulpit. The sense of ennui, or boredom, which seemed as unknown in the earlier part of the century as it is to the modern German, became strongly developed, and prose was much improved by the fear of provoking it. In all these ways the Restoration accompanied and quickened a speedier and greater change in letters than any political event in English history since the reign of Alfred, when prose itself was created.

Prose and criticism.

The formal change in prose can thus be assigned to no one writer, for the good reason that it presupposes a change of spoken style lying deeper than any personal influence. If we begin with the writing that is nearest living talk—the letters of Otway or Lady Rachel Russell, or the diary of Pepys (1659–1669)—that supreme disclosure of our mother-earth—or the evidence in a state trial, or the dialogue in the more natural comedies; if we then work upwards through some of the plainer kinds of authorship, like the less slangy of L'Estrange's pamphlets, or Burnet's *History of My Own Time*, a solid Whig memoir of historical value, until we reach really admirable or lasting prose like Dryden's *Preface* to his *Fables* (1700), or the maxims of Halifax;—if we do this, we are aware, amid all varieties, survivals and reversions, of a strong and rapid drift towards the style that we call modern. And one sign of this movement is the revulsion against any over-saturating of the working, daily language, and even of the language of appeal and eloquence, with the Latin element. In Barrow and Glanvil, descendants of Taylor and Browne, many Latinized words remain, which were soon expelled from style like foreign bodies from an organism. As in the mid-sixteenth and the mid-eighteenth century, the process is visible by which the Latin vocabulary and Latin complication of sentence first gathers strength, and then, though not without leaving its traces, is forced to ebb. The instinct of the best writers secured this result, and secured it for good and all. In Dryden's diction there is a nearly perfect balance and harmony of learned and native constituents, and a sensitive tact in Gallicizing; in his build of sentence there is the same balance between curtness or bareness and complexity or ungainly lengthiness. For ceremony and compliment he keeps a rolling period, for invective a short sharp stroke without the gloves. And he not only uses in general a sentence of moderate scale, inclining to brevity, but he finds out its harmonies; he is a seeming-careless but an absolute master of rhythm. In delusive ease he is unexcelled; and we only regret that he could not have written prose oftener instead of plays. We should thus, however, have lost their prefaces, in which the bulk and the best of Dryden's criticisms appear. From the *Essay of Dramatic Poesy* (1668) down to the *Preface to Fables* (1700) runs a series of essays: *On the Grounds of Criticism in Tragedy*, *On Heroic Plays*, *On Translated Verse*, *On Satire* and many more; which form the first connected body of criticisms in the language, and are nobly written always. Dryden's prose is literature as it stands, and yet is talk, and yet again is mysteriously better than talk. The critical writings of John Dennis are but a sincere application of the rules and canons that were now becoming conventional; Rymer, though not so despicable as Macaulay said, is still more depressing than Dennis; and for any critic at once so free, so generous and so sure as Dryden we wait in vain for a century.

Contributors to the new prose.

Three or four names are usually associated with Dryden's in the work of reforming or modifying prose: Sprat, Tillotson, Sir William Temple, and George Savile, marquis of Halifax; but the honours rest with Halifax. Sprat, though clear and easy, has little range; Tillotson, though lucid, orderly, and a very popular preacher, has little distinction; Temple, the elegant essayist, has a kind of barren gloss and fine literary manners, but very little to say. The political tracts, essays and maxims of Halifax (died 1695) are the most typically modern prose between Dryden and Swift, and are nearer than anything else to the best French writing of the same order, in their finality of epigram, their neatness and mannerliness and sharpness. The *Character of a Trimmer* and *Advice to a Daughter* are the best examples.

Preachers.

Religious literature, Anglican and Puritan, is the chief remaining department to be named. The strong, eloquent and coloured preaching of Isaac Barrow the mathematician, who died in 1677, is a survival of the larger and older manner of the Church. In its balance of logic, learning and emotion, in its command alike of Latin splendour and native force, it deserves a recognition it has lost. Another athlete of the pulpit, Robert South, who is so often praised for his wit that his force is forgotten, continues the lineage, while Tillotson and the elder Sherlock show the tendency to the smoother and more level prose. But the revulsion against strangeness and fancy and magnificence went too far; it made for a temporary bareness and meanness and disharmony, which had to be checked by Addison, Bolingbroke and Berkeley. From what Addison saved our daily written English, may be seen in the vigorous slangy hackwork of Roger L'Estrange, the translator and pamphleteer, in the news-sheets of Dunton, and in the satires of Tom Brown. These writers were debasing the coinage with their street journalism.

Puritan prose.

Another and far nobler variety of vernacular prose is found in the Puritans. Baxter and Howe, Fox and Bunyan, had the English Bible behind them, which gave them the best of their inspiration, though the first two of them were also erudite men. Richard Baxter, an immensely fertile writer, is best remembered by those of his own fold for his *Saint's Everlasting Rest* (1650) and his autobiography, John Howe for his evangelical apologia *The Living Temple of God*

Bunyan.

(1675), Fox for his *Journal* and its mixture of quaintness and rapturous mysticism. John Bunyan, the least instructed of them all, is their only born artist. His creed and point of view were those of half the nation—the half that was usually inarticulate in literature, or spoke without style or genius. His reading, consisting not only of the Bible, but of the popular allegories of giants, pilgrims and adventure, was also that of his class. *The Pilgrim's Progress*, of which the first part appeared in 1678, the second in 1684, is the happy flowering sport amidst a growth of barren plants of the same tribe. The *Progress* is a dream, more vivid to its author than most men's waking memories to themselves; the emblem and the thing signified are merged at every point, so that Christian's journey is not so much an allegory with a key as a spiritual vision of this earth and our neighbours. *Grace Abounding*, Bunyan's diary of his own voyage to salvation, *The Holy War*, an overloaded fable of the fall and recovery of mankind, and *The Life and Death of Mr Badman*, a novel telling of the triumphal earthly progress of a scoundrelly tradesman, are among Bunyan's other contributions to literature. His union of spiritual intensity, sharp humorous vision, and power of simple speech consummately chosen, mark his work off alike from his own inarticulate public and from all other literary performance of his time.

Transitional verse.

Hudibras.

Songsters.

The transition from the older to the newer poetry was not abrupt. Old themes and tunes were slowly disused, others previously of lesser mark rose into favour, and a few quite fresh ones were introduced. The poems of John Oldham and Andrew Marvell belong to both periods. Both of them begin with fantasy and elegy, and end with satires, which indeed are rather documents than works of art. The monody of Oldham on his friend Morwent is poorly exchanged for the *Satires on the Jesuits* (1681), and the lovely metaphysical verses of Marvell on gardens and orchards and the spiritual love sadly give place to his *Last Instructions to a Painter* (1669). In his *Horatian Ode* Marvell had nobly and impartially applied his earlier style to national affairs; but the time proved too strong for this delightful poet. Another and a stranger satire had soon greeted the Restoration, the *Hudibras* (1663–1678) of Samuel Butler, with its companion pieces. The returned wanderers delighted in this horribly agile, boisterous and fierce attack on the popular party and its religions, and its wrangles and its manners. Profoundly eccentric and tiresomely allusive in his form, and working in the short rhyming couplets thenceforth called "Hudibrastics," Butler founded a small and peculiar but long-lived school of satire. The other verse of the time is largely satire of a different tone and metre; but the earlier kind of finished and gallant lyric persisted through the reign of Charles II. The songs of John Wilmot, Earl of Rochester, are usually malicious, sometimes passionate; they have a music and a splendid self-abandonment such as we never meet again till Burns. Sedley and Dorset and Aphra Behn and Dryden are the rightful heirs of Carew and Lovelace, those infallible masters of short rhythms; and this secret also was lost for a century afterwards.

Dryden.

In poetry, in prose, and to some extent in drama, John Dryden, the creature of his time, is the master of its expression. He began with panegyric verse, first on Cromwell and then on Charles, which is full of fine things and false writing. The *Annus Mirabilis* (1667) is the chief example, celebrating the Plague, the Fire and the naval victory, in the quatrains for which Davenant's pompous *Gondibert* had shown the way. The *Essay on Dramatic Poesy* (1668), a dialogue on the rivalries of blank verse with rhyme, and of the Elizabethan drama with the French, is perfect modern prose; and to this perfection Dryden attained at a bound, while he attained his poetical style more gradually. He practised his couplet in panegyric, in heroic tragedy, and in dramatic prologue and epilogue for twenty years before it was consummate. Till 1680 he supported himself chiefly by his plays, which have not lived so long as their critical prefaces, already mentioned. His diction and versification came to their full power in his satires, rhymed arguments, dedications and translations. *Absalom and Achitophel* (part i., 1681; part ii., with Nahum Tate, 1682), as well as *The Medal* and *Mac Flecknoe*, marked a new birth of English satire, placing it at once on a level with that of any ancient or modern country. The mixture of deadly good temper, Olympian unfairness, and rhetorical and metrical skill in each of these poems has never been repeated. The presentment of Achitophel, earl of Shaftesbury, in his relations with Absalom Walters and Charles the minstrel-king of Judah, as well as the portraits of Shimei and Barzillai and Jotham, the eminent Whigs and Tories, and of the poets Og and Doeg, are things whose vividness age has never discoloured. Dryden's Protestant arguings in *Religio Laici* (1682) and his equally sincere Papistical arguings in *The Hind and the Panther* (1687) are just as skilful. His translations of Virgil and parts of Lucretius, of Chaucer and Boccaccio (*Fables*, 1700), set the seal on his command of his favourite couplet for the higher kinds of appeal and oratory. His *Ode* on Anne Killigrew, and his popular but coarser *Alexander's Feast*, have a more lyric harmony; and his songs, inserted in his plays, reflect the change of fashion by their metrical adeptness and often thoroughgoing wantonness. The epithet of "glorious," in its older sense of a certain conscious and warranted pride of place, not in that of boastful or pretentious, suits Dryden well. Not only did he leave a model and a point of departure for Pope, but his influence recurs in Churchill, in Gray, in Johnson and in Crabbe, where he is seen counteracting, with his large, wholesome and sincere bluntness, the acidity of Pope. Dryden was counted near Shakespeare and Milton until the romantic revival renewed the sense of proportion; but the same sense now demands his acknowledgment as the English poet who is nearest to their frontiers of all those who are exiled from their kingdom.

Tragedy.

Otway.

Restoration and Revolution tragedy is nearly all abortive; it is now hard to read it for pleasure. But it has noble flights, and its historic interest is high. Two of its species, the rhymed heroic play and the rehandling of Shakespeare in blank verse, were also brought to their utmost by Dryden, though in both he had many companions. The heroic tragedies were a hybrid offspring of the heroic romance and French tragedy; and though *The Conquest of Granada* (1669–1670) and *Tyrannic Love* would be very open to satire in Dryden's own vein, they are at least generously absurd. Their intention is never ignoble, if often impossible. After a time Dryden went back to Shakespeare, after a fashion already set by Sir William Davenant, the connecting link with the older tragedy and the inaugurator of the new. They "revived" Shakespeare; they vamped him in a style that did not wholly perish till after the time of Garrick. *The Tempest*, *Troilus and Cressida*, and *Antony and Cleopatra* were thus handled by Dryden; and the last of these, as converted by him into *All for Love* (1678), is loftier and stronger than any of his original plays, its blank verse renewing the ties of Restoration poetry with the great age. The heroic plays, written in one or other metre, lived long, and expired in the burlesques of Fielding and Sheridan. *The Rehearsal* (1671), a gracious piece of fooling partially aimed at Dryden by Buckingham and his friends, did not suffice to kill its victims. Thomas Otway and Nathaniel Lee, both of whom generally used blank verse, are the other tragic writers of note, children indeed of the extreme old age of the drama. Otway's long-acted *Venice Preserved* (1682) has an almost Shakespearian skill in melodrama, a wonderful tide of passionate language, and a blunt and bold delineation of character; but Otway's inferior style and verse could only be admired in an age like his own. Lee is far more of a poet, though less of a dramatist, and he wasted a certain talent in noise and fury.

Comedy.

Restoration comedy at first followed Jonson, whom it was easy to try and imitate; Shadwell and Wilson, whose works are a museum for the social antiquary, photographed the humours of the town. Dryden's many comedies often show his more boisterous and blatant, rarely his finer qualities. Like all playwrights of the time he pillages from the French, and vulgarizes Molière without stint or shame. A truer light comedy began with Sir George Etherege, who mirrored in

Wycherley.

his fops the gaiety and insolence of the world he knew. The society depicted by William Wycherley, the one comic dramatist of power between Massinger and Congreve, at first seems hardly human; but his energy is skilful and faithful as well as brutal; he excels in the graphic reckless exhibition of outward humours and bustle; he scavenges in the most callous good spirits and with careful cynicism. *The Plain Dealer* (1677), a skilful transplantation, as well as a depravation of Molière's *Le Misanthrope*, is his best piece: he writes in prose, and his prose is excellent, modern and lifelike.

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(O. E.*)

V. THE 18TH CENTURY

Social changes.

In the reign of Anne (1702–1714) the social changes which had commenced with the Restoration of 1660 began to make themselves definitely felt. Books began to penetrate among all classes of society. The period is consequently one of differentiation and expansion. As the practice of reading becomes more and more universal, English writers lose much of their old idiosyncrasy, intensity and obscurity. As in politics and religion, so in letters, there is a great development of nationality. Commercial considerations too for the first time become important. We hear relatively far less of religious controversy, of the bickering between episcopalians and nonconformists and of university squabbles. Specialization and cumbrous pedantry fall into profound disfavour. Provincial feeling exercises a diminishing sway, and literature becomes increasingly metropolitan or suburban. With the multiplication of moulds, the refinement of prose polish, and the development of breadth, variety and ease, it was natural enough, having regard to the place that the country played in the world's affairs, that English literature should make its début in western Europe. The strong national savour seemed to stimulate the foreign appetite, and as represented by Swift, Pope, Defoe, Young, Goldsmith, Richardson, Sterne and Ossian, if we exclude Byron and Scott, the 18th century may be deemed the cosmopolitan age, *par excellence*, of English Letters. The charms of 18th-century English literature, as it happens, are essentially of the rational, social and translatable kind: in intensity, exquisiteness and eccentricity of the choicer kinds it is proportionately deficient. It is pre-eminently an age of prose, and although verbal expression is seldom represented at its highest power, we shall find nearly every variety of English prose brilliantly illustrated during this period: the aristocratic style of Bolingbroke, Addison and Berkeley; the gentlemanly style of Fielding; the keen and logical controversy of Butler, Middleton, Smith and Bentham; the rhythmic and balanced if occasionally involved style of Johnson and his admirers; the limpid and flowing manner of Hume and Mackintosh; the light, easy and witty flow of Walpole; the divine chit-chat of Cowper; the colour of Gray and Berkeley; the organ roll of Burke; the detective journalism of Swift and Defoe; the sly familiarity of Sterne; the dance music and wax candles of Sheridan; the pomposity of Gibbon; the air and ripple of Goldsmith; the peeping preciosity of Boswell,—these and other characteristics can be illustrated in 18th-century prose as probably nowhere else.

But more important to the historian of literature even than the development of qualities is the evolution of types. And in this respect the 18th century is a veritable index-museum of English prose. Essentially, no doubt, it is true that in form the prose and verse of the 18th century is mainly an extension of Dryden, just as in content it is a reflection of the increased variety of the city life which came into existence as English trade rapidly increased in all directions. But the taste of the day was rapidly changing. People began to read in vastly increasing numbers. The folio was making place on the shelves for the octavo. The bookseller began to transcend the mere tradesman. Along with newspapers the advertizing of books came into fashion, and the market was regulated no longer by what learned men wanted to write, but what an increasing multitude wanted to read. The arrival of the octavo is said to have marked the enrolment of man as a reader, that of the novel the attachment of woman. Hence, among other causes, the rapid decay of lyrical verse and printed drama, of theology and epic, in ponderous tomes. The fashionable types of which the new century was to witness the fixation are accordingly the essay and the satire as represented respectively by Addison and Steele, Swift and Goldsmith, and by Pope and Churchill. Pope, soon to be followed by Lady Mary Wortley Montagu, was the first Englishman who treated letter-writing as an art upon a considerable scale. Personalities and memoirs prepare the way for history, in which as a department of literature English letters hitherto had been almost scandalously deficient. Similarly the new growth of fancy essay (Addison) and plain biography (Defoe) prepared the way for the English novel, the most important by far of all new literary combinations. Finally, without going into unnecessary detail, we have a significant development of topography, journalism and criticism. In the course of time, too, we shall perceive how the pressure of town life and the logic of a capital city engender, first a fondness for landscape gardening and a somewhat artificial Arcadianism, and then, by degrees, an intensifying love of the country, of the open air, and of the rare, exotic and remote in literature.

Locke: Addison.

At the outset of the new century the two chief architects of public opinion were undoubtedly John Locke and Joseph Addison. When he died at High Laver in October 1704 at the mature age of seventy-two, Locke had, perhaps, done more than any man of the previous century to prepare the way for the new era. Social duty and social responsibility were his two watchwords. The key to both he discerned in the *Human Understanding*—"no province of knowledge can be regarded as independent of reason." But the great modernist of the time was undoubtedly Joseph Addison (1672–1719). He first left the 17th century, with its stiff euphuisms, its formal obsequiousness, its ponderous scholasticism and its metaphorical antitheses, definitely behind. He did for English culture what Rambouillet did for that of France, and it is hardly an exaggeration to call the half-century before the great fame of the English novel, the half century of the *Spectator*.

Steele.

Addison's mind was fertilized by intercourse with the greater and more original genius of Swift and with the more inventive and more genial mind of Steele. It was Richard Steele (1672–1729) in the *Tatler* of 1709–1710 who first realized that the specific which that urbane age both needed and desired was no longer copious preaching and rigorous declamation, but homoeopathic doses of good sense, good taste and good-humoured morality, disguised beneath an easy and fashionable style. Nothing could have suited Addison better than the opportunity afforded him of contributing an occasional essay or roundabout paper in praise of virtue or dispraise of stupidity and bad form to his friend's periodical. When the *Spectator* succeeded the *Tatler* in March 1711, Addison took a more active share in shaping the chief characters (with the immortal baronet, Sir Roger, at their head) who were to make up the "Spectator Club"; and, better even than before, he saw his way, perhaps, to reinforcing his copious friend with his own more frugal but more refined endowment. Such a privileged talent came into play at precisely the right moment to circulate through the coffee houses and to convey a large measure of French courtly ease and elegance into the more humdrum texture of English prose. Steele became rather disreputable in his later years, Swift was banished and went mad, but Addison became a personage of the utmost consideration, and the essay as he left it became an almost indispensable accomplishment to the complete gentlemen of that age. As an architect of opinion from 1717 to 1775 Addison may well rank with Locke.

Swift.

Arbuthnot.

Bolingbroke.

The other side, both in life and politics, was taken by Jonathan Swift (1667–1745), who preferred to represent man on his unsocial side. He sneered at most things, but not at his own order, and he came to defend the church and the country squirearchy against the conventicle and Capel court. To undermine the complacent entrenchments of the Whig capitalists at war with France no sap proved so effectual as his pen. Literary influence was then exercised in politics mainly by pamphlets, and Swift was the greatest of pamphleteers. In the *Journal to Stella* he has left us a most wonderful portrait of himself in turn currying favour, spoiled, petted and humiliated by the party leaders of the Tories from 1710–1713. He had always been savage, and when the Hanoverians came in and he was treated as a suspect, his hate widened to embrace all mankind (*Gulliver's Travels*, 1726) and he bit like a mad dog. Would that he could have bitten more, for the infection of English stylists! In wit, logic, energy, pith, resourcefulness and Saxon simplicity, his prose has never been equalled. The choicest English then, it is the choicest English still. Dr John Arbuthnot (1667–1735) may be described as an understudy of Swift on the whimsical side only, whose malignity, in a nature otherwise most kindly, was circumscribed strictly by the limits of political persiflage. Bernard Mandeville (1670–1733), unorthodox as he was in every respect, discovered a little of Swift's choice pessimism in his assault (in *The Fable of the Bees* of 1723) against the genteel optimism of the *Characteristics* of Lord Shaftesbury. Neither the matter nor the manner of the brilliant Tory chieftain Henry St John, Viscount Bolingbroke (1678–1751), appears to us now as being of the highest significance; but, although Bolingbroke's ideas were second-hand, his work has an historical importance; his dignified, balanced and decorated style was the cynosure of 18th-century statesmen. His essays on "History" and on "a Patriot King" both disturb a soil well prepared, and set up a reaction against such evil tendencies as a narrowing conception of history and a primarily factious and partisan conception of politics. It may be noted here how the fall of Bolingbroke and the Tories in 1714 precipitated the decay of the Renaissance ideal of literary patronage. The dependence of the press upon the House of Lords was already an anomaly, and the practical toleration achieved in 1695 removed another obstacle from the path of liberation. The government no longer sought to strangle the press. It could generally be tuned satisfactorily and at the worst could always be temporarily muzzled. The pensions hitherto devoted to men of genius were diverted under Walpole to spies and journalists. Yet one of the most unscrupulous of all the fabricators of intelligence, looked down upon as a huckster of the meanest and most inconsiderable literary wares, established his fame by a masterpiece of which literary genius had scarcely even cognizance.

Defoe.

The new trade of writing was represented most perfectly by Daniel Defoe (1660–1731), who represents, too, what few writers possess, a competent knowledge of work and wages, buying and selling, the squalor and roguery of the very hungry and the very mean. From reporting sensations and chronicling *faits divers*, Defoe worked his way almost insensibly to the Spanish tale of the old Mendoza or picaresque pattern. *Robinson Crusoe* was a true story expanded on these lines, and written down under stress of circumstance when its author was just upon sixty. Resembling that of Bunyan and, later, Smollett in the skilful use made of places, facts and figures, Defoe's style is the mirror of man in his shirt sleeves. What he excelled in was plain, straightforward story-telling, in understanding and appraising the curiosity of the man in the street, and in possessing just the knowledge and just the patience, and just the literary stroke that would enable him most effectually to satisfy it. He was the first and cleverest of all descriptive reporters, for he knew better than any successor how and where to throw in those irrelevant details, tricks of speech and circumlocution, which tend to give an air of verisimilitude to a bald and unconvincing narrative—the funny little splutterings and naïvetés as of a plain man who is not telling a tale for effect, but striving after his own manner to give the plain unvarnished truth. Defoe contributes story, Addison character, Fielding the life-atmosphere, Richardson and Sterne the sentiment, and we have the 18th-century novel complete—the greatest literary birth of modern time. Addison, Steele, Swift and Defoe, as master-builders of prose fiction, are consequently of more importance than the "Augustan poets," as Pope and his school are sometimes called, for the most that they can be said to have done is to have perfected a more or less transient mode of poetry.

Pope.

Thomson.

Collins. Gray.

To the passion, imagination or musical quality essential to the most inspired kinds of poetry Alexander Pope (1688–1744) can lay small claim. His best work is contained in the *Satires* and *Epistles*, which are largely of the proverb-in-rhyme order. Yet in lucid, terse and pungent phrases he has rarely if ever been surpassed. His classical fancy, his elegant turn for periphrasis and his venomous sting alike made him the idol of that urbane age. Voltaire in 1726 had called him the best poet living, and at his death his style was paramount throughout the civilized world. It was the apotheosis of wit, point, lucidity and technical correctness. Pope was the first Englishman to make poetry pay (apart from patronage). He was flattered by imitation to an extent which threatened to throw the school of poetry which he represented into permanent discredit. Prior, Gay, Parnell, Akenside, Pomfret, Garth, Young, Johnson, Goldsmith, Falconer, Glover, Grainger, Darwin, Rogers, Hayley and indeed a host of others—the once famous mob of gentlemen who wrote with ease—worshipped Pope as their poetic founder. The second-rate wore his badge. But although the cult of Pope was the established religion of poetic taste from 1714 to 1798, there were always nonconformists. The poetic revolt, indeed, was far more versatile than the religious revival of the century. The *Winter* (1726) of James Thomson may be regarded as inaugurating a new era in English poetry. Lady Winchilsea, John Philips, author of *Cyder*, and John Dyer, whose *Grongar Hill* was published a few months before *Winter*, had pleaded by their work for a truthful and unaffected, and at the same time a romantic treatment of nature in poetry; but the ideal of artificiality and of a frigid poetic diction by which English poetry was dominated since the days of Waller and Cowley was first effectively challenged by Thomson. At the time when the Popean couplet was at the height of its vogue he deliberately put it aside in favour of the higher poetic power of blank verse. And he it was who transmitted the sentiment of natural beauty not merely to imitators such as Savage, Armstrong, Somerville, Langhorne, Mickle and Shenstone, but also to his elegist, William Collins, to Gray and to Cowper, and so indirectly to the lyrical bards of 1798. By the same hands and those of Shenstone experiments were being made in the stanza of *The Faerie Queene*; a little later, owing to the virtuosity of Bishop Percy, the cultivation of the old English and Scottish ballad literature was beginning to take a serious turn. Dissatisfaction with the limitations of "Augustan" poetry was similarly responsible for the revived interest in Shakespeare and Chaucer. Gray stood not only for a far more intimate worship of wild external nature, but also for an awakened curiosity in Scandinavian, Celtic and Icelandic poetry.

To pretend then that the poetic heart of the 18th century was Popean to the core is nothing short of extravagance. There were a number of true poets in the second and third quarters of the century to whom all credit is due as pioneers and precentors of the romantic movement under the depressing conditions to which innovators in poetry are commonly subject. They may strike us as rather an anaemic band after the great Elizabethan poets. Four of them were mentally deranged (Collins, Smart, Cowper, Blake), while Gray was a hermit, and Shenstone and Thomson the most indolent of recluses. The most adventurous, one might say the most virile of the group, was a boy who died at the age of seventeen. Single men all (save for Blake), a more despondent group of artists as a whole it would not perhaps be easy to discover. Catacombs and cypresses were the forms of imagery that came to them most naturally. Elegies and funeral odes were the types of expression in which they were happiest. Yet they strove in the main to follow the gleam in poetry, to reinstate imagination upon its throne, and to substitute the singing voice for the rhetorical recitative of the heroic couplet. Within two years of the death of Pope, in 1746, William Collins was content to *sing* (not say) what he had in him without a glimpse of wit or a flash of eloquence—and in him many have discerned the germ of that romantic *éclosion* which blossomed in *Christabel*. A more important if less original factor in that movement was Collins's severe critic Thomas Gray, a man of the widest curiosities of his time, in whom every attribute of the poet to which scholarship, taste and refinement are contributory may be found to the full, but in whom the strong creative energy is fatally lacking—despite the fact that he wrote a string of "divine truisms" in his *Elegy*, which has given to multitudes more of the exquisite pleasure of poetry than any other single piece in the English language. Shenstone and Percy, Capell, the Wartons and eventually Chatterton, continued to mine in the shafts which Gray had been the first to sink. Their laborious work of discovery resembled that which was commencing in regard to the Gothic architecture which the age of Pope had come to regard as rude and barbaric. The Augustans had come seriously to regard all pre-Drydenic poetry as grossly barbarian. One of the greatest achievements of the mid-eighteenth century was concerned with the disintegration of this obstinate delusion. The process was manifold; and it led, among other things, to a realization of the importance of the study of comparative literature.

The novel.

The literary grouping of the 18th century is, perhaps, the biggest thing on the whole that English art has to show; but among all its groups the most famous, and probably the most original, is that of its proto-novelists Richardson, Fielding, Smollett and Sterne. All nations have had their novels, which are as old at least as Greek vases. The various types have generally had collective appellations such as Milesian Tales, Alexandrian Romances, Romances of Chivalry, Acta Sanctorum, Gesta Romanorum, Cent Nouvelles Nouvelles, Romances of Roguery, Arabian Nights; but owing to the rivalry of other more popular or more respectable or at least more eclectic literary forms, they seldom managed to attain a permanent lodgment in the library. The taste in prose fiction changes, perhaps, more rapidly than that in any other kind of literature. In Britain alone several forms had passed their prime since the days of Caxton and his Arthurian prose romance of *Morte d'Arthur*. Such were the wearisome Arcadian romance or pastoral heroic; the new centos of tales of chivalry like the *Seven Champions of Christendom*; the utopian, political and philosophical romances (*Oceana*, *The Man in the Moone*); the grotesque and facetious stories of rogues retailed from the Spanish or French in dwarf volumes; the prolix romance of modernized classic heroism (*The Grand Cyrus*); the religious allegory (Bunyan's *Life and Death of Mr Badman*); the novels of outspoken French or Italian gallantry, represented by Aphra Behn; the imaginary voyages so notably adapted to satire by Dr Swift; and last, but not least, the minutely prosaic chronicle-novels of Daniel Defoe. The prospect of the novel was changing rapidly. The development of the individual and of a large well-to-do urban middle class, which was rapidly multiplying its area of leisure, involved a curious and self-conscious society, hungry for pleasure and new sensations, anxious to be told about themselves, willing in some cases even to learn civilization from their betters. The disrepute into which the drama had fallen since Jeremy Collier's attack on it directed this society by an almost inevitable course into the flowery paths of fiction. The novel, it is true, had a reputation which was for the time being almost as unsavoury as that of the drama, but the novel was not a confirmed ill-doer, and it only needed a touch of genius to create for it a vast congregation of enthusiastic votaries. In the *Tatler* and *Spectator* were already found the methods and subjects of the modern novel. The De Coverley papers in the *Spectator*, in fact, want nothing but a love-thread to convert them into a serial novel of a high order. The supreme importance of the sentimental interest had already been discovered and exemplified to good purpose in France by Madame de la Fayette, the Marquise de Tencin, Marivaux and the Abbé Prevost. Samuel Richardson (1689–1762), therefore, when he produced the first two modern novels of European fame in *Pamela* (1740) and *Clarissa* (1748), inherited far more than he invented. There had been Richardsonians before Richardson. *Clarissa* is nevertheless a pioneer work, and we have it on the high authority of M. Jusserand that the English have contributed more than any other people to the formation of the contemporary novel. Of the long-winded, typical and rather chaotic English novel of love analysis and moral sentiment (as opposed to the romance of adventure) Richardson is the first successful charioteer.

Richardson.

Fielding.

The novel in England gained prodigiously by the shock of opposition between the ideals of Richardson and Henry Fielding (1707–1754), his rival and parodist. Fielding's brutal toleration is a fine corrective to the slightly rancid morality of Richardson, with its frank insistence upon the cash-value of chastity and virtue. Fielding is, to be brief, the succinct antithesis of Richardson, and represents the opposite pole of English character. He is the Cavalier, Richardson the Roundhead; he is the gentleman, Richardson the tradesman; he represents church and county, Richardson chapel and borough. Richardson had much of the patient insight and intensity of genius, but he lacked the humour and literary accomplishment which Fielding had in rich abundance. Fielding combined breadth and keenness, classical culture and a delicate Gallic irony to an extent rare among English writers. He lacked the delicate intuition of Richardson in the analysis of women, nor could he compass the broad farcical humour of Smollett or the sombre colouring by which Smollett produces at times such poignant effects of contrast. There was no poetry in Fielding; but there was practically every other ingredient of a great prose writer—taste, culture, order, vivacity, humour, penetrating irony and vivid, pervading common sense, and it is Fielding's chef-d'œuvre *Tom Jones* (1749) that we must regard if not as the fundament at least as the head of the corner in English prose fiction. Before *Tom Jones* appeared, the success of the novel had drawn a new competitor into the field in Tobias Smollett, the descendant of a good western lowland family who had knocked about the world and seen more of its hurlyburly than Fielding himself. In *Roderick Random* (1748) Smollett represents a rougher and more uncivilized world even than that depicted in *Joseph Andrews*. The savagery and horse-play peculiar to these two novelists derives in part from the rogue romance of Spain (as then recently revived by Lesage), and has a counterpart to some extent in the graphic art of Hogarth and Rowlandson; yet one cannot altogether ignore an element of exaggeration which has greatly injured both these writers in the estimation (and still more in the affection) of posterity. The genius which struggles through novels such as *Roderick Random* and *Ferdinand Count Fathom* was nearly submerged under the hard conditions of a general writer during the third quarter of the 18th century, and it speaks volumes for Smollett's powers of recuperation that he survived to write two such masterpieces of sardonic and humorous observation as his *Travels* and *Humphry Clinker*.

Smollett.

The fourth proto-master of the English novel was the antiquarian humorist Lawrence Sterne. Though they owed a

Sterne.

good deal to *Don Quixote* and the French novelists, Fielding and Smollett were essentially observers of life in the quick. Sterne brought a far-fetched style, a bookish apparatus and a deliberate eccentricity into fiction. *Tristram Shandy*, produced successively in nine small volumes between 1760 and 1764, is the pretended history of a personage who is not born (before the fourth volume) and hardly ever appears, carried on in an eccentric rigmarole of old and new, original and borrowed humour, arranged in a style well known to students of the later Valois humorists as *fatrasie*. Far more than Molière, Sterne took his literary *bien* wherever he found it. But he invented a kind of tremolo style of his own, with the aid of which, in conjunction with the most unblushingly indecent innuendoes, and with a conspicuous genius for humorous portraiture, trembling upon the verge of the pathetic, he succeeded in winning a new domain for the art of fiction.

These four great writers then, Richardson, Fielding, Smollett and Sterne—all of them great pessimists in comparison with the benignant philosophers of a later fiction—first thoroughly fertilized this important field. Richardson obtained a European fame during his lifetime. Sterne, as a pioneer impressionist, gave all subsequent stylists a new handle. Fielding and Smollett grasped the new instrument more vigorously, and fashioned with it models which, after serving as patterns to Scott, Marryat, Cooper, Ainsworth, Dickens, Lever, Stevenson, Merriman, Weyman and other romancists of the 19th century, have still retained a fair measure of their original popularity unimpaired.

Johnson.

Apart from the novelists, the middle period of the 18th century is strong in prose writers: these include Dr Johnson, Oliver Goldsmith, Lord Chesterfield and Horace Walpole. The last three were all influenced by the sovereign lucidity of the best French style of the day. Chesterfield and Walpole were both writers of aristocratic experience and of European knowledge and sentiment. Johnson alone was a distinctively English thinker and stylist. His knowledge of the world, outside England, was derived from books, he was a good deal of a scholar, an earnest moralist, and something of a divine; his style, at any rate, reaches back to Taylor, Barrow and South, and has a good deal of the complex structure, the cadence, and the balance of English and Latinistic words proper to the 17th century, though the later influence of Addison and Bolingbroke is also apparent; Johnson himself was fond of the essay, the satire in verse, and the moral tale (*Rasselas*); but he lacked the creative imagination indispensable for such work and excelled chiefly as biographer and critic. For a critic even, it must be admitted that he was singly deficient in original ideas. He upholds authority. He judges by what he regards as the accepted rules, derived by Dryden, Rapin, Boileau, Le Bossu, Rymer, Dennis, Pope and such "estimable critics" from the ancients, whose decisions on such matters he regards as paramount. He tries to carry out a systematic, motived criticism; but he asserts rather than persuades or convinces. We go to his critical works (*Lives of the Poets* and *Essay on Shakespeare*) not for their conclusions, but for their shrewd comments on life, and for an application to literary problems of a caustic common sense. Johnson's character and conversation, his knowledge and memory were far more remarkable than his ideas or his writings, admirable though the best of these were; the exceptional traits which met in his person and made that age regard him as a nonpareil have found in James Boswell a delineator unrivalled in patience, dexterity and dramatic insight. The result has been a portrait of a man of letters more alive at the present time than that which any other age or nation has bequeathed to us. In most of his ideas Johnson was a generation behind the typical academic critics of his date, Joseph and Thomas Warton, who championed against his authority what the doctor regarded as the finicking notions of Gray. Both of the Wartons were enthusiastic for Spenser and the older poetry; they were saturated with Milton whom they placed far above the correct Mr Pope, they wrote sonnets (thereby provoking Johnson's ire) and attempted to revive medieval and Celtic lore in every direction. Johnson's one attempt at a novel or tale was *Rasselas*, a long "Rambler" essay upon the vanity of human hope and ambition, something after the manner of the Oriental tales of which Voltaire had caught the idea from Swift and Montesquieu; but *Rasselas* is quite unenlivened by humour, personality or any other charm.

Goldsmith.

This one quality that Johnson so completely lacked was possessed in its fullest perfection by Oliver Goldsmith, whose style is the supreme expression of 18th-century clearness, simplicity and easy graceful fluency. Much of Goldsmith's material, whether as playwright, story writer or essayist, is trite and commonplace—his material worked up by any other hand would be worthless. But, whenever Goldsmith writes about human life, he seems to pay it a compliment, a relief of fun and good fellowship accompanies his slightest description, his playful and delicate touch could transform every thought that he handled into something radiant with sunlight and fragrant with the perfume of youth. Goldsmith's plots are Irish, his critical theories are French with a light top dressing of Johnson and Reynolds or Burke, while his prose style is an idealization of Addison. His versatility was great, and, in this and in other respects, he and Johnson are constantly reminding us that they were hardened professionals, writing against time for money.

Chesterfield and Walpole.

Much of the best prose work of this period, from 1740 to 1780, was done under very different conditions. The increase of travel, of intercourse between the nobility of Europe, and of a sense of solidarity, self-consciousness, leisure and connoisseurship among that section of English society known as the governing class, or, since Disraeli, as "the Venetian oligarchy," could hardly fail to produce an increasing crop of those elaborate collections of letters and memoirs which had already attained their apogee in France with Mme de Sévigné and the duc de Saint-Simon. England was not to remain far behind, for in 1718 commence the *Letters* of Lady Mary Wortley Montagu; ten years more saw the commencement of Lord Hervey's *Memoirs of the Reign of George II.*; and Lord Chesterfield and Lord Orford (better known as Horace Walpole) both began their inimitable series of *Letters* about 1740. These writings, none of them written ostensibly for the press, serve to show the enormous strides that English prose was making as a medium of vivacious description. The letters are all the recreation of extensive knowledge and cosmopolitan acquirements; they are not strong on the poetic or imaginative side of things, but they have an intense appreciation of the actual and mundane side of fallible humanity. Lord Chesterfield's *Letters* to his son and to his godson are far more, for they introduce a Ciceronian polish and a Gallic irony and wit into the hitherto uncultivated garden of the literary graces in English prose. Chesterfield, whose theme is manners and social amenity, deliberately seeks a form of expression appropriate to his text—the perfection of tact, neatness, good order and *savoir faire*. After his grandfather, the marquess of Halifax, Lord Chesterfield, the synonym in the vulgar world for a heartless exquisite, is in reality the first fine gentleman and epicurean in the best sense in English polite literature. Both Chesterfield and Walpole were conspicuous as raconteurs in an age of witty talkers, of whose talk R. B. Sheridan, in *The School for Scandal* (1777), served up a *suprême*. Some of it may be tinsel, but it looks wonderfully well under the lights. The star comedy of the century represents the sparkle of this brilliant crowd: it reveals no hearts, but it shows us every trick of phrase, every eccentricity of manner and every foible of thought. But the most mundane of the letter writers, the most frivolous, and also the most pungent, is Horace Walpole, whose writings are an epitome of the history and biography of the Georgian era. "Fiddles sing all through them, wax lights, fine dresses, fine jokes, fine plate, fine equipages glitter and sparkle; never was such a brilliant, smirking Vanity Fair as that through which he leads us." Yet, in some ways, he was a corrective to the self-complacency of his generation, a vast dilettante, lover of "Gothic," of curios and antiques, of costly printing, of old illuminations and stained glass. In his short miracle-novel, called *The Castle of Otranto*, he set a fashion for mystery and terror in fiction, for medieval legend, diablerie, mystery, horror, antique furniture and Gothic jargon, which led directly by the route of Anne Radcliffe, Maturin, *Vathek*, *St Leon* and *Frankenstein*, to *Queenhoo Hall*, to *Waverley* and even to Hugo and Poe.

Fanny Burney. Boswell.

Meanwhile the area of the Memoir was widening rapidly in the hands of Fanny, the sly daughter of the wordly-wise and fashionable musician, Dr Burney, author of a novel (*Evelina*) most satirical and facete, written ere she was well out of her teens; not too kind a satirist of her former patroness, Mrs Thrale (afterwards Piozzi), the least tiresome of the new group of scribbling sibyls, bluestockings, lady dilettanti and Della Cruscans. Both, as portraitists and purveyors of *Johnsoniana*, were surpassed by the inimitable James Boswell, first and most fatuous of all interviewers, in brief a biographical genius, with a new recipe, distinct from Sterne's, for disclosing personality, and a deliberate, artificial method of revealing himself to us, as it were, unawares.

From all these and many other experiments, a far more flexible prose was developing in England, adapted for those critical reviews, magazines and journals which were multiplying rapidly to exploit the new masculine interest, apart from the schools, in history, topography, natural philosophy and the picturesque, just as circulating libraries were springing up to exploit the new feminine passion for fiction, which together with memoirs and fashionable poetry contributed to give the booksellers bigger and bigger ideas.

The progress of authorship.

It is surprising how many types of literary productions with which we are now familiar were first moulded into definite and classical form during the Johnsonian period. In addition to the novel one need only mention the economic treatise, as exemplified for the first time in the admirable symmetry of *The Wealth of Nations*, the diary of a faithful observer of nature such as Gilbert White, the *Fifteen Discourses* (1769–1791) in which Sir Joshua Reynolds endeavours for the first time to expound for England a philosophy of Art, the historico-philosophical tableau as exemplified by Robertson and Gibbon, the light political parody of which the poetry of *The Rolliad* and *Anti-Jacobin* afford so many excellent models; and, going to the other extreme, the ponderous archaeological or topographical monograph, as exemplified in Stuart and Revett's *Antiquities of Athens*, in Robert Wood's colossal *Ruins of Palmyra* (1753), or the monumental *History of Leicestershire* by John Nichols. Such works as this last might well seem the outcome of Horace Walpole's maxim: In this scribbling age "let those who can't write, glean." In short, the literary landscape in Johnson's day was slowly but surely assuming the general outlines to which we are all accustomed. The literary conditions of the period dated from the time of Pope in their main features, and it is quite possible that they were more considerably modified in Johnson's own lifetime than they have been since. The booksellers, or, as they would now be called, publishers, were steadily superseding the old ties of patronage, and basing their relations with authors upon a commercial footing. A stage in their progress is marked by the success of Johnson's friend and Hume's correspondent, William Strahan, who kept a coach, "a credit to literature." The evolution of a normal status for the author was aided by the definition of copyright and gradual extinction of piracy.

Historians.

Histories of their own time by Clarendon and Burnet have been in much request from their own day to this, and the first, at least, is a fine monument of English prose; Bolingbroke again, in 1735, dwelt memorably upon the ethical, political and philosophical value of history. But it was not until the third quarter of the 18th century that English literature freed itself from the imputation of lagging hopelessly behind France, Italy and Germany in the serious work of historical reconstruction. Hume published the first volume of his *History of England* in 1754. Robertson's *History of Scotland* saw the light in 1759 and his *Charles V.* in 1769; Gibbon's *Decline and Fall of the Roman Empire* came in 1776. Hume was, perhaps, the first modernist in history; he attempted to give his work a modern interest and, Scot though he was, a modern style—it could not fail, as he knew, to derive piquancy from its derision of the Whiggish assumption which regarded 1688 as a political millennium. Wm. Robertson was, perhaps, the first man to adapt the polished periphrases of the pulpit to historical generalization. The gifts of compromise which he had learned as Moderator of the General Assembly he brought to bear upon his historical studies, and a language so unfamiliar to his lips as academic English he wrote with so much the more care that the greatest connoisseurs of the day were enthusiastic about "Robertson's wonderful style." Even more portentous in its superhuman dignity was the style of Edward Gibbon, who conbined with the unspiritual optimism of Hume and Robertson a far more concentrated devotion to his subject, an industry more monumental, a greater co-ordinative vigour, and a malice which, even in the 18th century, rendered him the least credulous man of his age. Of all histories, therefore, based upon the transmitted evidence of other ages rather than on the personal observation of the writer's own, Gibbon's *Decline and Fall* has hitherto maintained its reputation best. Hume, even before he was superseded, fell a prey to continuations and abridgements, while Robertson was supplanted systematically by the ornate pages of W. H. Prescott.

The increasing transparency of texture in the working English prose during this period is shown in the writings of theologians such as Butler and Paley, and of thinkers such as Berkeley and Hume, who, by prolonging and extending Berkeley's contention that matter was an abstraction, had shown that mind would have to be considered an abstraction too, thereby signalling a school of reaction to common sense or "external reality" represented by Thomas Reid, and with modifications by David Hartley, Abraham Tucker and others. Butler and Paley are merely two of the biggest amd most characteristic apologists of that day, both great stylists, though it must be allowed that their very lucidity and good sense excites almost more doubt than it stills, and both very successful in repelling the enemy in controversy, though their very success accentuates the faults of that unspiritual age in which churchmen were so far more concerned about the title deeds than about the living portion of the church's estate. Free thought was already beginning to sap their defences in various directions, and in Tom Paine, Priestley, Price, Godwin and Mackintosh they found more formidable adversaries than in the earlier deists. The greatest champion, however, of continuity and conservation both in church and state, against the new schools of latitudinarians and radicals, the great eulogist of the unwritten constitution, and the most perfect master of emotional prose in this period, prose in which the harmony of sense and sound is attained to an extent hardly ever seen outside supreme poetry, was Edmund Burke, one of the most commanding intellects in the whole range of political letters—a striking contrast in this respect to Junius, whose mechanical and journalistic talent for invective has a quite ephemeral value.

Return to nature.

From 1660 to 1760 the English mind was still much occupied in shaking off the last traces of feudality. The crown, the parliament, the manor and the old penal code were left, it is true: but the old tenures and gild-brotherhoods, the old social habits, miracles, arts, faith, religion and letters were irrevocably gone. The attempt of the young Chevalier in 1745 was a complete anachronism, and no sooner was this generally felt to be so than men began to regret that it should so be. Men began to describe as "grand" and "picturesque" scenery hitherto summarized as "barren mountains covered in mist"; while Voltaire and Pope were at their height, the world began to realize that the Augustan age, in its zeal for rationality, civism and trim parterres, had neglected the wild freshness of an age when literature was a wild flower that grew on the common. Rousseau laid the axe to the root of this over-sophistication of life; Goldsmith, half understanding, echoed some of his ideas in "The Deserted Village." Back from books to men was now the prescription—from the crowded town to the spacious country. From plains and valleys to peaks and pinewoods. From cities, where men were rich and corrupt,

Change in poetic spirit.

Cowper. Blake. Burns.

to the earlier and more primitive moods of earth. The breath had scarcely left the body of the Grand Monarque before an intrigue was set on foot to dispute the provisions of his will. So with the critical testament of Pope. Within a few years of his death we find Gray, Warton, Hurd and other disciples of the new age denying to Pope the highest kind of poetic excellence, and exalting imagination and fancy into a sphere far above the Augustan qualities of correct taste and good judgment. Decentralization and revolt were the new watchwords in literature. We must eschew France and Italy and go rather to Iceland or the Hebrides for fresh poetic emotions: we must shun academies and classic coffee-houses and go into the street-corners or the hedge-lanes in search of Volkspoesie. An old muniment chest and a roll of yellow parchment were the finest incentives to the new spirit of the picturesque. How else are we to explain the enthusiasm that welcomed the sham Ossianic poems of James Macpherson in 1760; Percy's patched-up ballads of 1765 (*Reliques of Ancient Poetry*); the new enthusiasm for Chaucer; the "black letter" school of Ritson, Tyrrwhitt, George Ellis, Steevens, Ireland and Malone; above all, the spurious 15th-century poems poured forth in 1768–1769 with such a wild gusto of archaic imagination by a prodigy not quite seventeen years of age? Chatterton's precocious fantasy cast a wonderful spell upon the romantic imagination of other times. It does not prepare us for the change that was coming over the poetic spirit of the last two decades of the century, but it does at least help us to explain it. The great masters of verse in Britain during this period were the three very disparate figures of William Cowper, William Blake and Robert Burns. Cowper was not a poet of vivid and rapturous visions. There is always something of the rusticating city-scholar about his humour. The ungovernable impulse and imaginative passion of the great masters of poesy were not his to claim. His motives to express himself in verse came very largely from the outside. The greater part, nearly all his best poetry is of the occasional order. To touch and retouch, he says, in one of his letters—among the most delightful in English—is the secret of almost all good writing, especially verse. Whatever is short should be nervous, masculine and compact. In all the arts that raise the best occasional poetry to the level of greatness Cowper is supreme. In phrase-moulding, verbal gymnastic and prosodical marquetry he has scarcely a rival, and the fruits of his poetic industry are enshrined in the filigree of a most delicate fancy and a highly cultivated intelligence, purified and thrice refined in the fire of mental affliction. His work expresses the rapid civilization of his time, its humanitarian feeling and growing sensitiveness to natural beauty, home comfort, the claims of animals and the charms of light literature. In many of his short poems, such as "The Royal George," artistic simplicity is indistinguishable from the stern reticence of genius. William Blake had no immediate literary descendants, for he worked alone, and Lamb was practically alone in recognizing what he wrote as poetry. But he was by far the most original of the reactionaries who preceded the Romantic Revival, and he caught far more of the Elizabethan air in his lyric verse than any one else before Coleridge. The *Songs of Innocence* and *Songs of Experience*, in 1789 and 1794, sing themselves, and have a bird-like spontaneity that has been the despair of all song-writers from that day to this. After 1800 he winged his flight farther and farther into strange and unknown regions. In the finest of these earlier lyrics, which owe so little to his contemporaries, the ripple of the stream of romance that began to gush forth in 1798 is distinctly heard. But the first poetic genius of the century was unmistakably Robert Burns. In song and satire alike Burns is racy, in the highest degree, of the poets of North Britain, who since Robert Sempill, Willy Hamilton of Gilbertfield, douce Allan Ramsay, the Edinburgh periwig-maker and miscellanist, and Robert Fergusson, "the writer-chiel, a deathless name," had kept alive the old native poetic tradition, had provided the strolling fiddlers with merry and wanton staves, and had perpetuated the daintiest shreds of national music, the broadest colloquialisms, and the warmest hues of patriotic or local sentiment. Burns immortalizes these old staves by means of his keener vision, his more fiery spirit, his stronger passion and his richer volume of sound. Burns's fate was a pathetic one. Brief, broken glimpses of a genius that could never show itself complete, his poems wanted all things for completeness: culture, leisure, sustained effort, length of life. Yet occasional, fragmentary, extemporary as most of them are, they bear the guinea stamp of true genius. His eye is unerring, his humour of the ripest, his wit both fine and abundant. His ear is less subtle, except when dialect is concerned. There he is infallible. Landscape he understands in subordination to life. For abstract ideas about Liberty and 1789 he cares little. But he is a patriot and an insurgent, a hater of social distinction and of the rich. Of the divine right or eternal merit of the system under which the poor man sweats to put money into the rich man's pocket and fights to keep it there, and is despised in proportion to the amount of his perspiration, he had a low opinion. His work has inspired the meek, has made the poor feel themselves less of ciphers in the world and given courage to the down-trodden. His love of women has inspired some of the most ardently beautiful lyrics in the world. Among modern folk-poets such as Jókai and Mistral, the position of Burns in the hearts of his own people is the best assured.

BIBLIOGRAPHICAL NOTE.—The dearth of literary history in England makes it rather difficult to obtain a good general view of letters in Britain during the 18th century. Much may be gleaned, however, from chapters of Lecky's *History of England during the 18th Century*, from Stephen's *Lectures on English Literature and Society in the 18th Century* (1904), from Taine's *History of English Literature* (van Laun's translation), from vols. v. and vi. of Prof. Courthope's *History of English Poetry*, and from the second volume of Chambers's *Cyclopaedia of English Literature* (1902). The two vols. dealing respectively with the *Age of Pope* and the *Age of Johnson* in Bell's Handbooks of English Literature will be found useful, and suggestive chapters will be found in Saintsbury's *Short History* and in A. H. Thompson's *Student's History of English Literature* (1901). The same may, perhaps, be said of books v. and vi. in the *Bookman Illustrated History of English Literature* (1906), by the present writer. Sidelights of value are to be found in Walter Raleigh's little book on the *English Novel*, in Beljame's *Le Publique et les hommes de lettres en Angleterre au XVIII^e siècle*, in H. A. Beers' *History of English Romanticism in the 18th Century* (1899), and above all in Sir Leslie Stephen's *History of English Thought during the 18th Century*; Stephen's *Hours in a Library*, the monographs dealing with the period in the English Men of Letters series, the Vignettes and Portraits of Austin Dobson and George Paston, Elwin's *Eighteenth Century Men of Letters*, and Thomas Wright's *Caricature History of the Georges*, must also be kept in mind. (T. SE.)

VI. THE 19TH CENTURY

We have seen how great was the reverence which the 18th century paid to poetry, and how many different kinds of poetic experiment were going on, mostly by the imitative efforts of revivalists (Spenserians, Miltonians, Shakespeareans, Ballad-mongers, Scandinavian, Celtic, Gothic scholars and the like), but also in the direction of nature study and landscape description, while the more formal type of Augustan poetry, satire and description, in the direct succession of Pope, was by no means neglected.

Wordsworth.

The most original vein in the 19th century was supplied by the Wordsworth group, the first manifesto of which appeared in the *Lyrical Ballads* of 1798. William Wordsworth himself represents, in the first place, a revolutionary movement against the poetic diction of study-poets since the first acceptance of the Miltonic model by Addison. His ideal, imperfectly carried out, was a reversion to popular language of the utmost simplicity and directness. He added to this the idea of the enlargement of man by Nature, after Rousseau, and went further than this in the utterance of an essentially pantheistic desire to become part of its loveliness, to partake in a mystical sense of the loneliness of the mountain, the sound of falling water, the upper horizon of the clouds and the wind. To the growing multitude of educated people who were being pent in huge cities these ideas were far sweeter than the formalities of the old pastoral. Wordsworth's great discovery, perhaps, was that popular poetry need not be imitative, artificial or condescending, but that a simple story truthfully told of the passion, affliction or devotion of simple folk, and appealing to the primal emotion, is worthy of the highest effort of the poetic artist, and may achieve a poetic value far in advance of conventional descriptions of strikingly grouped incidents picturesquely magnified or rhetorically exaggerated. But Wordsworth's theories might have ended very much where they began, had it not been for their impregnation by the complementary genius of Coleridge.

Coleridge.

Coleridge at his best was inspired by the supreme poetic gifts of passion, imagination, simplicity and mystery, combining form and colour, sound and sense, novelty and antiquity, realism and romanticism, scholarly ode and popular ballad. His three fragmentary poems *The Rime of the Ancient Mariner*, *Christabel* and *Kubla Khan* are the three spells and touchstones, constituting what is often regarded by the best judges as the high-standard of modern English poetry. Their subtleties and beauties irradiated the homelier artistic conceptions of Wordsworth, and the effect on him was permanent. Coleridge's inspiration, on the other hand, was irrecoverable; a physical element was due, no doubt, to the first exaltation indirectly due to the opium habit, but the moral influence was contributed by the Wordsworths. The steady will of the Dalesman seems to have constrained Coleridge's imagination from aimless wandering, his lofty and unwavering self-confidence inspired his friend with a similar energy. Away from Wordsworth after 1798, Coleridge lost himself in visions of work that always remained to be "transcribed," by one who had every poetic gift—save the rudimentary will for sustained and concentrated effort.

Lamb.

Hazlitt.

Leigh Hunt. De Quincey.

Coleridge's more delicate sensibility to the older notes of that more musical era in English poetry which preceded the age of Dryden and Pope was due in no small measure to the luminous yet subtle intuitions of his friend Charles Lamb. Lamb's appreciation of the imaginative beauty inhumed in old English literature amounted to positive genius, and the persistence with which he brought his perception of the supreme importance of imagination and music in poetry to bear upon some of the finest creative minds of 1800, in talk, letters, selections and essays, brought about a gradual revolution in the aesthetic morality of the day. He paid little heed to the old rhetoric and the *ars poetica* of classical comparison. His aim was rather to discover the mystery, the folk-seed and the old-world element, latent in so much of the finer ancient poetry and implicit in so much of the new. The *Essays of Elia* (1820–1825) are the binnacle of Lamb's vessel of exploration. Lamb and his great rival, William Hazlitt, both maintained that criticism was not so much an affair of learning, or an exercise of comparative and expository judgment, as an act of imagination in itself. Hazlitt became one of the master essayists, a fine critical analyst and declaimer, denouncing all insipidity and affectation, stirring the soul with metaphor, soaring easily and acquiring a momentum in his prose which often approximates to the impassioned utterance of Burke. Like Lamb, he wanted to measure his contemporaries by the Elizabethans, or still older masters, and he was deeply impressed by *Lyrical Ballads*. The new critics gradually found responsible auxiliaries, notably Leigh Hunt, De Quincey and Wilson of *Blackwood's*. Leigh Hunt, not very important in himself, was a cause of great authorship in others. He increased both the depth and area of modern literary sensibility. The world of books was to him an enchanted forest, in which every leaf had its own secret. He was the most catholic of critics, but he knew what was poor—at least in other people. As an essayist he is a feminine diminutive of Lamb, excellent in fancy and literary illustration, but far inferior in decisive insight or penetrative masculine wit. The Miltonic quality of impassioned pyramidal prose is best seen in Thomas De Quincey, of all the essayists of this age, or any age, the most diffuse, unequal and irreducible to rule, and which yet at times trembles upon the brink of a rhythmical sonority which seems almost to rival that of the greatest poetry. Leigh Hunt supplies a valuable link between Lamb, the sole external moderator of the Lake school, Byron, Shelley, and the junior branch of imaginative Aesthetic, represented by Keats.

Keats.

John Keats (1795–1821), three years younger than Shelley, was the greatest poetic artist of his time, and would probably have surpassed all, but for his collapse of health at twenty-five. His vocation was as unmistakable as that of Chatterton, with whose youthful ardour his own had points of likeness. The two contemporary conceptions of him as a fatuous Cockney Bunthorne or as "a tadpole of the lakes" were equally erroneous. But Keats was in a sense the first of the virtuoso or aesthetic school (caricatured later by the formula of "Art for Art's sake"); artistic beauty was to him a kind of religion, his expression was more technical, less personal than that of his contemporaries, he was a conscious "romantic," and he travelled in the realms of gold with less impedimenta than any of his fellows. Byron had always himself to talk about, Wordsworth saw the universe too much through the medium of his own self-importance, Coleridge was a metaphysician, Shelley hymned Intellectual Beauty; Keats treats of his subject, "A Greek Urn," "A Nightingale," the season of "Autumn," in such a way that our thought centres not upon the poet but upon the enchantment of that which he sings. In his three great medievalising poems, "The Pot of Basil," "The Eve of St Agnes" and "La Belle Dame Sans Merci," even more than in his Odes, Keats is the forerunner of Tennyson, the greatest of the word-painters. But apart from his perfection of loveliness, he has a natural magic and a glow of humanity surpassing that of any other known poet. His poetry, immature as it was, gave a new beauty to the language. His loss was the greatest English Literature has sustained.

Landor.

Before Tennyson, Rossetti and Morris, Keats's best disciples in the aesthetic school were Thomas Lovell Beddoes, George Dailey and Thomas Hood, the failure of whose "Midsummer Fairies" and "Fair Inez" drove him into that almost mortific vein of verbal humour which threw up here and there a masterpiece such as "The Song of a Shirt." The master virtuoso of English poetry in another department (the classical) during this and the following age was Walter Savage Landor, who threw off a few fragments of verse worthy of the Greek Anthology, but in his Dialogues or "Imaginary Conversations" evolved a kind of violent monologizing upon the commonplace which descends into the most dismal caverns of egotism. Carlyle furiously questioned his competence. Mr Shaw allows his classical amateurship and respectable strenuosity of character, but denounces his work, with a substratum of truth, as that of a "blathering, unreadable pedant."

Shelley.

Among those, however, who found early nutriment in Landor's Miltonic *Gebir* (1798) must be reckoned the most poetical of our poets. P. B. Shelley was a spirit apart, who fits into no group, the associate of Byron, but spiritually as remote from him as possible, hated by the rationalists of his age, and regarded by the poets with more pity than jealousy. He wrote only for poets, and had no public during his lifetime among general readers, by whom, however, he is now regarded as *the poet* par excellence. In his conduct it must be admitted that he was in a sense, like Coleridge, irresponsible, but on the other hand his poetic energy was irresistible and all his work is technically of the highest order of excellence. In ideal beauties it is supreme; its great lack is its want of humanity; in this he is the opposite of Wordsworth who reads human nature into everything. Shelley, on the other hand, dehumanises things and makes them unearthly. He hangs a poem, like a cobweb or a silver cloud, on a horn of the crescent moon, and leaves it to dangle there in a current of ether. His quest was continuous for figures of beauty, figures, however, more ethereal and less sensuous than those in Keats; having obtained such an idea he passed it again and again through the prism of his mind, in talk, letters, prefaces, poems. The deep sense of the mystery of words and their lightest variations in the skein of poetry, half forgotten since Milton's time, had been recovered in a great measure by Coleridge and Wordsworth since 1798; Lamb, too, and Hazlitt, and, perhaps, Hogg were in the secret, while Keats had its open sesame on his lips ere he died. The union of poetic emotion with verbal music of the greatest perfection was the aim of all, but none of these masters made words breathe and sing with quite the same spontaneous ease and fervour that Shelley attained in some of the lyrics written between twenty-four and thirty, such as "The Cloud," "The Skylark," the "Ode of the West Wind," "The Sensitive Plant," the "Indian Serenade."

The path of the new romantic school had been thoroughly prepared during the age of Gray, Cowper and Burns, and it won its triumphs with little resistance and no serious convulsions. The opposition was noisy, but its representative character has been exaggerated. In the meantime, however, the old-fashioned school and the Popean couplet, the Johnsonian dignity of reflection and the Goldsmithian ideal of generalized description, were well maintained by George Crabbe (1754-1832), "though Nature's sternest painter yet the best," a worsted-stockinged Pope and austere delineator of village misdoing and penurious age, and Samuel Rogers (1763-1855), the banker poet, liberal in sentiment, extreme Tory in form, and dilettante delineator of Italy to the music of the heroic couplet. Robert Southey, Thomas Campbell and Thomas Moore were a dozen years younger and divided their allegiance between two schools. In the main, however, they were still poeticisers of the orthodox old pattern, though all wrote a few songs of exceptional merit, and Campbell especially by defying the old anathemas.

Byron.

The great champion of the Augustan masters was himself the architect of revolution. First the idol and then the outcast of respectable society, Lord Byron sought relief in new cadences and new themes for his poetic talent. He was, however, essentially a history painter or a satirist in verse. He had none of the sensitive aesthetic taste of a Keats, none of the spiritual ardour of a Shelley, or of the elemental beauty or artistry of Wordsworth or Coleridge. He manages the pen (said Scott) with the careless and negligent ease of a man of quality. The "Lake Poets" sought to create an impression deep, calm and profound, Byron to start a theme which should enable him to pose, travel, astonish, bewilder and confound as lover of daring, freedom, passion and revolt. For the subtler symphonic music—that music of the spheres to which the ears of poets alone are attuned—Byron had an imperfect sympathy. The delicate ear is often revolted in his poetry by the vices of impromptu work. He steadily refused to polish, to file or to furbish—the damning, inevitable sign of a man born to wear a golden tassel. "I am like the tiger. If I miss the first spring I go growling back to the jungle." Subtlety is sacrificed to freshness and vigour. The exultation, the breadth, the sweeping magnificence of his effects are consequently most appreciated abroad, where the ineradicable flaws of his style have no power to annoy.

The European fame of Byron was from the first something quite unique. At Missolonghi people ran through the streets crying "The great man is dead—he is gone." His corpse was refused entrance at Westminster; but the poet was taken to the inmost heart of Russia, Poland, Spain, Italy, France, Germany, Scandinavia, and among the Slavonic nations generally. In Italy his influence is plainly seen in Berchet, Leopardi, Giusti, and even Carducci. In Spain the Myrtle Society was founded in Byron's honour. Hugo in his *Orientales* traversed Greece. Chateaubriand joined the Greek Committee. Delavigne dedicated his verse to Byron; Lamartine wrote another canto to *Childe Harold*; Mérimée is interpenetrated by Byronesque feeling which also animates the best work of Heine, Pushkin, Lermontov, and Mickievicz, and even De Musset.

Criticism.

Like Scott, Byron was a man of two eras, and not too much ahead of his time to hold the Press-Dragon in fee. His supremacy and that of his satellites Moore and Campbell were championed by the old papers and by the two new blatant Quarterlies, whose sails were filled not with the light airs of the future but by the Augustan "gales" of the classical past. The distinction of this new phalanx of old-fashioned critics who wanted to confer literature by university degree was that they wrote as gentlemen for gentlemen: they first gave criticism in England a respectable shakedown. Francis Jeffrey, a man of extraordinary ability and editor of *The Edinburgh Review* from 1803 to 1829 (with the mercurial Sydney Smith, the first of English conversationists, as his aide-de-camp), exercised a powerful influence as a standardizer of the second rate. He was one of the first of the critics to grasp firmly the main idea of literary evolution—the importance of time, environment, race and historical development upon the literary landscape; but he was vigorously aristocratic in his preferences, a hater of mystery, symbolism or allegory, an instinctive individualist of intolerant pattern. His chief weapons against the new ideas were social superiority and omniscience, and he used both unsparingly. The strident political partisanship of the *Edinburgh* raised up within six years a serious rival in the *Quarterly*, which was edited in turn by the good-natured pedagogue William Gifford and by Scott's extremely able son-in-law John Gibson Lockhart, the "scorpion" of the infant *Blackwood*. With the aid of the remnant of the old anti-Jacobins, Canning, Ellis, Barrow, Southey, Croker, Hayward, Apperley and others, the theory of *Quarterly* infallibility was carried to its highest point of development about 1845.

The historical and critical work of the *Quarterly* era, as might be expected, was appropriate to this gentlemanly censorship. The thinkers of the day were economic or juristic—Bentham, the great codifier; Malthus, whose theory of population gave Darwin his main impulse to theorise; and Mackintosh, whose liberal opposition to Burke deserved a better fate than it has ever perhaps received. The historians were mainly of the second class—the judicial Hallam, the ornate Roscoe, the plodding Lingard, the accomplished Milman, the curious Isaac D'Israeli, the academic Bishop Thirlwall. Mitford and Grote may be considered in the light of Tory and Radical historical pamphleteers, but Grote's work has the much larger measure of permanent value. As the historian of British India, James Mill's industry led him beyond his thesis of Benthamism in practice. Sir William Napier's heroic picture of the Peninsular War is strongly tinged by bias against the Tory administration of 1808-1813; but it conserves some imperishable scenes of war. Some of the most magnetic prose of the Regency Period was contained in the copious and insincere but profoundly emotionalising pamphlets of the self-taught Surrey labourer William Cobbett, in whom Diderot's paradox of a comedian is astonishingly illustrated. Lockhart's Lives of Burns and of Sir Walter Scott—the last perhaps the most memorable prose monument of its epoch—appeared in 1828 and 1838, and both formed the subjects of Thomas Carlyle in the *Edinburgh Review*, where, under the unwelcome discipline of Jeffrey, the new prophet worked nobly though in harness.

Scott.

Great as the triumph of the Romantic masters and the new ideas was, it is in the ranks of the Old School after all that we have to look for the greatest single figure in the literature of this age. Except in the imitative vein of ballad or folk-song, the poetry of Sir Walter Scott is never quite first-rate. It is poetry for repetition rather than for close meditation or contemplation, and resembles a military band more than a full orchestra. Nor will his prose bear careful analysis. It is a good servant, no more. When we consider, however, not the intensity but the vast extent, range and versatility of Scott's powers, we are constrained to assign him the first place in his own age, if not that in the next seat to Shakespeare in the whole of the English literary Pantheon. Like Shakespeare, he made humour and a knowledge of human nature his first instruments in depicting the past. Unlike Shakespeare, he was a born antiquary, and he had a great (perhaps excessive) belief in *mise en scène*, costume, patois and scenic properties generally. His portraiture, however, is Shakespearean in its wisdom and maturity, and, although he wrote very rapidly, it must be remembered that his mind had been prepared by strenuous work for twenty years as a storehouse of material in which nothing was handled until it had been carefully mounted by the imagination, classified in the memory, and tested by experimental use. Once he has got the imagination of the reader well grounded to earth, there is nothing he loves better than telling a good story. Of detail he is often careless. But he trusted to a full wallet, and rightly, for mainly by his abundance he raised the literature of the novel to its highest point of influence, breathing into it a new spirit, giving it a fulness and universality of life, a romantic charm, a dignity and elevation, and thereby a coherence, a power and predominance which it never had before.

In Scott the various lines of 18th-century conservatism and 19th-century romantic revival most wonderfully converge. His intense feeling for Long Ago made him a romantic almost from his cradle. The master faculties of history and humour made a strong conservative of him; but his Toryism was of a very different spring from that of Coleridge or Wordsworth. It was not a reaction from disappointment in the sequel of 1789, nor was it the result of reasoned conviction. It was indwelling, rooted deeply in the fibres of the soil, to which Scott's attachment was passionate, and nourished as from a source by ancestral sentiment and "heather" tradition. This sentiment made Scott a victorious pioneer of the Romantic movement all over Europe. At the same time we must remember that, with all his fondness for medievalism, he was fundamentally a thorough 18th-century Scotsman and successor of Bailie Nicol Jarvie: a worshipper of good sense, toleration, modern and expert governmental ideas, who valued the past chiefly by way of picturesque relief, and was thoroughly alive to the benefit of peaceful and orderly rule, and deeply convinced that we are much better off as we are than we could have been in the days of King Richard or good Queen Bess. Scott had the mind of an enlightened 18th-century administrator and statesmen who had made a fierce hobby of armour and old ballads. To expect him to treat of intense passion or romantic medievalism as Charlotte Brontë or Dante Gabriel Rossetti would have treated them is as absurd as to expect to find the sentiments of a Mrs Browning blossoming amidst the horse-play of *Tom Jones* or *Harry Lorrequer*. Scott has few niceties or secrets: he was never subtle, morbid or fantastic. His handling is ever broad, vigorous, easy, careless, healthy and free. Yet nobly simple and straightforward as man and writer were, there is something very complex about his literary legacy, which has gone into all lands and created bigoted enemies (Carlyle, Borrow) as well as unexpected friends (Hazlitt, Newman, Jowett); and we can seldom be sure whether his influence is reactionary or the reverse. There has always been something semi-feudal about it. The "shirra" has a demesne in letters as broad as a countryside, a band of mesne vassals and a host of Eildon hillsmen, Tweedside cottiers, minor feudatories and forest retainers attached to the "Abbotsford Hunt." Scott's humour, humanity and insistence upon the continuity of history transformed English literature profoundly.

Transition fiction.

Scott set himself to coin a quarter of a million sterling out of the new continent of which he felt himself the Columbus. He failed (quite narrowly), but he made the Novel the paymaster of literature for at least a hundred years. His immediate contemporaries and successors were not particularly great. John Galt (1779–1839), Susan Ferrier (1782–1854) and D. M. Moir (1798–1851) all attempted the delineation of Scottish scenes with a good deal of shrewdness of insight and humour. The main bridge from Scott to the great novelists of the 'forties and 'fifties was supplied by sporting, military, naval and political novels, represented in turn by Surtees, Smith, Hook, Maxwell, Lever, Marryat, Cooper, Morier, Ainsworth, Bulwer-Lytton and Disraeli. Surtees gave all-important hints to *Pickwick*, Marryat developed grotesque character-drawing, Ainsworth and Bulwer attempted new effects in criminology and contemporary glitter. Disraeli in the 'thirties was one of the foremost romantic wits who had yet attempted the novel. Early in the 'forties he received the laying-on of hands from the Young England party, and attempted to propagandize the good tidings of his mission in *Coningsby* and *Sybil*, novels full of *entraînement* and promise, if not of actual genius. Unhappily the author was enmeshed in the fatal drolleries of the English party system, and *Lothair* is virtually a confession of abandoned ideals. He completes the forward party in fiction; Jane Austen (1775–1815) stands to this as Crabbe and Rogers to Coleridge and Shelley. She represents the fine flower of the expiring 18th century. Scott could do the trumpet notes on the organ. She fingers the fine ivory flutes. She combines self-knowledge and artistic reticence with a complete tact and an absolute lucidity of vision within the area prescribed. Within the limits of a park wall in a country parish, absolutely oblivious of Europe and the universe, her art is among the finest and most finished that our literature has to offer. In irony she had no rival at that period. But the trimness of her plots and the delicacy of her miniature work have affinities in Maria Edgeworth, Harriet Martineau and Mary Russell Mitford, three excellent writers of pure English prose. There is a finer aroma of style in the contemporary "novels" of Thomas Love Peacock (1785–1866). These, however, are rather tournaments of talk than novels proper, releasing a flood of satiric portraiture upon the idealism of the day—difficult to be apprehended in perfection save by professed students. Peacock's style had an appreciable influence upon his son-in-law George Meredith (1828–1909). His philosophy is for the most part Tory irritability exploding in ridicule; but Peacock was one of the most lettered men of his age, and his flouts and jeers smack of good reading, old wine and respectable prejudices. In these his greatest successor was George Borrow (1803–1881), who used three volumes of half-imaginary autobiography and road-faring in strange lands as a sounding-board for a kind of romantic revolt against the century of comfort, toleration, manufactures, mechanical inventions, cheap travel and commercial expansion, unaccompanied (as he maintains) by any commensurate growth of human wisdom, happiness, security or dignity.

The Victorian era.

In the year of Queen Victoria's accession most of the great writers of the early part of the century, whom we may denominate as "late Georgian," were silent. Scott, Byron, Shelley, Keats, Coleridge, Lamb, Sheridan, Hazlitt, Mackintosh, Crabbe and Cobbett were gone. Wordsworth, Southey, Campbell, Moore, Jeffrey, Sydney Smith, De Quincey, Miss Edgeworth, Miss Mitford, Leigh Hunt, Brougham, Samuel Rogers were still living, but the vital portion of their work was already done. The principal authors who belong equally to the Georgian and Victorian eras are Landor, Bulwer, Marryat, Hallam, Milman and Disraeli; none of whom, with the exception of the last, approaches the first rank in either. The significant work of Tennyson, the Brownings, Carlyle, Dickens, Thackeray, the Brontës, George Eliot, Mrs Gaskell, Trollope, the Kingsleys, Spencer, Mill, Darwin, Ruskin, Grote, Macaulay, Freeman, Froude, Lecky, Buckle, Green, Maine, Borrow, FitzGerald, Arnold, Rossetti, Swinburne, Meredith, Hardy, Stevenson, Morris, Newman, Pater, Jefferies—the work of these writers may be termed conclusively Victorian; it gives the era a stamp of its own and distinguishes it as the most varied in intellectual riches in the whole course of our literature. Circumstances have seldom in the world been more favourable to a great outburst of literary energy. The nation was secure and prosperous to an unexampled degree, conscious of the will and the power to expand still further. The canons of taste were still aristocratic. Books were made and unmade according to a regular standard. Literature was the one form of art which the English understood, in which they had always excelled since 1579, and in which their originality was supreme. To the native genius for poetry was now added the advantage of materials for a prose which in lucidity and versatility should surpass even that of Goldsmith and Hazlitt. The diversity of form and content of this great literature was commensurate with the development of human knowledge and power which marked its age. In this and some other respects it resembles the extraordinary contemporary development in French literature which began under the reign of Louis Philippe. The one signally disconcerting thing about the great Victorian writers is their amazing prolixity. Not content with two or three long books, they write whole literatures. A score of volumes, each as long as the Bible or Shakespeare, barely represents the output of such authors as Carlyle, Ruskin, Froude, Dickens, Thackeray, Newman, Spencer or Trollope.

They obtained vast quantities of new readers, for the middle class was beginning to read with avidity; but the quality of brevity, the knowledge when to stop, and with it the older classic conciseness and the nobler Hellenic idea of a perfect measure—these things were as though they had not been. Meanwhile, the old schools were broken up and the foolscap addressed to the old masters. Singers, entertainers, critics and historians abound. Every man may say what is in him in the phrases that he likes best, and the sole motto that compels is "every style is permissible except the style that is tiresome." The old models are strangely discredited, and the only conventions which hold are those concerning the subjects which English delicacy held to be tabooed. These conventions were inordinately strict, and were held to include all the unrestrained, illicit impulses of love and all the more violent aberrations from the Christian code of faith and ethics. Infidel speculation and the liaisons of lawless love (which had begun to form the staple of the new French fiction—hence regarded by respectable English critics of the time as profoundly vitiated and scandalous) had no recognized existence and were totally ignored in literature designed for general reading. The second or Goody-two-Shoes convention remained strictly in force until the penultimate decade of the 19th century, and was acquiesced in or at least submitted to by practically all the greatest writers of the Victorian age. The great poets and novelists of that day easily out-topped their fellows. Society had no difficulty in responding to the summons of its literary leaders. Nor was their fame partial, social or sectional. The great novelists of early Victorian days were aristocratic and democratic at once. Their popularity was universal within the limits of the language and beyond it. The greatest of men were men of imagination rather than men of ideas, but such sociological and moral ideas as they derived from their environment were poured helter-skelter into their novels, which took the form of huge pantechnicon magazines. Another distinctive feature of the Victorian novel is the position it enabled women to attain in literature, a position attained by them in creative work neither before nor since.

Dickens.

The novelists to a certain extent created their own method like the great dramatists, but such rigid prejudices or conventions as they found already in possession they respected without demur. Both Dickens and Thackeray write as if they were almost entirely innocent of the existence of sexual vice. As artists and thinkers they were both formless. But the enormous self-complacency of the England of their time, assisted alike by the part played by the nation from 1793 to 1815, evangelicalism, free trade (which was originally a system of super-nationalism) and later, evolution, generated in them a great benignity and a strong determination towards a liberal and humanitarian philosophy. Despite, however, the diffuseness of the envelope and the limitations of horizon referred to, the unbookish and almost unlettered genius of Charles Dickens (1812–1870), the son of a poor lower middle-class clerk, almost entirely self-educated, has asserted for itself the foremost place in the literary history of the period. Dickens broke every rule, rioted in absurdity and bathed in extravagance. But everything he wrote was received with an almost frantic joy by those who recognized his creations as deifications of themselves, his scenery as drawn by one of the quickest and intensest observers that ever lived, and his drollery as an accumulated dividend from the treasury of human laughter. Dickens's mannerisms were severe, but his geniality as a writer broke down every obstruction, reduced Jeffrey to tears and Sydney Smith to helpless laughter.

Thackeray.

The novel in France was soon to diverge and adopt the form of an anecdote illustrating the traits of a very small group of persons, but the English novel, owing mainly to the predilection of Dickens for those Gargantuan entertainers of his youth, Fielding and Smollett, was to remain anchored to the history. William Makepeace Thackeray (1811–1863) was even more historical than Dickens, and most of his leading characters are provided with a detailed genealogy. Dickens's great works, excepting *David Copperfield* and *Great Expectations*, had all appeared when Thackeray made his mark in 1848 with *Vanity Fair*, and Thackeray follows most of his predecessor's conventions, including his conventional religion, ethics and politics, but he avoids his worse faults of theatricality. He never forces the note or lashes himself into fury or sentimentality; he limits himself in satire to the polite sphere which he understands, he is a great master of style and possesses every one of its fairy gifts except brevity. He creates characters and scenes worthy of Dickens, but within a smaller range and without the same abundance. He is a traveller and a cosmopolitan, while Dickens is irredeemably Cockney. He is often content to criticize or annotate or to preach upon some congenial theme, while Dickens would be in the flush of humorous creation. His range, it must be remembered, is wide, in most respects a good deal wider than his great contemporary's, for he is at once novelist, pamphleteer, essayist, historian, critic, and the writer of some of the most delicate and sentimental *vers d'occasion* in the language.

Charlotte Brontë.

George Eliot.

The absorption of England in itself is shown with exceptional force in the case of Thackeray, who was by nature a cosmopolitan, yet whose work is so absorbed with the structure of English society as to be almost unintelligible to foreigners. The exploration of the human heart and conscience in relation to the new problems of the time had been almost abandoned by the novel since Richardson's time. It was for woman to attempt to resolve these questions, and with the aid of powerful imagination to propound very different conclusions. The conviction of Charlotte Brontë (1816–1855) was that the mutual passionate love of one man and one woman is sacred and creates a centre of highest life, energy and joy in the world. George Eliot (1819–1880), on the other hand, detected a blind and cruel egoism in all such ecstasy of individual passion. It was in the autumn of 1847 that *Jane Eyre* shocked the primness of the coteries by the unconcealed ardour of its love passages. Twelve years later *Adam Bede* astonished the world by the intensity of its ethical light and shade. The introspective novel was now very gradually to establish a supremacy over the historical. The romance of the Brontës' forlorn life colours *Jane Eyre*, colours *Wuthering Heights* and colours *Villette*; their work is inseparable from their story to an extent that we perhaps hardly realize. George Eliot did not receive this adventitious aid from romance, and her work was, perhaps, unduly burdened by ethical diatribe, scientific disquisition and moral and philosophical asides. It is more than redeemed, however, by her sovereign humour, by the actual truth in the portrayal of that absolutely self-centred Midland society of the 'thirties and 'forties, and by the moral significance which she extracts from the smaller actions and more ordinary characters of life by means of sympathy, imagination and a deep human compassion. Her novels are generally admitted to have obtained twin summits in *Adam Bede* (1859) and *Middlemarch* (1872). An even nicer delineator of the most delicate shades of the curiously remote provincial society of that day was Mrs Gaskell (1810–1865), whose *Cranford* and *Wives and Daughters* attain to the perfection of easy, natural and unaffected English narrative. Enthusiasm and a picturesque boyish ardour and partisanship are the chief features of *Westward Ho!* and the other vivid and stirring novels of Charles Kingsley (1819–1875), to which a subtler gift in the discrimination of character must be added in the case of his brother Henry Kingsley (1830–1876).

Kingsley. Trollope. Reade. Meredith. Hardy.

Charles, however, was probably more accomplished as a poet than in the to him too exciting operation of taking sides in a romance. The novels of Trollope, Reade and Wilkie Collins are, generally speaking, a secondary product of the literary forces which produced the great fiction of the 'fifties. The two last were great at structure and sensation: Trollope dogs the prose of every-day life with a certainty and a clearness that border upon inspiration. The great novels of George Meredith range between 1859 and 1880, stories of characters deeply interesting who reveal themselves to us by flashes and trust to our inspiration to do the rest. The wit, the sparkle, the entrain and the horizon of these books, from *Richard Feverel* to the master analysis of

The Egoist, have converted the study of Meredith into an exact science. Thomas Hardy occupies a place scarcely inferior to Meredith's as a stylist, a discoverer of new elements of the plaintive and the wistful in the vanishing of past ideals, as a depicter of the old southern rustic life of England and its tragi-comedy, in a series of novels which take rank with the greatest.

Tennyson.

If Victorian literature had something more than a paragon in Dickens, it had its paragon too in the poet Tennyson. The son of a Lincolnshire parson of squirearchal descent, Alfred Tennyson consecrated himself to the vocation of poesy with the same unalterable conviction that had characterized Milton, Pope, Thomson, Wordsworth and Keats, and that was yet to signalize Rossetti and Swinburne, and he became easily the greatest virtuoso of his time in his art. To lyrics and idylls of a luxurious and exotic picturesqueness he gave a perfection of technique which criticism has chastened only to perfect in such miracles of description as "The Lotus Eaters," "The Dream of Fair Women," and "Morte d'Arthur." He received as vapour the sense of uneasiness as to the problems of the future which pervaded his generation, and in the elegies and lyrics of *In Memoriam*, in *The Princess* and in *Maud* he gave them back to his contemporaries in a running stream, which still sparkles and radiates amid the gloom. After the lyrical monodrama of *Maud* in 1855 he devoted his flawless technique of design, harmony and rhythm to works primarily of decoration and design (*The Idylls of the King*), and to experiments in metrical drama for which the time was not ripe; but his main occupation was varied almost to the last by lyrical blossoms such as "Frater Ave," "Roman Virgil," or "Crossing the Bar," which, like "Tears, Idle Tears" and "O that 'twere possible," embody the aspirations of Flaubert towards a perfected art of language shaping as no other verse probably can.

Browning.

Few, perhaps, would go now to *In Memoriam* as to an oracle for illumination and guidance as many of Queen Victoria's contemporaries did, from the Queen herself downwards. And yet it will take very long ere its fascination fades. In language most musical it rearticulates the gospel of Sorrow and Love, and it remains still a pathetic expression of emotions, sentiments and truths which, as long as human nature remains the same, and as long as calamity, sorrow and death are busy in the world, must be always repeating themselves. Its power, perhaps, we may feel of this poem and indeed of most of Tennyson's poetry, is not quite equal to its charm. And if we feel this strongly, we shall regard Robert Browning as the typical poet of the Victorian era. His thought has been compared to a galvanic battery for the use of spiritual paralytics. The grave defect of Browning is that his ideas, however excellent, are so seldom completely won; they are left in a twilight, or even a darkness more Cimmerian than that to which the worst of the virtuosi dedicate their ideas. Similarly, even in his "Dramatic Romances and Lyrics" (1845) or his "Men and Women" (1855) he rarely depicts action, seldom goes further than interpreting the mind of man as he approaches action. If Dickens may be described as the eye of Victorian literature, Tennyson the ear attuned to the subtlest melodies, Swinburne the reed to which everything blew to music, Thackeray the velvet pulpit-cushion, Eliot the impending brow, and Meredith the cerebral dome, then Browning might well be described as the active brain itself eternally expounding some point of view remote in time and place from its own. Tennyson was ostensibly and always a poet in his life and his art, in his blue cloak and sombrero, his mind and study alike stored with intaglios of the thought of all ages, always sounding and remodelling his verses so that they shall attain the maximum of sweetness and symmetry. He was a recluse. Browning on the other hand dissembled his poethood, successfully disguised his muse under the semblance of a stock merchant, was civil to his fellowmen, and though nervous with bores, encountered every one he met as if he were going to receive more than he could impart. In Tennyson's poetry we are always discovering new beauties. In Browning's we are finding new blemishes. Why he chose rhythm and metre for seven-eighths of his purpose is somewhat of a mystery. His protest against the materialistic view of life is, perhaps, a more valid one than Tennyson's; he is at pains to show us the noble elements valuable in spite of failure to achieve tangible success. He realizes that the greater the man, the greater is the failure, yet protests unfailingly against the despondent or materialist view of life. His nimble appreciation of character and motive attracts the attentive curiosity of highly intellectual people; but the question recurs with some persistence as to whether poetry, after all, was the right medium for the expression of these views.

Ruskin.
Morris.
Symonds.
Pater.

Many of Browning's ideas and fertilizations will, perhaps, owing to the difficulty and uncertainty which attaches to their form, penetrate the future indirectly as the stimulant of other men's work. This is especially the case with those remarkable writers who have for the first time given the fine arts a considerable place in English literature, notably John Ruskin (*Modern Painters*, 1842, *Seven Lamps*, 1849, *Stones of Venice*, 1853), William Morris, John Addington Symonds and Walter Pater. Browning, it is true, shared the discipleship of the first two with Kingsley and Carlyle. But Ruskin outlived all discipleships and transcended almost all the prose writers of his period in a style the elements of emotional power in which still preserve their secret.

Arnold.

More a poet of doubt than either Tennyson or the college friend, A. H. Clough, whose loss he lamented in one of the finest pastoral elegies of all ages, Matthew Arnold takes rank with Tennyson, Browning and Swinburne alone among the Dii Majores of Victorian poetry. He is perhaps a disciple of Wordsworth even more than of Goethe, and he finds in Nature, described in rarefied though at times intensely beautiful phrase, the balm for the unrest of man's unsatisfied yearnings, the divorce between soul and intellect, and the sense of contrast between the barren toil of man and the magic operancy of nature. His most delicate and intimate strains are tinged with melancholy. The infinite desire of what might have been, the *lacrimae rerum*, inspires "Resignation," one of the finest pieces in his volume of 1849 (*The Strayed Reveller*). In the deeply-sighed lines of "Dover Beach" in 1867 it is associated with his sense of the decay of faith. The dreaming garden trees, the full moon and the white evening star of the beautiful English-coloured *Thyrsis* evoke the same mood, and render Arnold one of the supreme among elegiac poets. But his poetry is the most individual in the circle and admits the popular heart never for an instant. As a popularizer of Renan and of the view of the Bible, not as a talisman but as a literature, and, again, as a chastener of his contemporaries by means of the iteration of a few telling phrases about philistines, barbarians, sweetness and light, sweet reasonableness, high seriousness, Hebraism and Hellenism, "young lions of the *Daily Telegraph*," and "the note of provinciality," Arnold far eclipsed his fame as a poet during his lifetime. His crusade of banter against the bad civilization of his own class was one of the most audaciously successful things of the kind ever accomplished. But all his prose theorizing was excessively superficial. In poetry he sounded a note which the prose Arnold seemed hopelessly unable ever to fathom.

Rossetti.

It is easier to speak of the virtuoso group who derived their first incitement to poetry from Chatterton, Keats and the early exotic ballads of Tennyson, far though these yet were from attaining the perfection in which they now appear after half a century of assiduous correction. The chief of them were Dante Gabriel Rossetti, his sister Christina, William Morris and Algernon Charles Swinburne. The founders of this school, which took and acquired the name Pre-Raphaelite, were profoundly impressed by the Dante revival and by the study of the early Florentine masters. Rossetti himself was an accomplished translator from Dante and from Villon. He preferred Keats to Shelley because (like himself) he had no philosophy. The 18th century was to him as if it had never been, he dislikes Greek lucidity and the open air, and prefers lean medieval saints, spectral images and mystic loves. The passion of these students was retrospective; they wanted to revive the literature of a forgotten past, Italian, Scandinavian, French, above all, medieval. To do this is a question of enthusiastic experiment and adventure. Rossetti leads the way with his sonnets and ballads. Christina follows with *Goblin Market*, though she subsequently, with a perfected technique, writes poetry more and more confined to the religious emotions. William Morris publishes in 1858 his *Defence of Guenevere*, followed in ten years by *The Earthly Paradise*, a collection of metrical tales, which hang in the sunshine like tapestries woven of golden thread, where we should naturally expect the ordinary paperhanging of prose romance.

Swinburne.

From the verdurous gloom of the studio with its mysterious and occult properties in which Rossetti compounded his colours, Morris went forth shortly to chant and then to narrate Socialist songs and parables. Algernon Charles Swinburne set forth to scandalise the critics of 1866 with the roses and lilies of vice and white death in *Poems and Ballads*, which was greeted with howls and hisses, and reproach against a "fleshly school of modern poetry." Scandalous verses these were, rioting on the crests of some of these billows of song. More discerning persons perceived the harmless impersonal unreality and mischievous youthful extravagance of all these Cyprian outbursts, that the poems were the outpourings of a young singer up to the chin in the Pierian flood, and possessed by a poetic energy so urgent that it could not wait to apply the touchstones of reality or the chastening planes of experience. Swinburne far surpassed the promoters of this exotic school in technical excellence, and in *Atalanta in Calydon* and its successors may be said to have widened the bounds of English song, to have created a new music and liberated a new harmonic scale in his verse. Of the two elements which, superadded to a consummate technique, compose the great poet, intensity of imagination and intensity of passion, the latter in Swinburne much predominated. The result was a great abundance of heat and glow and not perhaps quite enough defining light. Hence the tendency to be incomprehensible, so fatal in its fascination for the poets of the last century, which would almost justify the title of the triumvirs of twilight to three of the greatest. It is this incomprehensibility which alienates the poet from the popular understanding and confines his audience to poets, students and scholars. Poetry is often comparable to a mountain range with its points and aiguilles, its peaks and crags, its domes and its summits. But Swinburne's poetry, filled with the sound and movement of great waters, is as incommunicable as the sea. Trackless and almost boundless, it has no points, no definite summits. The poet never seems to know precisely when he is going to stop. His metrical flow is wave-like, beautiful and rather monotonous, inseparable from the general effect. His endings seem due to an exhaustion of rhythm rather than to an exhaustion of sense. A cessation of meaning is less perceptible than a cessation of magnificent sound.

Newman and the Church.

Akin in some sense to the attempt made to get behind the veil and to recapture the old charms and spells of the middle ages, to discover the open sesame of the *Morte D'Arthur* and the *Mabinogion* and to reveal the old Celtic and monastic life which once filled and dominated our islands, was the attempt to overthrow the twin gods of the 'forties and 'fifties, state-Protestantism and the sanctity of trade. The curiously assorted Saint Georges who fought these monsters were John Henry Newman and Thomas Carlyle. The first cause of the movement was, of course, the anomalous position of the Anglican Church, which had become a province of the oligarchy officered by younger sons. It stood apart from foreign Protestantism; its ignorance of Rome, and consequently of what it protested against, was colossal; it was conscious of itself only as an establishment—it had produced some very great men since the days of the non-jurors, when it had mislaid its historical conscience, but these had either been great scholars in their studies, such as Berkeley, Butler, Warburton, Thomas Scott, or revivalists, evangelicals and missionaries, such as Wilson, Wesley, Newton, Romaine, Cecil, Venn, Martyn, who were essentially Congregationalists rather than historical Churchmen. A new spiritual beacon was to be raised; an attempt was to be made to realize the historical and cosmic aspects of the English Church, to examine its connexions, its descent and its title-deeds. In this attempt Newman was to spend the best years of his life.

The growth of liberal opinions and the denudation of the English Church of spiritual and historical ideas, leaving "only pulpit orators at Clapham and Islington and two-bottle orthodox" to defend it, seemed to involve the continued existence of Anglicanism in any form in considerable doubt. Swift had said at the commencement of the 18th century that if an act was passed for the extirpation of the gospel, bank stock might decline 1%; but a century later it is doubtful whether the passing of such a bill would have left any trace, however evanescent, upon the stability of the money market. The Anglican *via media* had enemies not only in the philosophical radicals, but also in the new caste of men of science. Perhaps, as J. A. Froude suggests, these combined enemies, *The Edinburgh Review*, Brougham, Mackintosh, the Reform Ministry, Low Church philosophy and the London University were not so very terrible after all. The Church was a vested interest which had a greater stake in the country and was harder to eradicate than they imagined. But it had nothing to give to the historian and the idealist. They were right to fight for what their souls craved after and found in the Church of Andrewes, Herbert, Ken and Waterland. Belief in the divine mission of the Church lingered on in the minds of such men as Alexander Knox or his disciple Bishop Jebb; but few were prepared to answer the question—"What is the Church as spoken of in England? Is it the Church of Christ?"—and the answers were various. Hooker had said it was "the nation"; and in entirely altered circumstances, with some qualifications, Dr Arnold said the same. It was "the Establishment" according to the lawyers and politicians, both Whig and Tory. It was an invisible and mystical body, said the Evangelicals. It was the aggregate of separate congregations, said the Nonconformists. It was the parliamentary creation of the Reformation, said the Erastians. The true Church was the communion of the Pope; the pretended Church was a legalised schism, said the Roman Catholics. All these ideas were floating about, loose and vague, among people who talked much about the Church.

One thing was persistently obvious, namely, that the nationalist church had become opportunist in every fibre, and that it had thrown off almost every semblance of ecclesiastical discipline. The view was circulated that the Church owed its continued existence to the good sense of the individuals who officered it, and to the esteem which possession and good sense combined invariably engendered in the reigning oligarchy. But since Christianity was true—and Newman was the one man of modern times who seems never to have doubted this, never to have overlooked the unmistakable threat of eternal punishment to the wicked and unbelieving—modern England, with its march of intellect and its chatter about progress, was advancing with a light heart to the verge of a bottomless abyss. By a diametrically opposite chain of reasoning Newman reached much the same conclusion as Carlyle. Newman sought a haven of security in a rapprochement with the Catholic Church. The medieval influences already at work in Oxford began to fan the flame which kindled to a blaze in the ninetieth of the celebrated *Tracts for the Times*. It proved the turning of the ways leading Keble and Pusey to Anglican ritual and Newman to Rome. This anti-liberal campaign was poison to the state-churchmen and Protestants, and became perhaps the chief intellectual storm centre of the century. Charles Kingsley in 1864 sought to illustrate by recent events that veracity could not be considered a Roman virtue.

Scientific cross-currents.

After some preliminary ironic sparring Newman was stung into writing what he deliberately called *Apologia pro vita sua*. In this, apart from the masterly dialectic and exposition in which he had already shown himself an adept, a volume of autobiography is made a chapter of general history, unsurpassed in its kind since the *Confessions* of St Augustine, combined with a perfection of form, a precision of phrasing and a charm of style peculiar to the genius of the author, rendering it one of the masterpieces of English prose. But while Newman was thus sounding a retreat, louder and more urgent voices were signalling the advance in a totally opposite direction. The *Apologia* fell in point of time between *The Origin of Species* and *Descent of Man*, in which Charles Darwin was laying the corner stones of the new science of which Thomas Huxley and Alfred Russel Wallace were to be among the first apostles, and almost coincided with the *First Principles* of a synthetic philosophy, in which Herbert Spencer was formulating a set of probabilities wholly destructive to the acceptance of positive truth in any one religion. The typical historian of the 'fifties, Thomas Babington Macaulay, and the seminal thinker of the 'sixties, John Stuart Mill, had as determinedly averted their faces from the old conception of revealed religion. Nourished in the school of the great Whig pamphleteer historians, George Grote and Henry Hallam, Macaulay combined gifts of memory, enthusiastic conviction, portraiture and literary expression, which gave to his historical writing a resonance unequalled (even by Michelet) in modern literature. In spite of faults of taste and fairness, Macaulay's resplendent gifts enabled him to achieve for the period from Charles II. to the peace of Ryswick what Thucydides had done for the Peloponnesian War. The pictures that he drew with such exultant force are stamped ineffaceably upon the popular mind. His chief faults are not of detail, but rather a lack of subtlety as regards characterization and motive, a disposition to envisage history too exclusively as a politician, and the sequence of historical events as a kind of ordered progress towards the material ideals of universal trade and Whig optimism as revealed in the Great Exhibition of 1851.

Macaulay.

Carlyle.

Macaulay's tendency to disparage the past brought his whole vision of the Cosmos into sharp collision with that of his rival appellant to the historical conscience, Thomas Carlyle, a man whose despair of the present easily exceeded Newman's. But Carlyle's despondency was totally irrespective of the attitude preserved by England towards the Holy Father, whom he seldom referred to save as "the three-hatted Papa" and "servant of the devil." It may be in fact almost regarded as the reverse or complement to the excess of self-complacency in Macaulay. We may correct the excess of one by the opposite excess of the other. Macaulay was an optimist in ecstasy with the material advance of his time in knowledge and power; the growth of national wealth, machinery and means of lighting and locomotion caused him to glow with satisfaction. Carlyle, the pessimist, regards all such symptoms of mechanical development as contemptible. Far from panegyrizing his own time, he criticizes it without mercy. Macaulay had great faith in rules and regulations, reform bills and parliamentary machinery. Carlyle regards them as wiles of the devil. Frederick William of Prussia, according to Macaulay, was the most execrable of fiends, a cross between Moloch and Puck, his palace was hell, and Oliver Twist and Smike were petted children compared with his son the crown prince. In the same bluff and honest father Carlyle recognized the realized ideal of his fancy and hugged the just man made perfect to his heart of hearts. Such men as Bentham and Cobden, Mill and Macaulay, had in Carlyle's opinion spared themselves no mistaken exertion to exalt the prosperity and happiness of their own day. The time had come to react at all hazards against the prevalent surfeit of civilization. Henceforth his literary activity was to take two main directions. First, tracts for the times against modern tendencies, especially against the demoralizing modern talk about progress by means of money and machinery which emanated like a miasma from the writings of such men as Mill, Macaulay, Brougham, Buckle and from the Quarterlies. Secondly, a cyclopean exhibition of Caesarism, discipline, the regimentation of workers, and the convertibility of the Big Stick and the Bible, with a preference to the Big Stick as a panacea. The snowball was to grow rapidly among such writers as Kingsley, Ruskin, George Borrow, unencumbered by reasoning or deductive processes which they despised. Carlyle himself felt that the condition of England was one for anger rather than discussion. He detested the rationalism and symmetry of such methodists of thought as Mill, Buckle, Darwin, Spencer, Lecky, Ricardo and other demonstrations of the dismal science—mere chatter he called it. The palliative philanthropy of the day had become his aversion even more than the inroads of Rome under cover of the Oxford movement which Froude, Borrow and Kingsley set themselves to correct. As an historian of a formal order Carlyle's historical portraits cannot bear a strict comparison with the published work of Gibbon and Macaulay, or even of Maine and Froude in this period, but as a biographer and autobiographer Carlyle's caustic insight has enabled him to produce much which is of the very stuff of human nature. Surrounded by philomaths and savants who wrote smoothly about the perfectibility of man and his institutions, Carlyle almost alone refused to distil his angry eloquence and went on railing against the passive growth of civilization at the heart of which he declared that he had discovered a cancer. This uncouth Titan worship and prostration before brute force, this constant ranting about jarls and vikings trembles often on the verge of cant and comedy, and his fiddling on the one string of human pretension and bankruptcy became discordant almost to the point of chaos. Instinctively destructive, he resents the apostleship of teachers like Mill, or the pioneer discoveries of men like Herbert Spencer and Darwin. He remains, nevertheless, a great incalculable figure, the cross grandfather of a school of thought which is largely unconscious of its debt and which so far as it recognizes it takes Carlyle in a manner wholly different from that of his contemporaries.

New schools.

History.

The deaths of Carlyle and George Eliot (and also of George Borrow) in 1881 make a starting-point for the new schools of historians, novelists, critics and biographers, and those new nature students who claim to cure those evil effects of civilization which Carlyle and his disciples had discovered. History in the hands of Macaulay, Buckle and Carlyle had been occupied mainly with the bias and tendency of change, the results obtained by those who consulted the oracle being more often than not diametrically opposite. With Froude still on the one hand as the champion of Protestantism, and with E. A. Freeman and J. R. Green on the other as nationalist historians, the school of applied history was fully represented in the next generation, but as the records grew and multiplied in print in accordance with the wise provisions made in 1857 by the commencement of the Rolls Series of medieval historians, and the Calendars of State Papers, to be followed shortly by the rapidly growing volumes of Calendars of Historical Manuscripts, historians began to concentrate their attention more upon the process of change as their right subject matter and to rely more and more upon documents, statistics and other impersonal and disinterested forms of material. Such historical writers as Lecky, Lord Acton, Creighton, Morley and Bryce contributed to the process of transition mainly as essayists, but the new doctrines were tested and to a certain extent put into action by such writers as Thorold Rogers, Stubbs, Gardiner and Maitland. The theory that History is a science, no less and no more, was propounded in so many words by Professor Bury in his inaugural lecture at Cambridge in 1903, and this view and the corresponding divergence of history from the traditional pathway of Belles Lettres has become steadily more dominant in the world of historical research and historical writing since 1881. The bulk of quite modern historical writing can certainly be justified from no other point of view.

The novel.

The novel since 1881 has pursued a course curiously analogous to that of historical writing. Supported as it was by masters of the old régime such as Meredith and Hardy, and by those who then ranked even higher in popular esteem such as Wilkie Collins, Anthony Trollope, Besant and Rice, Blackmore, William Black and a monstrous rising regiment of lady novelists—Mrs Lynn Linton, Rhoda Broughton, Mrs Henry Wood, Miss Braddon, Mrs Humphry Ward, the type seemed securely anchored to the old formulas and the old ways. In reality, however, many of these popular workers were already moribund and the novel was being honeycombed by French influence.

This is perceptible in Hardy, but may be traced with greater distinctness in the best work of George Gissing, George Moore, Mark Rutherford, and later on of H. G. Wells, Arnold Bennett and John Galsworthy. The old novelists had left behind them a giant's robe. Intellectually giants, Dickens and Thackeray were equally gigantic spendthrifts. They worked in a state of fervent heat above a glowing furnace, into which they flung lavish masses of unshaped metal, caring little for immediate effect or minute dexterity of stroke, but knowing full well that the emotional energy of their temperaments was capable of fusing the most intractable material, and that in the end they would produce their great downright effect. Their spirits rose and fell, but the case was desperate, copy had to be despatched at once or the current serial would collapse. Good and bad had to make up the tale against time, and revelling in the very exuberance and excess of their humour, the novelists invariably triumphed. It was incumbent on the new school of novelists to economize their work with more skill, to relieve their composition of irrelevancies, to keep the writing in one key, and to direct it consistently to one end—in brief, to unify the novel as a work of art and to simplify its ordonnance.

The novel, thus lightened and sharpened, was conquering new fields. The novel of the 'sixties remained not, perhaps, to win many new triumphs, but a very popular instrument in the hands of those who performed variations on the old masters, and much later in the hands of Mr William de Morgan, showing a new force and quiet power of its own. The novel, however, was ramifying in other directions in a way full of promise for the future. A young Edinburgh student, Robert Louis Stevenson, had inherited much of the spirit of the Pre-Raphaelitic virtuosos, and combined with their passion for the romance of the historic past a curiosity fully as strong about the secrets of romantic technique. A coterie which he formed with W. E. Henley and his cousin R. A. M. Stevenson studied words as a young art student studies paints, and made studies for portraits of buccaneers with the same minute drudgery that Rossetti had studied a wall or Morris a piece of figured tapestry. While thus forming a new romantic school whose work when wrought by his methods should be fit to be grafted upon the picturesque historic fiction of Scott and Dumas, Stevenson was also naturalizing the short story of the modern French type upon English ground. In this particular field he was eclipsed by Rudyard Kipling, who, though less original as a man of letters, had a technical vocabulary and descriptive power far in advance of Stevenson's, and was able in addition to give his writing an exotic quality derived from Oriental colouring. This regional type of writing has since been widely imitated, and the novel has simultaneously developed in many other ways, of which perhaps the most significant is the psychological study as manipulated severally by Shorthouse, Mallock and Henry James.

Criticism.

The expansion of criticism in the same thirty years was not a whit less marked than the vast divagation of the novel. In the early 'eighties it was still tongue-bound by the hypnotic influence of one or two copy-book formulae—Arnold's "criticism of life" as a definition of poetry, and Walter Pater's implied doctrine of art for art's sake. That two dicta so manifestly absurd should have cast such an augur-like spell upon the free expression of opinion, though it may of course, like all such instances, be easily exaggerated, is nevertheless a curious example of the enslavement of ideas by a confident claptrap. A few representatives of the old schools of motived or scientific criticism, deduced from the literatures of past time, survived the new century in Leslie Stephen, Saintsbury, Stopford Brooke, Austin Dobson, Courthope, Sidney Colvin, Watts-Dunton; but their agreement is certainly not greater than among the large class of emancipated who endeavour to concentrate the attention of others without further ado upon those branches of literature which they find most nutritive. Among the finest appreciators of this period have been Pattison and Jebb, Myers, Hutton, Dowden, A. C. Bradley, William Archer, Richard Garnett, E. Gosse and Andrew Lang. Birrell, Walkley and Max Beerbohm have followed rather in the wake of the Stephens and Bagehot, who have criticized the sufficiency of the titles made out by the more enthusiastic and lyrical eulogists. In Arthur Symons, Walter Raleigh and G. K. Chesterton the new age possessed critics of great originality and power, the work of the last two of whom is concentrated upon the application of ideas about life at large to the conceptions of literature. In exposing palpable nonsense as such, no one perhaps did better service in criticism than the veteran Frederic Harrison.

In the cognate work of memoir and essay, the way for which has been greatly smoothed by co-operative lexicographical efforts such as the *Dictionary of National Biography*, the *New English Dictionary*, the *Victoria County History* and the like, some of the most dexterous and permeating work of the transition from the old century to the new was done by H. D. Traill, Gosse, Lang, Mackail, E. V. Lucas, Lowes Dickinson, Richard le Gallienne, A. C. Benson, Hilaire Belloc, while the open-air relief work for dwellers pent in great cities, pioneered by Gilbert White, has been expanded with all the zest and charm that a novel pursuit can endow by such writers as Richard Jefferies, an open-air and nature mystic of extraordinary power at his best, Selous, Seton Thompson, W. H. Hudson.

Poetry.

The age has not been particularly well attuned to the efforts of the newer poets since Coventry Patmore in the *Angel in the House* achieved embroidery, often extremely beautiful, upon the Tennysonian pattern, and since Edward FitzGerald, the first of all letter-writing commentators on life and letters since Lamb, gave a new cult to the decadent century in his version of the Persian centoist Omar Khayyam. The prizes which in Moore's day were all for verse have now been transferred to the prose novel and the play, and the poets themselves have played into the hands of the Philistines by disdaining popularity in a fond preference for virtuosity and obscurity. Most kinds of the older verse, however, have been well represented, descriptive and elegiac poetry in particular by Robert Bridges and William Watson, the music of the waters of the western sea and its isles by W. B. Yeats, Synge, Moira O'Neill, "Fiona Macleod" and an increasing group of Celtic bards, the highly wrought verse of the 17th-century lyrists by Francis Thompson, Lionel Johnson, Ernest Dowson, the simplicity of a more popular strain by W. H. Davies, of a brilliant rhetoric by John Davidson, and of a more intimate romance by Sturge Moore and Walter de la Mare. Light verse has never, perhaps, been represented more effectively since Praed and Calverley and Lewis Carroll than by Austin Dobson, Locker Lampson, W. S. Gilbert and Owen Seaman. The names of C. M. Doughty, Alfred Noyes, Herbert Trench and Laurence Binyon were also becoming prominent at the opening of the 20th century. For originality in form and substance the palm rests in all probability with A. E. Housman, whose *Shropshire Lad* opens new avenues and issues, and with W. E. Henley, whose town and hospital poems had a poignant as well as an ennobling strain. The work of Henry Newbolt, Mrs. Meynell and Stephen Phillips showed a real poetic gift. Above all these, however, in the esteem of many reign the verses of George Meredith and of Thomas Hardy, whose *Dynasts* was widely regarded by the best judges as the most remarkable literary production of the new century.

Drama.

The new printed and acted drama dates almost entirely from the late 'eighties. Tom Robertson in the 'seventies printed nothing, and his plays were at most a timid recognition of the claims of the drama to represent reality and truth. The enormous superiority of the French drama as represented by Augier, Dumas *fils* and Sardou began to dawn slowly upon the English consciousness. Then in the 'eighties came Ibsen, whose daring in handling actuality was only equalled by his intrepid stage-craft. Oscar Wilde and A. W. Pinero were the first to discover how the spirit of these new discoveries might be adapted to the English stage. Gilbert Murray, with his fascinating and tantalizing versions from Euripides, gave a new flexibility to the expansion that was going on in English dramatic ideas. Bernard Shaw and his disciples, conspicuous among them Granville Barker, gave a new seasoning of wit to the absolute novelties of subject, treatment and application with which they transfixed the public which had so long abandoned thought upon entering the theatre. This new adventure enjoyed a *succès de stupeur*, the precise range of which can hardly be estimated, and the force of which is clearly by no means spent.

20th-century changes.

English literature in the 20th century still preserves some of the old arrangements and some of the consecrated phrases of patronage and aristocracy; but the circumstances of its production were profoundly changed during the 19th century. By 1895 English literature had become a subject of regular instruction for a special degree at most of the universities, both in England and America. This has begun to lead to research embodied in investigations which show that what were regarded as facts in connexion with the earlier literature can be regarded so no longer. It has also brought comparative and historical treatment of a closer kind and on a larger scale to bear upon the evolution of literary types. On the other hand it has concentrated an excessive attention perhaps upon the grammar and prosody and etymology of literature, it has stereotyped the admiration of lifeless and obsolete forms, and has substituted antiquarian notes and ready-made commentary for that live enjoyment, which is essentially individual and which tends insensibly to evaporate from all literature as soon as the circumstance of it changes. It is prone, moreover, to force upon the immature mind a rapt admiration for the mirror before ever it has scanned the face of the original. A result due rather to the general educational agencies of the time is that, while in the middle of the 19th century one man could be found to write competently on a given subject, in 1910 there were fifty. Books and apparatus for reading have multiplied in proportion. The fact of a book having been done quite well in a certain way is no longer any bar whatever to its being done again without hesitation in the same way. This continual pouring of ink from one bottle into another is calculated gradually to raise the standard of all subaltern writing and compiling, and to leave fewer and fewer books securely rooted in a universal recognition of their intrinsic excellence, power and idiosyncrasy or personal charm. Even then, of what we consider first-rate in the 19th century, for instance, but a very small residuum can possibly survive. The one characteristic that seems likely to cling and to differentiate this voluble century is its curious reticence, of which the 20th century has already made uncommonly short work. The new playwrights have untaught England a shyness which came in about the time of Southey, Wordsworth and Sir Walter Scott. That the best literature has survived hitherto is at best a pious opinion. As the area of experience grows it is more and more difficult to circumscribe or even to describe the supreme best, and such attempts have always been responsible for base superstition. It is clear that some limitation of the literary stock-in-trade will become increasingly urgent as time goes on, and the question may well occur as to whether we are insuring the right baggage. The enormous apparatus of literature at the present time is suitable only to a peculiar phasis and manner of existence. Some hold to the innate and essential aristocracy of literature; others that it is bound to develop on the popular and communistic side, for that at present, like machinery and other deceptive benefits, it is a luxury almost exclusively advantageous to the rich. But to predict the direction of change in literature is even more futile than to predict the direction of change in human history, for of all factors of history, literature, if one of the most permanent, is also one of the least calculable.

BIBLIOGRAPHICAL NOTE.—*The Age of Wordsworth* and *The Age of Tennyson* in Bell's "Handbooks of English Literature" are of special value for this period. Prof. Dowden's and Prof. Saintsbury's 19th-century studies fill in interstices; and of the "Periods of European Literature," the *Romantic Revolt* and *Romantic Triumph* are pertinent, as are the literary chapters in vols. x. and xi. of the *Cambridge Modern History*. Of more specific books George Brandes's *Literary Currents of the Nineteenth Century*, Stedman's *Victorian Poets*, Holman Hunt's *Pre-Raphaelite Brotherhood*, R. H. Hutton's *Contemporary Thought* (and companion volumes), Sir Leslie Stephen's *The Utilitarians*, Buxton Forman's *Our Living Poets*, Dawson's *Victorian Novelists*, Thureau-Dangin's *Renaissance des idées catholiques en Angleterre*, A. Chevrillon's *Sydney Smith et la renaissance des idées libérales en Angleterre*, A. W. Benn's *History of English Thought in the Nineteenth Century*, the publishing histories of Murray, Blackwood, Macvey Napier, Lockhart, &c., J. M. Robertson's *Modern Humanists*, and the critical miscellanies of Lord Morley, Frederic Harrison, W. Bagehot, A. Birrell, Andrew Lang and E. Gosse, will be found, in their several degrees, illuminating. The chief literary lives are those of Scott by Lockhart, Carlyle by Froude, Macaulay by Trevelyan, Dickens by Forster and Charlotte Brontë by Mrs Gaskell. (T. SE.)

ENGLISHRY (*Englescherie*), a legal name given, in the reign of William the Conqueror, to the presentment of the fact that a person slain was an Englishman. If an unknown man was found slain, he was presumed to be a Norman, and the hundred was fined accordingly, unless it could be proved that he was English. Englishry, if established, excused the hundred. Dr W. Stubbs (*Constitutional History*, i. 196) says that possibly similar measures were taken by King Canute. Englishry was abolished in 1340.

See *Select Cases from the Coroners' Rolls, 1265–1413*, ed. C. Gross, Selden Society (London, 1896).

ENGRAVING, the process or result of the action implied by the verb "to engrave" or mark by incision, the marks (whether for inscriptive, pictorial or decorative purposes) being produced, not by simply staining or discolouring the material (as with paint, pen or pencil), but by cutting into or otherwise removing a portion of the substance. In the case of pictures, the engraved surface is reproduced by printing; but this is only one restricted sense of "engraving," since the term includes seal-engraving (where a cast is taken), and also the chased ornamentation of plate or gems, &c.

The word itself is derived from an O. Fr. *engraver* (not to be confused with the same modern French word used for the running of a boat's keel into the beach, or for the sticking of a cart's wheels in the mud,—from *grève*, Provençal *grava*, sands of the sea or river shore; cf. Eng. "gravel"); it was at one time supposed that the Gr. γράφειν, to write, was etymologically connected, but this view is not now accepted, and (together with "grave," meaning either to engrave, or the place where the dead are buried) the derivation is referred to a common Teutonic form signifying "to dig" (O. Eng. *grafan*, Ger. *graben*). The modern French *graver*, to engrave, is a later adoption. The idea of a furrow, by digging or cutting, is thus historically associated with an engraving, which may properly include the rudest marks cut into any substance. In old English literature it included carving and sculpture, from which it has become convenient to differentiate the terminology; and the ancients who chiselled their writing on slabs of stone were really "engraving." The word is not applicable, therefore, either strictly to lithography (*q.v.*), nor to any of the photographic processes (see PROCESS), except those in which the surface of the plate is actually eaten into or lowered. In the latter case, too, it is convenient to mark a distinction and to ignore the strict analogy. In modern times the term is, therefore, practically restricted—outside the spheres of gem-engraving and seal-engraving (see GEM), or the inscribing or ornamenting of stone, plate, glass, &c.—to the art of making original pictures (*i.e.* by the draughtsman himself, whether copies of an original painting or not), either by incised lines on metal plates (see LINE-ENGRAVING), or by the corrosion of the lines with acid (see ETCHING), or by the roughening of a metal surface without actual lines (see MEZZOTINT), or by cutting a wood surface away so as to leave lines in relief (see WOOD-ENGRAVING); the result in each case may be called generically an engraving, and in common parlance the term is applied, though incorrectly, to the printed reproduction or "print."

Of these four varieties of engraving—line-engraving, etching, mezzotint or wood-engraving—the woodcut is historically the earliest. Line-engraving is now practically obsolete, while etching and mezzotint have recently come more and more to the front. To the draughtsman the difference in technical handling in each case has in most cases some relation to his own artistic impulse, and to his own feeling for beauty. A line engraver, as P. G. Hamerton said, will not see or think like an etcher, nor an etcher like an engraver in mezzotint. Each kind, with its own sub-varieties, has its peculiar effect and attraction.

A real knowledge of engraving can only be attained by a careful study and comparison of the prints themselves, or of accurate facsimiles, so that books are of little use except as guides to prints when the reader happens to be unaware of their existence, or else for their explanation of technical processes. The value of the prints varies not only according to the artist, but also according to the fineness of the impression, and the "state" (or stage) in the making of the plate, which may be altered from time to time. "Proofs" may also be taken from the plate, and even touched up by the artist, in various stages and various degrees of fineness of impression.

The department of art-literature which classifies prints is called *Iconography*, and the classifications adopted by iconographers are of the most various kinds. For example, if a complete book were written on Shakespearian iconography it would contain full information about all prints illustrating the life and works of Shakespeare, and in the same way there may be the iconography of a locality or of a single event.

The history of engraving is a part of iconography, and various histories of the art exist in different languages. In England W. Y. Ottley wrote an *Early History of Engraving*, published in two volumes 4to (1816), and began what was intended to be a series of notices on engravers and their works. The facilities for the reproduction of engravings by the photographic processes have of late years given an impetus to iconography. One of the best modern writers on the subject was Georges Duplessis, the keeper of prints in the national library of France. He wrote a *History of Engraving in France* (1888), and published many notices of engravers to accompany the reproductions by M. Amand Durand. He is also the author of a useful little manual entitled *Les Merveilles de la gravure* (1871). Jansen's work on the origin of wood and plate engraving, and on the knowledge of prints of the 15th and 16th centuries, was published at Paris in two volumes 8vo in 1808. Among general works see Adam Bartsch, *Le Peintre-graveur* (1803–1843); J. D. Passavant, *Le Peintre-graveur* (1860–1864); P. G. Hamerton, *Graphic Arts* (1882); William Gilpin, *Essay on Prints* (1781); J. Maberly, *The Print Collector* (1844); W. H. Wiltshire, *Introduction to the Study and Collection of Ancient Prints* (1874); F. Wedmore, *Fine Prints* (1897). See also the lists of works given under the separate headings for LINE-ENGRAVING, ETCHING, MEZZOTINT and WOOD-ENGRAVING.

ENGROSSING, a term used in two legal senses: (1) the writing or copying of a legal or other document in a fair large hand (*en gros*), and (2) the buying up of goods wholesale in order to sell at a higher price so as to establish a monopoly. The word "engross" has come into English ultimately from the Late Lat. *grossus*, thick, stout, large, through the A. Fr. *engrosser*, Med. Lat. *ingrossare*, to write in a large hand, and the French phrase *en gros*, in gross, wholesale. Engrossing and the kindred practices of forestalling and regrating were early regarded as serious offences in restraint of trade, and were punishable both at common law and by statute. They were of more particular importance in relation to the distribution of corn supplies. The statute of 1552 defines engrossing as "buying corn growing, or any other corn, grain, butter, cheese, fish or other dead victual, with *intent to sell the same again*." The law forbade all dealing in corn as an article of ordinary merchandise, apart from questions of foreign import or export. The theory was that when corn was plentiful in any district it should be consumed at what it would bring, without much respect to whether the next harvest might be equally abundant, or to what the immediate wants of an adjoining province of the same country might be. The first statute on the subject appears to have been passed in the reign of Henry III., though the general policy had prevailed before that time both in popular prejudice and in the feudal custom. The statute of Edward VI. (1552) was the most important, and in it the offences were elaborately defined; by this statute any one who bought corn to sell it again was made liable to two months' imprisonment with forfeit of the corn. A second offence was punished by six months' imprisonment and forfeit of double the value of the corn, and a third by the pillory and utter ruin. Severe as this statute was, liberty was given by it to transport corn from one part of the country under licence to men of approved probity, which implied that there was to be some buying of corn to sell it again and elsewhere. Practically "engrossing" came to be considered buying wholesale to sell again wholesale. "Forestalling" was different, and the statutes were directed against a class of dealers who went forward and bought or contracted for corn and other provisions, and spread false rumours in derogation of the public and open markets appointed by law, to which our ancestors appear to have attached much importance, and probably in these times not without reason. The statute of Edward VI. was modified by many subsequent enactments, particularly by the statute of 1663, by which it was declared that there could be no "engrossing" of corn when the price did not exceed 48s. per quarter, and which Adam Smith recognized, though it adhered to the variable and unsatisfactory element of price, as having contributed more to the progress of agriculture than any previous law in the statute book. In 1773 these injurious statutes were abolished, but the penal character of "engrossing" and "forestalling" had a root in the common law of England, as well as in the popular prejudice, which kept the evil alive to a later period. As the public enlightenment increased the judges were at no loss to give interpretations of the common law consistent with public policy. Subsequent to the act of 1773, for example, there was a case of conviction and punishment for engrossing hops, *R.* v. *Waddington*, 1800, 1 East, 143, but though this was deemed a sound and proper judgment at the time, yet it was soon afterwards overthrown in other cases, on the ground that buying wholesale to sell wholesale was not in "restraint of trade" as the former judges had assumed.

In 1800, one John Rusby was indicted for having bought ninety quarters of oats at 41s. per quarter and selling thirty of them at 43s. the same day. Lord Kenyon, the presiding judge, animadverted strongly against the repealing act of 1773, and addressed the jury strongly against the accused. Rusby was heavily fined, but, on appeal, the court was equally divided as to whether engrossing, forestalling and regrating were still offences at common law. In 1844, all the statutes, English, Irish and Scottish, defining the offences, were repealed and with them the supposed common law foundation. In the United States there have been strong endeavours by the government to suppress trusts and combinations for engrossing. (See also TRUSTS; MONOPOLY.)

AUTHORITIES.—D. Macpherson, *Annals of Commerce* (1805); J. S. Girdler, *Observations on Forestalling, Regrating and Ingrossing* (1800); W. Cunningham, *Growth of English Industry and Commerce*; W. J. Ashley, *Economic History*; Sir J. Stephen, *History of Criminal Law*; Murray, *New English Dictionary*.

ENGYON, an ancient town of the interior of Sicily, a Cretan colony, according to legend, and famous for an ancient temple of the Matres which aroused the greed of Verres. Its site is uncertain; some topographers have identified it with Gangi, a town 20 m. S.S.E. of Cefalu, but only on the ground of the similarity of the two names.

See C. Hülsen in Pauly-Wissowa, *Realencyclopädie*, v. 2568.

ENID, a city and the county-seat of Garfield county, Oklahoma, U.S.A., about 55 m. N.W. of Guthrie. Pop. (1900) 3444; (1907) 10,087 (355 of negro descent); (1910) 13,799. Enid is served by the St Louis & San Francisco, the Atchison, Topeka & Santa Fé, and the Chicago, Rock Island & Pacific railways, and by several branch lines, and is an important railway centre. It is the seat of the Oklahoma Christian University (1907; co-educational). Enid is situated in a flourishing agricultural and stock-raising region, of which it is the commercial centre, and has various manufactures, including lumber, brick, tile and flour. Natural gas was discovered near the city in 1907. Enid was founded in 1893 and was chartered as a city in the same year.

ENIGMA (Gr. *αἴνιγμα*), a riddle or puzzle, especially a form of verse or prose composition in which the answer is concealed by means of metaphors. Such were the famous riddle of the Sphinx and the riddling answers of the ancient oracles. The composition of enigmas was a favourite amusement in Greece and prizes were often given at banquets for the best solution of them (Athen. x. 457). In France during the 17th century enigma-making became fashionable. Boileau, Charles Rivière Dufresny and J. J. Rousseau did not consider it beneath their literary dignity. In 1646 the abbé Charles Cotier (1604–1682) published a *Recueil des énigmes de ce temps*. The word is applied figuratively to anything inexplicable or difficult of understanding.

ENKHUIZEN, a seaport of Holland in the province of North Holland, on the Zuider Zee, and a railway terminus, 11½ m. N.E. by E. of Hoorn, with which it is also connected by steam tramway. In conjunction with the railway service there is a steamboat ferry to Stavoren in Friesland. Pop. (1900) 6865. Enkhuizen, like its neighbour Hoorn, exhibits many interesting examples of domestic architecture dating from the 16th and 17th centuries, when it was an important and flourishing city. The façades of the houses are usually built in courses of brick and stone, and adorned with carvings, sculptures and inscriptions. Some ruined gateways belonging to the old city walls are still standing; among them being the tower-gateway called the Dromedary (1540), which overlooks the harbour. The tower contains several rooms, one of which was formerly used as a prison. Among the churches mention must be made of the Zuiderkerk, or South church, with a conspicuous tower (1450–1525); and the Westerkerk, or West church, which possesses a beautifully carved Renaissance screen and pulpit of the middle of the 16th century, and a quaint wooden bell-house (1519) built for use before the completion of the bell-tower. There are also a Roman Catholic church and a synagogue. The picturesque town hall (1688) contains some finely decorated rooms with paintings by Johan van Neck, a collection of local antiquities and the archives. Other interesting buildings are the orphanage (1616), containing some 17th and 18th century portraits and ancient leather hangings; the weigh-house (1559), the upper story of which was once used by the Surgeons' Gild, several of the window-panes (dating chiefly from about 1640), being decorated with the arms of various members; the former mint (1611); and the ancient assembly-house of the dike-reeves of Holland and West Friesland. Enkhuizen possesses a considerable fishing fleet and has some shipbuilding and rope-making, as well as market traffic.

ENNEKING, JOHN JOSEPH (1841–), American landscape painter, was born, of German ancestry, in Minster, Ohio, on the 4th of October 1841. He was educated at Mount St Mary's College, Cincinnati, served in the American Civil War in 1861–1862, studied art in New York and Boston, and gave it up because his eyes were weak, only to return to it after failing in the manufacture of tinware. In 1873–1876 he studied in Munich under Schleich and Leier, and in Paris under Daubigny and Bonnat; and in 1878–1879 he studied in Paris again and sketched in Holland. Enneking is a "plein-airist," and his favourite subject is the "November twilight" of New England, and more generally the half lights of early spring, late autumn, and winter dawn and evening.

ENNIS (Gaelic, *Inis*, an island; Irish, *Ennis* and *Inish*), the county town of Co. Clare, Ireland, in the east parliamentary division, on the river Fergus, 25 m. W.N.W. from Limerick by the Great Southern & Western railway. Pop. of urban district (1901) 5093. It is the junction for the West Clare line. Ennis has breweries, distilleries and extensive flour-mills; and in the neighbourhood limestone is quarried. The principal buildings are the Roman Catholic church, which is the pro-cathedral of the diocese of Killaloe; the parish church formed out of the ruins of the Franciscan Abbey, founded in 1240 by Donough Carbrac O'Brien; a school on the foundation of Erasmus Smith, and various county buildings. The abbey, though greatly mutilated, is full of interesting details, and includes a lofty tower, a marble screen, a chapter-house, a notable east window, several fine tombs and an altar of St Francis. On the site of the old court-house a colossal statue in white limestone of Daniel O'Connell was erected in 1865. The interesting ruins of Clare Abbey, founded in 1194 by Donnell O'Brien, king of Munster, are half-way between Ennis and the village of Clare Castle. O'Brien also founded Killone Abbey, beautifully situated on the lough of the same name, 3 m. S. of the town, possessing the unusual feature of a crypt and a holy well. Five miles N.W. of Ennis is Dysert O'Dea, with interesting ecclesiastical remains, a cross, a round tower and a castle. Ennis was incorporated in 1612, and returned two members to the Irish parliament until the Union, and thereafter one to the Imperial parliament until 1885.

ENNISCORTHY, a market town of Co. Wexford, Ireland, in the north parliamentary division, on the side of a steep hill above the Slaney, which here becomes navigable for barges of large size. Pop. of urban district (1901) 5458. It is 77½ m. S. by W. from Dublin by the Dublin & South-Eastern railway. There are breweries and flour-mills; tanning, distilling and woollen manufactures are also prosecuted to some extent, and the town is the centre of the agricultural trade for the district, which is aided by the water communication with Wexford. There are important fowl markets and horse-fairs. Enniscorthy was taken by Cromwell in 1649, and in 1798 was stormed and burned by the rebels, whose main forces encamped on an eminence called Vinegar Hill, which overlooks the town from the east. The old castle of Enniscorthy, a massive square pile with a round tower at each corner, is one of the earliest military structures of the Anglo-Norman invaders, founded by Raymond le Gros (1176). Ferns, the next station to Enniscorthy on the railway towards Dublin, was the seat of a former bishopric, and the modernized cathedral, and ruins of a church, an Augustinian monastery founded by Dermod Mac-Morrough about 1160, and a castle of the Norman period, are still to be seen. Enniscorthy was incorporated by James I., and sent two members to the Irish parliament until the Union.

ENNISKILLEN, WILLIAM WILLOUGHBY COLE, 3RD EARL OF (1807–1886), British palaeontologist, was born on the 25th of January 1807, and educated at Harrow and Christ Church, Oxford. As Lord Cole he early began to devote his leisure to the study and collection of fossil fishes, with his friend Sir Philip de M. G. Egerton, and he amassed a fine collection at Florence Court, Enniskillen—including many specimens that were described and figured by Agassiz and Egerton. This collection was subsequently acquired by the British Museum. He died on the 21st of November 1886, being succeeded by his son (b. 1845) as 4th earl.

The first of the Coles (an old Devonshire and Cornwall family) to settle in Ireland was Sir William Cole (d. 1653), who was "undertaker" of the northern plantation and received a grant of a large property in Fermanagh in 1611, and became provost and later governor of Enniskillen. In 1760 his descendant John Cole (d. 1767) was created Baron Mountflorence, and the latter's son, William Willoughby Cole (1736–1803), was in 1776 created Viscount Enniskillen and in 1789 earl. The 1st earl's second son, Sir Galbraith Lowry Cole (1772–1842), was a prominent general in the Peninsular War, and colonel of the 27th Inniskillings, the Irish regiment with whose name the family was associated.

ENNISKILLEN [INNISKILLING], a market town and the county town of county Fermanagh, Ireland, in the north parliamentary division, picturesquely situated on an island in the river connecting the upper and lower loughs Erne, 116 m. N.W. from Dublin by the Great Northern railway. Pop. of urban district (1901) 5412. The town occupies the whole island, and is connected with two suburbs on the mainland on each side by two bridges. It has a brewery, tanneries and a small manufactory of cutlery, and a considerable trade in corn, pork and flax. In 1689 Enniskillen defeated a superior force sent against it by James II. at the battle of Crom; and part of the defenders of the town were subsequently formed into a regiment of cavalry, which still retains the name of the Inniskilling Dragoons. The town was incorporated by James I., and returned two members to the Irish parliament until the Union; thereafter it returned one to the Imperial parliament until 1885. There are wide communications by water by the river and the upper and lower loughs Erne, and by the Ulster canal to Belfast. The loughs contain trout, large pike and other coarse fish. Two miles from Enniskillen in the lower lough is Devenish Island, with its celebrated monastic remains. The abbey of St Mary here was founded by St Molaise (Laserian) in the 6th century; here too are a fine round tower 85 ft. high, remains of domestic buildings, a holed stone and a tall well-preserved cross. The whole is carefully preserved by the commissioners of public works under the Irish Church Act of 1869. Steamers ply between Enniskillen and Belleek on the lower lake, and between Enniskillen and Knockninny on the upper lake.

ENNIUS, QUINTUS (239–170 B.C.), ancient Latin poet, was born at Rudiae in Calabria. Familiar with Greek as the language in common use among the cultivated classes of his district, and with Oscan, the prevailing dialect of lower Italy, he further acquired a knowledge of Latin; to use his own expression (Gellius xvii. 17), he had three "hearts" (*corda*), the Latin word being used to signify the seat of intelligence. He is said (Servius on *Aen.* vii. 691) to have claimed descent from one of the legendary kings of his native district, Messapus the eponymous hero of Messapia, and this consciousness of ancient lineage is in accordance with the high self-confident tone of his mind, with his sympathy with the dominant genius of the Roman republic, and with his personal relations to the members of her great families. Of his early years nothing is directly known, and we first hear of him in middle life as serving during the Second Punic War, with the rank of centurion, in Sardinia, in the year 204, where he attracted the attention of Cato the elder, and was taken by him to Rome in the same year. Here he taught Greek and adapted Greek plays for a livelihood, and by his poetical compositions gained the friendship of the greatest men in Rome. Amongst these were the elder Scipio and Fulvius Nobilior, whom he accompanied on his Aetolian campaign (189). Through the influence of Nobilior's son, Ennius subsequently obtained the privilege of Roman citizenship (Cicero, *Brutus*, 20. 79). He lived plainly and simply on the Aventine with the poet Caecilius Statius. He died at the age of 70, immediately after producing his tragedy *Thyestes*. In the last book of his epic poem, in which he seems to have given various details of his personal history, he mentions that he was in his 67th year at the date of its composition. He compared himself, in contemplation of the close of the great work of his life, to a gallant horse which, after having often won the prize at the Olympic games, obtained his rest when weary with age. A similar feeling of pride at the completion of a great career is expressed in the memorial lines which he composed to be placed under his bust after death,—"Let no one weep for me, or celebrate my funeral with mourning; for I still live, as I pass to and fro through the mouths of men." From the impression stamped on his remains, and from the testimony of his countrymen, we think of him as a man of a robust, sagacious and cheerful nature (Hor. *Epp.* ii. 1. 50; Cic. *De sen.* 5); of great industry and versatility; combining imaginative enthusiasm and a vein of religious mysticism with a sceptical indifference to popular beliefs and a scorn of religious imposture; and tempering the grave seriousness of a Roman with a genial capacity for enjoyment (Hor. *Epp.* i. 19. 7).

Till the appearance of Ennius, Roman literature, although it had produced the epic poem of Naevius and some adaptations of Greek tragedy, had been most successful in comedy. Naevius and Plautus were men of thoroughly popular fibre. Naevius suffered for his attacks on members of the aristocracy, and, although Plautus carefully avoids any direct notice of public matters, yet the bias of his sympathies is indicated in several passages of his extant plays. Ennius, on the other hand, was by temperament in thorough sympathy with the dominant aristocratic element in Roman life and institutions. Under his influence literature became less suited to the popular taste, more especially addressed to a limited and cultivated class, but at the same time more truly expressive of what was greatest and most worthy to endure in the national sentiment and traditions. He was a man of many-sided activity. He devoted attention to questions of Latin orthography, and is said to have been the first to introduce shorthand writing in Latin. He attempted comedy, but with so little success that in the canon of Volcacius Sedigitus he is mentioned, solely as a mark of respect "for his antiquity," tenth and last in the list of comic poets. He may be regarded also as the inventor of Roman satire, in its original sense of a "medley" or "miscellany," although it was by Lucilius that the character of aggressive and censorious criticism of men and manners was first imparted to that form of literature. The word *satura* was originally applied to a rude scenic and musical performance, exhibited at Rome before the introduction of the regular drama. The *saturae* of Ennius were collections of writings on various subjects, written in various metres and contained in four (or six) books. Among these were included metrical versions of the physical speculations of Epicharmus, of the gastronomic researches of Archestratus of Gela (*Hedyphagetica*), and, probably, of the rationalistic doctrines of Euhemerus. It may be noticed that all these writers whose works were thus introduced to the Romans were Sicilian Greeks. Original compositions were also contained in these *saturae*, and among them the panegyric on Scipio, unless this was a drama. The satire of Ennius seems to have resembled the more artistic satire of Horace in its record of personal experiences, in the occasional introduction of dialogue, in the use made of fables with a moral application, and in the didactic office which it assumed.

But the chief distinction of Ennius was gained in tragic and narrative poetry. He was the first to impart to the Roman adaptations of Greek tragedy the masculine dignity, pathos and oratorical fervour which continued to animate them in the hands of Pacuvius and Accius, and, when set off by the acting of Aesopus, called forth vehement applause in the age of Cicero. The titles of about twenty-five of his tragedies are known to us, and a considerable number of fragments, varying in length from a few words to about fifteen lines, have been preserved. These tragedies were for the most part adaptations and, in some cases, translations from Euripides. One or two were original dramas, of the class called *praetextae*, *i.e.* dramas founded on Roman history or legend; thus, the *Ambracia* treated of the capture of that city by his patron Nobilior, the *Sabinae* of the rape of the Sabine women. The heroes and heroines of the Trojan cycle, such as Achilles, Ajax, Telamon, Cassandra, Andromache, were prominent figures in some of the dramas adapted from the Greek. Several of the more important fragments are found in Cicero, who expresses a great admiration for their manly fortitude and dignified pathos. In these remains of the tragedies of Ennius we can trace indications of strong sympathy with the nobler and bolder elements of character, of vivid realization of impassioned situations, and of sagacious observation of life. The frank bearing, fortitude and self-sacrificing heroism of the best type of the soldierly character find expression in the persons of Achilles, Telamon and Eurypylus; and a dignified and passionate tenderness of feeling makes itself heard in the lyrical utterances of Cassandra and Andromache. The language is generally nervous and vigorous, occasionally vivified with imaginative energy. But it flows less smoothly and easily than that of the dialogue of Latin comedy. It shows the same tendency to aim at effect by alliterations, assonances and plays on words. The rudeness of early art is most apparent in the inequality of the metres in which both the dialogue and the "recitative" are composed.

But the work which gained him his reputation as the Homer of Rome, and which called forth the admiration of Cicero and Lucretius and frequent imitation from Virgil, was the *Annales*, a long narrative poem in eighteen books, containing the record of the national story from mythical times to his own. Although the whole conception of the work implies that confusion of the provinces of poetry and history which was perpetuated by later writers, and especially by Lucan and Silius Italicus, yet it was a true instinct of genius to discern in the idea of the national destiny the only possible motive of a Roman epic. The execution of the poem (to judge from the fragments, amounting to about six hundred lines), although rough, unequal and often prosaic, seems to have combined the realistic fidelity and freshness of feeling of a contemporary chronicle with the vivifying and idealizing power of genius. Ennius prided himself especially on being the first to form the strong speech of Latium into the mould of the Homeric hexameter in place of the old Saturnian metre. And although it took several generations of poets to beat their music out to the perfection of the Virgilian cadences, yet in the rude adaptation of Ennius the secret of what ultimately became one of the grandest organs of literary expression was first discovered and revealed. The inspiring idea of the poem was accepted, purified of all alien material, and realized in artistic shape by Virgil in his national epic. He deliberately imparted to that poem the charm of antique associations by incorporating with it much of the phraseology and sentiment of Ennius. The occasional references to Roman history in Lucretius are evidently reminiscences of the *Annales*. He as well as Cicero speaks of him with pride and affection as "Ennius noster." Of the great Roman writers Horace had least sympathy with him; yet he testifies to the high esteem in which he was held during the Augustan age. Ovid expresses the grounds of that esteem when he characterizes him as

> "Ingenio maximus, arte rudis."

A sentence of Quintilian expresses the feeling of reverence for his genius and character, mixed with distaste for his rude workmanship, with which the Romans of the early empire regarded him: "Let us revere Ennius as we revere the sacred groves, hallowed by antiquity, whose massive and venerable oak trees are not so remarkable for beauty as for the religious awe which they inspire" (*Inst. or* x. 1. 88).

Editions of the fragments by L. Müller (1884), L. Valmaggi (1900, with notes), J. Vahlen (1903); monographs by L. Müller (1884 and 1893). C. Pascal, *Studi sugli scrittori Latini* (1900); see also Mommsen, *History of Rome*, bk. iii. ch. 14. On Virgil's indebtedness to Ennius see V. Crivellari, *Quae praecipue hausit Vergilius ex Naevio et Ennio* (1889).

ENNODIUS, MAGNUS FELIX (A.D. 474–521), bishop of Pavia, Latin rhetorician and poet. He was born at Arelate (Arles) and belonged to a distinguished but impecunious family. Having lost his parents at an early age, he was brought up by an aunt at Ticinum (Pavia); according to some, at Mediolanum (Milan). After her death he was received into the family of a pious and wealthy young lady, to whom he was betrothed. It is not certain whether he actually married this lady; she seems to have lost her money and retired to a convent, whereupon Ennodius entered the Church, and was ordained deacon (about 493) by Epiphanius, bishop of Pavia. From Pavia he went to Milan, where he continued to reside until his elevation to the see of Pavia about 515. During his stay at Milan he visited Rome and other places, where he gained a reputation as a teacher of rhetoric. As bishop of Pavia he played a considerable part in ecclesiastical affairs. On two occasions (in 515 and 517) he was sent to Constantinople by Theodoric on an embassy to the emperor Anastasius, to endeavour to bring about a reconciliation between the Eastern and Western churches. He died on the 17th of July 521; his epitaph still exists in the basilica of St Michael at Pavia (*Corpus Inscriptionum Latinarum*, v. pt. ii. No. 6464).

Ennodius is one of the best representatives of the twofold (pagan and Christian) tendency of 5th-century literature, and of the Gallo-Roman clergy who upheld the cause of civilization and classical literature against the inroads of barbarism. But his anxiety not to fall behind his classical models—the chief of whom was Virgil—his striving after elegance and grammatical correctness, and a desire to avoid the commonplace have produced a turgid and affected style, which, aggravated by rhetorical exaggerations and popular barbarisms, makes his works difficult to understand. It has been remarked that his poetry is less unintelligible than his prose.

The numerous writings of this versatile ecclesiastic may be divided into (1) letters, (2) miscellanies, (3) discourses, (4) poems. The letters on a variety of subjects, addressed to high church and state officials, are valuable for the religious and political history of the period. Of the miscellanies, the most important are. *The Panegyric of Theodoric*, written to thank the Arian prince for his tolerance of Catholicism and support of Pope Symmachus (probably delivered before the king on the occasion of his entry into Ravenna or Milan); like all similar works, it is full of flattery and exaggeration, but if used with caution is a valuable authority; *The Life of St Epiphanius*, bishop of Pavia, the best written and perhaps the most important of all his writings, an interesting picture of the political activity and influence of the church; *Eucharisticon de Vita Sua*, a sort of "confessions," after the manner of St Augustine; the description of the enfranchisement of a slave with religious formalities in the presence of a bishop; *Paraenesis didascalica*, an educational guide, in which the claims of grammar as a preparation for the study of rhetoric, the mother of all the sciences, are strongly insisted on. The discourses (*Dictiones*) are sacred, scholastic, controversial and ethical. The discourse on the anniversary of Laurentius, bishop of Milan, is the chief authority for the life of that prelate; the scholastic discourses, rhetorical exercises for the schools, contain eulogies of classical learning, distinguished professors and pupils; the controversial deal with imaginary charges, the subjects being chiefly borrowed from the *Controversiae* of the elder Seneca; the ethical harangues are put into the mouth of mythological personages (*e.g.* the speech of Thetis over the body of Achilles). Amongst the poems mention may be made of two *Itineraria*, descriptions of a journey from Milan to Brigantium (Briançon) and of a trip on the Po; an apology for the study of profane literature; an epithalamium, in which Love is introduced as execrating Christianity; a dozen hymns, after the manner of St Ambrose, probably intended for church use; epigrams on various subjects, some being epigrams proper—inscriptions for tombs, basilicas, baptisteries—others imitations of Martial, satiric pieces and descriptions of scenery.

There are two excellent editions of Ennodius by G. Hartel (vol. vi. of *Corpus scriptorum ecclesiasticorum Latinorum*, Vienna, 1882) and F Vogel (vol. vii. of *Monumenta Germaniae historica*, 1885, with exhaustive prolegomena). On Ennodius generally consult M. Fertig, *Ennodius und seine Zeit* (1855–1860); A. Dubois, *La Latinité d'Ennodius* (1903); F. Magani, *Ennodio* (Pavia, 1886); A. Ebert, *Allgemeine Geschichte der Litt. des Mittelalters im Abendlande*, i. (1889); M. Manitius, *Geschichte der christlich-lateinischen Poesie* (1891); Teuffel, *Hist. of Roman Literature*, § 479 (Eng. tr., 1892). French translation by the abbé S. Léglise (Paris, 1906 foll.).

ENNS, a town of Austria, in upper Austria, 11 m. by rail S.E. of Linz. Pop. (1900) 4371. It is situated on the Enns near its confluence with the Danube and possesses a 15th-century castle, an old Gothic church, and a town hall erected in 1565. Three miles to the S.W. lies the Augustinian monastery of St Florian, one of the oldest and largest religious houses of Austria. Founded in the 7th century, it was occupied by the Benedictines till the middle of the 11th century. It was established on a firm basis in 1071, when it passed into the hands of the Augustinians. The actual buildings, which are among the most magnificent in Austria, were constructed between 1686 and 1745. Its library, with over 70,000 volumes, contains valuable manuscripts and also a fine collection of coins. Enns is one of the oldest towns in Austria, and stands near the site of the Roman *Laureacum*. The nucleus of the actual town was formed by a castle, called Anasiburg or Anesburg, erected in 900 by the Bavarians as a post against the incursions of the Hungarians. It soon attained commercial prosperity, and by a charter of 1212 was made a free town. In 1275 it passed into the hands of Rudolph of Habsburg. An encounter between the French and the Austrian troops took place here on the 5th of November 1805.

ENOCH (חֲנוֹךְ, חֲנֹךְ, Hănōkh, Teaching or Dedication). (1) In Gen. iv. 17, 18 (J), the eldest son of Cain, born while Cain was building a city, which he named after Enoch; nothing is known of the city. (2) In Gen. v. 24, &c. (P), *seventh* in descent from Adam in the line of Seth; he "walked with God," and after 365 years "was not for God took him." [(1) and (2) are often regarded as both corruptions of the *seventh* primitive king Evedorachos (Enmeduranki in cuneiform inscriptions), the two genealogies, Gen. iv. 16-24, v. 12-17, being variant forms of the Babylonian list of primitive kings. Enmeduranki is the favourite of the sun-god, cf. Enoch's 365 years.[1]] Heb. xi. 5 says Enoch "was not found, because God *translated* him." Later Jewish legends represented him as receiving revelations on astronomy, &c., and as the first author; apparently following the Babylonian account which makes Enmeduranki receive instruction in all wisdom from the sun-god.[1] Two apocryphal works written in the name of Enoch are extant, the *Book of Enoch*, compiled from documents written 200–50 B.C., quoted as the work of Enoch, Jude 14 and 15; and the *Book of the Secrets of Enoch*, A.D. 1–50. Cf. 1 Chron. i. 3; Luke iii. 37; Wisdom iv. 7-14; Ecclus. xliv. 16, xlix. 14. (3) Son, *i.e.* clan, of Midian, in Gen. xxv. 4; 1 Chron. i. 33. (4) Son, *i.e.* clan, of Reuben, E. V. *Hanoch*, *Henoch*, in Gen. xlvi. 9; Exod. vi. 14; Num. xxvi. 5; 1 Chron. v. 3. There may have been some historical connexion between these two clans with identical names.

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[1] Eberhard Schrader, *Die Keilinschriften und das A.T.*, 3rd ed., pp. 540 f.

ENOCH, BOOK OF. The *Book of Enoch*, or, as it is sometimes called, the *Ethiopic Book of Enoch*, in contradistinction to the *Slavonic Book of Enoch* (see later), is perhaps the most important of all the apocryphal or pseudapocryphal Biblical writings for the history of religious thought. It is not the work of a single author, but rather a conglomerate of literary fragments which once circulated under the names of Enoch, Noah and possibly Methuselah. In the *Book of the Secrets of Enoch* we have additional portions of this literature. As the former work is derived from a variety of Pharisaic writers in Palestine, so the latter in its present form was written for the most part by Hellenistic Jews in Egypt.

The *Book of Enoch* was written in the second and first centuries B.C. It was well known to many of the writers of the New Testament, and in many instances influenced their thought and diction. Thus it is quoted by name as a genuine production of Enoch in the Epistle of Jude, 14 sq., and it lies at the base of Matt. xix. 28 and John v. 22, 27, and many other passages. It had also a vast indirect influence on the Palestinian literature of the 1st century of our era. Like the Pentateuch, the Psalms, the Megilloth, the Pirke Aboth, this work was divided into five parts, with the critical discussion of which we shall deal below. With the earlier Fathers and Apologists it had all the weight of a canonical book, but towards the close of the 3rd and the beginning of the 4th century it began to be discredited, and finally fell under the ban of the Church. Almost the latest reference to it in the early church is made by George Syncellus in his Chronography about A.D. 800. The book was then lost sight of till 1773, when Bruce discovered the Ethiopic version in Abyssinia.

Original Language.—That the *Book of Enoch* was written in Semitic is now accepted on all hands, but scholars are divided as to whether the Semitic language in question was Hebrew or Aramaic. Only one valuable contribution on this question has been made, and that by Halévy in the *Journal Asiatique*, Avril-Mai 1867, pp. 352-395. This scholar is of opinion that the entire work was written in Hebrew. Since this publication, however, fresh evidence bearing on the question has been discovered in the Greek fragment (i.-xxxii.) found in Egypt. Since this fragment contains three Aramaic words transliterated in the Greek, some scholars, and among them Schürer, Lévi and N. Schmidt, have concluded that not only are chapters i.-xxxvi. derived from an Aramaic original, but also the remainder of the book. In support of the latter statement no evidence has yet been offered by these or any other scholars, nor yet has there been any attempt to meet the positive arguments of Halévy for a Hebrew original of xxxvii.-civ., whose Hebrew reconstructions of the text have been and must be adopted in many cases by every editor and translator of the book. A prolonged study of the text, which has brought to light a multitude of fresh passages the majority of which can be explained by retranslation into Hebrew, has convinced the present writer[1] that, whilst the evidence on the whole is in favour of an Aramaic original of vi.-xxxvi., it is just as conclusive on behalf of the Hebrew original of the greater part of the rest of the book.

Versions—Greek, Latin and Ethiopic.—The Semitic original was translated into Greek. It is not improbable that there were two distinct Greek versions. Of the one, several fragments have been preserved in Syncellus (A.D. 800), vi.–x. 14, viii. 4–ix. 4, xv. 8–xvi. 1; of the other, i.-xxxii. in the Giza Greek fragment discovered in Egypt and published by Bouriant (*Fragments grecs du livre d'Enoch*), in 1892, and subsequently by Lods, Dillmann, Charles (*Book of Enoch*, 318 sqq.), Swete, and finally by Radermacher and Charles (*Ethiopic Text*, 3-75). In addition to these fragments there is that of lxxxix. 42-49 (see Gildemeister in the *ZDMG*, 1855, pp. 621-624, and Charles, *Ethiopic Text*, pp. 175-177). Of the Latin version only i. 9 survives, being preserved in the Pseudo-Cyprian's *Ad Novatianum*, and cvi. 1-18 discovered by James in an 8th-century MS. of the British Museum (see James, *Apoc. anecdota*, 146-150; Charles, *op. cit.* 219-222). This version is made from the Greek.

The Ethiopic version, which alone preserves the entire text, is a very faithful translation of the Greek. Twenty-eight MSS. of this version are in the different libraries of Europe, of which fifteen are to be found in England. This version was made from an ancestor of the Greek fragment discovered at Giza. Some of the utterly unintelligible passages in this fragment are literally reproduced in the Ethiopic. The same wrong order of the text in vii.-viii. is common to both. In order to recover the original text, it is from time to time necessary to retranslate the Ethiopic into Greek, and the latter in turn into Aramaic or Hebrew. By this means we are able to detect dittographies in the Greek and variants in the original Semitic. The original was written to a large extent in verse. The discovery of this fact is most helpful in the criticism of the text. This version was first edited by Laurence in 1838 from one MS., in 1851 by Dillmann from five, in 1902 by Flemming from fifteen MSS., and in 1906 by the present writer from twenty-three.

Translations and Commentaries.—Laurence, *The Book of Enoch* (Oxford, 1821); Dillmann, *Das Buch Henoch* (1853); Schodde, *The Book of Enoch* (1882); Charles, *The Book of Enoch* (1893); Beer, "Das Buch Henoch," in Kautzsch's *Apok. u. Pseud. des A.T.* (1900), ii. 217-310; Flemming and Radermacher, *Das Buch Henoch* (1901); Martin, *Le Livre d' Henoch* (1906). *Critical Inquiries.*—The bibliography will be found in Schürer, *Gesch. d. jüdischen Volkes*^{3}, iii. 207-209, and a short critical account of the most important of these in Charles, *op. cit.* pp. 9-21.

The different Elements in the Book, with their respective Characteristics and Dates.—We have remarked above that the *Book of Enoch* is divided into five parts—i.-xxxvi., xxxvii.-lxxi., lxxii.-lxxxii., lxxxiii.-xc., xci-cviii. Some of these parts constituted originally separate treatises. In the course of their reduction and incorporation into a single work they suffered much mutilation and loss. From an early date the compositeness of this work was recognized. Scholars have varied greatly in their critical analyses of the work (see Charles, *op. cit.* 6-21, 309-311). The analysis which gained most acceptation was that of Dillmann (Herzog's *Realencyk.*^{3} xii. 350-352), according to whom the present books consist of—(1) the groundwork, *i.e.* i.-xxxvi., lxxii.-cv., written in the time of John Hyrcanus; (2) xxxvii.-lxxi., xvii.-xix., before 64 B.C.; (3) the Noachic fragments, vi. 3-8, viii. 1-3, ix. 7, x. 1, 11, xx., xxxix. 1, *2a*, liv. 7–lv. 2, lx., lxv.-lxix. 25, cvi.-cvii.; and (4) cviii., from a later hand. With much of this analysis there is no reason to disagree. The similitudes are undoubtedly of different authorship from the rest of the book, and certain portions of the book are derived from the *Book of Noah*. On the other hand, the so-called groundwork has no existence unless in the minds of earlier critics and some of their belated followers in the present. It springs from at least four hands, and may be roughly divided into four parts, corresponding to the present actual divisions of the book.

A new critical analysis of the book based on this view was given by Charles (*op. cit.* pp. 24-33), and further developed by Clemen and Beer. The analysis of the latter (see Herzog, *Realencyk.*^{3} xiv. 240) is very complex. The book, according to this scholar, is composed of the following separate elements from the Enoch tradition:—(1) Ch. i.-v.; (2) xii-xvi.; (3) xvii.-xix.; (4) xx.-xxxvi.; (5) xxxvii.-lxix. (from diverse sources); (6) lxx.-lxxi.; (7) lxxii.-lxxxii.; (8) lxxxiii.-lxxxiv.; (9) lxxxv.-xc.; (10) xciii., cxi. 12-17; (11) xci. 1-11, 18, 19, xcii., xciv.-cv.; (12) cviii., and from the Noah tradition; (13) vi.-xi.; (14) xxxix. 1-*2a*, liv. 7–lv. 2, lx., lxv.-lxix. 25; (15) cvi.-cvii. Thus while Clemen finds eleven separate sources, Beer finds fifteen. A fresh study from the hand of Appel (*Die Composition des äthiopischen Henochbuchs*, 1906) seeks to reach a final analysis of our book. But though it evinces considerable insight, it cannot escape the charge of extravagance. The original book or ground-work of Enoch consisted of i.-xvi., xx.-xxxvi. This work called forth a host of imitators, and a number of their writings, together with the groundwork, were edited as a Book of Methuselah, *i.e.* lxxii.-cv. Then came the final redactor, who interpolated the groundwork and the Methuselah sections, adding two others from his own pen. The Similitudes he worked up from a series of later sources, and gave them the second place in the final work authenticating them with the name of Noah. The date of the publication of the entire work Appel assigns to the years immediately following the death of Herod.

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[1] The evidence is given at length in R. H. Charles' *Ethiopic Text of Enoch*, pp. xxvii-xxxiii.

We shall now give an analysis of the book, with the dates of the various sections where possible. Of these we shall deal with the easiest first. *Chap. lxxii.-lxxxii.* constitutes a work in itself, the writer of which had very different objects before him from the writers of the rest of the book. His sole aim is to give the law of the heavenly bodies. His work has suffered disarrangements and interpolations at the hands of the editor of the whole work. Thus lxxvi.-lxxvii., which are concerned with the winds, the quarters of the heaven, and certain geographical matters, and lxxxi., which is concerned wholly with ethical matters, are foreign to a work which professes in its title (lxxii. 1) to deal only with the luminaries of the heaven and their laws. Finally, lxxxii. should stand before lxxix.; for the opening words of the latter suppose it to be already read. The date of this section can be partially established, for it was known to the author of Jubilees, and was therefore written before the last third of the 2nd century B.C.

Chaps. lxxxiii.-xc.—This section was written before 161 B.C., for "the great horn," who is Judas the Maccabee, was still warring when the author was writing. (Dillmann, Schürer and others take the great horn to be John Hyrcanus, but this interpretation does violence to the text.) These chapters recount three visions: the first two deal with the first-world judgment; the third with the entire history of the world till the final judgment. An eternal Messianic kingdom at the close of the judgment is to be established under the Messiah, with its centre in the New Jerusalem set up by God Himself.

Chaps. xci.-civ.—In the preceding section the Maccabees were the religious champions of the nation and the friends of the Hasidim. Here they are leagued with the Sadducees, and are the declared foes of the Pharisaic party. This section was written therefore after 134 B.C., when the breach between John Hyrcanus and the Pharisees took place and before the savage massacres of the latter by Jannaeus (95 B.C.); for it is not likely that in a book dealing with the sufferings of the Pharisees such a reference would be omitted. These chapters indicate a revolution in the religious hopes of the nation. An eternal Messianic kingdom is no longer anticipated, but only a temporary one, at the close of which the final judgment will ensue. The righteous dead rise not to this kingdom but to spiritual blessedness in heaven itself—to an immortality of the soul. This section also has suffered at the hands of the final editor. Thus xci. 12-17, which describe the last three weeks of the Ten-Weeks Apocalypse, should be read immediately after xciii. 1-10, which recount the first seven weeks of the same apocalypse. But, furthermore, the section obviously begins with xcii. "Written by Enoch the scribe," &c. Then comes xci. 1-10 as a natural sequel. The Ten-Weeks Apocalypse, xciii. 1-10, xci. 12-17, if it came from the same hand, followed, and then xciv. The attempt (by Clemen and Beer) to place the Ten-Weeks Apocalypse before 167, because it makes no reference to the Maccabees, is not successful; for where the history of mankind from Adam to the final judgment is despatched in sixteen verses, such an omission need cause little embarrassment, and still less if the author is the determined foe of the Maccabees, whom he would probably have stigmatized as apostates, if he had mentioned them at all, just as he similarly brands all the Sadducean priesthood that preceded them to the time of the captivity. This Ten-Weeks Apocalypse, therefore, we take to be the work of the writer of the rest of xci.-civ.

Chaps. i.-xxxvi.—This is the most difficult section of the book. It is very composite. Chaps. vi.-xi. is apparently an independent fragment of the Enoch Saga. It is itself compounded of the Semjaza and Azazel myths, and in its present composite form is already presupposed by lxxxviii.-lxxxix. 1; hence its present form is earlier than 166 B.C. It represents a primitive and very sensuous view of the eternal Messianic kingdom on earth, seeing that the righteous beget 1000 children before they die. These chapters appear to be from the Book of Noah; for they never refer to Enoch but to Noah only (x. 1). Moreover, when the author of Jubilees is clearly drawing on the Book of Noah, his subject-matter (vii. 21-25) agrees most closely with that of these chapters in Enoch (see Charles' edition of Jubilees, pp. lxxi. sq. 264). xii.-xvi., on the other hand, belong to the Book of Enoch. These represent for the most part what Enoch saw in a vision. Now whereas vi.-xvi. deal with the fall of the angels, their destruction of mankind, and the condemnation of the fallen angels, the subject-matter now suddenly changes and xvii.-xxxvi. treat of Enoch's journeyings through earth and heaven escorted by angels. Here undoubtedly we have a series of doublets; for xvii.-xix. stand in this relation to xx.-xxxvi., since both sections deal with the same subjects. Thus xvii. 4 = xxiii.: xvii. 6 = xxii.; xviii. 1 = xxxiv.-xxxvi.: xviii. 6-9 = xxiv.-xxv., xxxii. 1-2; xviii. 11, xix. = xxi. 7-10; xviii. 12-16 = xxi. 1-6. They belong to the same cycle of tradition and cannot be independent of each other. Chap. xx. appears to show that xx.-xxxvi. is fragmentary, since only four of the seven angels mentioned in xx. have anything to do in xxi.-xxxvi. Finally, i.-v. seems to be of a different date and authorship from the rest.

Chaps. xxxvii.-lxxi.—These constitute the well-known Similitudes. They were written before 64 B.C., for Rome was not yet known to the writer, and after 95 B.C., for the slaying of the righteous, of which the writer complains, was not perpetrated by the Maccabean princes before that date. This section consists of three similitudes—xxxviii.-xliv., xlv.-lvii., lviii.-lxix. These are introduced and concluded by xxxvii. and lxx. There are many interpolations—lx., lxv.-lxix. 25 confessedly from the Book of Noah; most probably also liv. 7-lv. 2. Whence others, such as xxxix. 1, 2a, xli. 3-8, xliii. sq., spring is doubtful. Chaps. 1, lvi. 5-lvii. 3a are likewise insertions.

In R. H. Charles's edition of Enoch, lxxi. was bracketed as an interpolation. The writer now sees that it belongs to the text of the Similitudes though it is dislocated from its original context. It presents two visits of Enoch to heaven in lxxi. 1-4 and lxxi. 5-17. The extraordinary statement in lxxi. 14, according to which Enoch is addressed as "the Son of Man," is seen, as Appel points out, on examination of the context to have arisen from the loss of a portion of the text after verse 13, in which Enoch saw a heavenly being with the Head of Days and asked the angel who accompanied him who this being was. Then comes ver. 14, which, owing to the loss of this passage, has assumed the form of an address to Enoch: "Thou art the Son of Man," but which stood originally as the angel's reply to Enoch: "This is the Son of Man," &c. Ver. 15, then, gives the message sent to Enoch by the Son of Man. In the next verse the second person should be changed into the third. Thus we recover the original text of this difficult chapter. The Messianic doctrine and eschatology of this section is unique. The Messiah is here for the first time described as the pre-existent Son of Man (xlviii. 2), who sits on the throne of God (xlv. 3; xlvii. 3), possesses universal dominion (lxii. 6), and is the Judge of all mankind (lxix. 27). After the judgment there will be a new heaven and a new earth, which will be the abode of the blessed.

The BOOK OF THE SECRETS OF ENOCH, or *Slavonic Enoch*. This new fragment of the Enochic literature has only recently come to light through five MSS. discovered in Russia and Servia. Since about A.D. 500 it has been lost sight of. It is cited without acknowledgment in the *Book of Adam and Eve*, the *Apocalypses of Moses and Paul*, the *Sibylline Oracles*, the *Ascension of Isaiah*, the *Epistle of Barnabas*, and referred to by Origen and Irenaeus (see Charles, *The Book of the Secrets of Enoch*, 1895, pp. xvii-xxiv). For Charles's *editio princeps* of this work, in 1895, Professor Morfill translated two of the best MSS., as well as Sokolov's text, which is founded on these and other MSS. In 1896 Bonwetsch issued his *Das slavische Henochbuch*, in which a German translation of the above two MSS. is given side by side, preceded by a short introduction.

Analysis.—Chaps. i.-ii. Introduction: life of Enoch: his dream, in which he is told that he will be taken up to heaven: his admonitions to his sons. iii.-xxxvi. What Enoch saw in heaven. iii.-vi. The first heaven: the rulers of the stars: the great sea and the treasures of snow, &c. vii. The second heaven: the fallen angels. viii.-x. The third heaven: Paradise and place of punishment. xi.-xvii. The fourth heaven: courses of the sun and moon: phoenixes. xviii. The fifth heaven: the watchers mourning for their fallen brethren. xix. The sixth heaven: seven bands of angels arrange and study the courses of the stars, &c.: others set over the years, the fruits of the earth, the souls of men. xx.-xxxvi. The seventh heaven. The Lord sitting on His throne with the ten chief orders of angels. Enoch is clothed by Michael in the raiment of God's glory and instructed in the secrets of nature and of man, which he wrote down in 366 books. God reveals to Enoch the history of the creation of the earth and the seven planets and circles of the heaven and of man, the story of the fallen angels, the duration of the world through 7000 years, and its millennium of rest. xxxviii.-lxvi. Enoch returns to earth, admonishes his sons: instructs them on what he had seen in the heavens, gives them his books. Bids them not to swear at all nor to expect any intercession of the departed saints for sinners. lvi.-lxiii. Methuselah asks Enoch's blessing before he departs, and to all his sons and their families Enoch gives fresh instruction. lxiv.-lxvi. Enoch addressed the assembled people at Achuszan. lxvii.-lxviii. Enoch's translation. Rejoicings of the people on behalf of the revelation given them through Enoch.

Language and Place of Writing.—A large part of this book was written for the first time in Greek. This may be inferred from such statements as (1) xxx. 13, "And I gave him a name (*i.e.* Adam) from the four substances: the East, the West, the North and the South." Thus Adam's name is here derived from the initial letters of the four quarters: ἀνατολή, δύσις, ἄρκτος, μεσημβρία. This derivation is impossible in Semitic. This context is found elsewhere in the Sibyllines iii. 24 sqq. and other Greek writings. (2) Again our author uses the chronology of the Septuagint and in 1, 4 follows the Septuagint text of Deuteronomy xxxii. 35 against the Hebrew. On the other hand, some sections may wholly or in part go back to Hebrew originals. There is a Hebrew Book of Enoch attributed to R. Ishmael ben Elisha who lived at the close of the 1st century and the beginning of the 2nd century B.C. This book is very closely related to the Book of the Secrets of Enoch, or rather, to a large extent dependent upon it. Did Ishmael ben Elisha use the Book of the Secrets of Enoch in its Greek form, or did he find portions of it in Hebrew? At all events, extensive quotations from a Book of Enoch are found in the rabbinical literature of the middle ages, and the provenance of these has not yet been determined. See *Jewish Encyc.* i. 676 seq.

But there is a stronger argument for a Hebrew original of certain sections to be found in the fact that the Testaments of the XII. Patriarchs appears to quote xxxiv. 2, 3 of our author in T. Napth. iv. 1, T. Benj. ix.

The book in its present form was written in Egypt. This may be inferred (1) from the variety of speculations which it holds in common with Philo and writings of a Hellenistic character that circulated mainly in Egypt. (2) The Phoenixes are Chalkydries (ch. xii.)—monstrous serpents with the heads of crocodiles—are natural products of the Egyptian imagination. (3) The syncretistic character of the creation account (xxv.-xxvi.) betrays Egyptian elements.

Relation to Jewish and Christian Literature.—The existence of a kindred literature in Neo-Hebrew has been already pointed out. We might note besides that it is quoted in the Book of Adam and Eve, the Apocalypse of Moses, the Apocalypse of Paul, the anonymous work *De montibus Sina et Sion*, the Sibylline Oracles ii. 75, Origen, *De princip.* i. 3, 2. The authors of the Ascension of Isaiah, the Apoc. of Baruch and the Epistle of Barnabas were probably acquainted with it. In the New Testament the similarity of matter and diction is sufficiently strong to establish a close connexion, if not a literary dependence. Thus with Matt. v. 9, "Blessed are the peacemakers," cf. lii. 11, "Blessed is he who establishes peace": with Matt. v. 34, 35, 37, "Swear not at all," cf. xlix. 1, "I will not swear by a single oath, neither by heaven, nor by earth, nor by any other creature which God made—if there is no truth in man, let them swear by a word yea, yea, or nay, nay."

Date and Authorship.—The book was probably written between 30 B.C. and A.D. 70. It was written after 30 B.C., for it makes use of Sirach, the (Ethiopic) Book of Enoch and the Book of Wisdom. It was written before A.D. 70; for the temple is still standing: see lix. 2.

The author was an orthodox Hellenistic Jew who lived in Egypt. He believed in the value of sacrifices (xlii. 6; lix. 1, 2, &c.), but is careful to enforce enlightened views regarding them (xlv. 3, 4; lxi. 4, 5.) in the law, lii. 8, 9; in a blessed immortality, l. 2; lxv. 6, 8-10, in which the righteous should be clothed in "the raiment of God's glory," xxii. 8. In questions relating to cosmology, sin, death, &c., he is an eclectic, and allows himself the most unrestricted freedom, and readily incorporates Platonic (xxx. 16), Egyptian (xxv. 2) and Zend (lviii. 4-6) elements into his system of thought.

Anthropological Views.—All the souls of men were created before the foundation of the world (xxiii. 5) and likewise their future abodes in heaven or hell (xlix. 2, lviii. 5). Man's name was derived, as we have already seen, from the four quarters of the world, and his body was compounded from seven substances (xxx. 8). He was created originally good: freewill was bestowed upon him with instruction in the two ways of light and darkness, and then he was left to mould his own destiny (xxx. 15). But his preferences through the bias of the flesh took an evil direction, and death followed as the wages of sin (xxx. 16).

LITERATURE.—Morfill and Charles, *The Book of the Secrets of Enoch* (Oxford, 1896); Bonwetsch, "Das slavische Henochbuch," in the *Abhandlungen der königlichen gelehrten Gesellschaft zu Göttingen* (1896). See also Schürer *in loc.* and the Bible Dictionaries. (R. H. C.)

ENOMOTO, BUYO, VISCOUNT (1839–1909), Japanese vice-admiral, was born in Tokyo. He was the first officer sent by the Tokugawa government to study naval science in Europe, and after going through a course of instruction in Holland he returned in command of the frigate "Kaiyō Maru," built at Amsterdam to order of the Yedo administration. The salient episode of his career was an attempt to establish a republic at Hakodate. Finding himself in command of a squadron which represented practically the whole of Japan's naval forces, he refused to acquiesce in the deposition of the Shōgun, his liege lord, and, steaming off to Yezo (1867), proclaimed a republic and fortified Hakodate. But he was soon compelled to surrender. The newly organized government of the empire, however, instead of inflicting the death penalty on him and his principal followers, as would have been the inevitable sequel of such a drama in previous times, punished them with imprisonment only, and four years after the Hakodate episode, Enomoto received an important post in Hokkaido, the very scene of his wild attempt. Subsequently (1874), as his country's representative in St Petersburg, he concluded the treaty by which Japan exchanged the southern half of Saghalien for the Kuriles. He received the title of viscount in 1885, and afterwards held the portfolios of communications, education and foreign affairs. He died at Tokyo in 1909.

ENOS (anc. *Aenos*), a town of European Turkey, in the vilayet of Adrianople; on the southern shore of the river Maritza, where its estuary broadens to meet the Aegean Sea in the Gulf of Enos. Pop. (1905) about 8000. Enos occupies a ridge of rock surrounded by broad marshes. It is the seat of a Greek bishop, and the population is mainly Greek. It long possessed a valuable export trade, owing to its position at the mouth of the Maritza, the great natural waterway from Adrianople to the sea. But its commerce has declined, owing to the unhealthiness of its climate, to the accumulation of sandbanks in its harbour, which now only admits small coasters and fishing-vessels, and to the rivalry of Dédéagatch, a neighbouring seaport connected with Adrianople by rail.

ENRIQUEZ GOMEZ, ANTONIO (*c.* 1601–*c.* 1661), Spanish dramatist, poet and novelist of Portuguese-Jewish origin, was known in the early part of his career as Enrique Enriquez de Paz. Born at Segovia, he entered the army, obtained a captaincy, was suspected of heresy, fled to France about 1636, assumed the name of Antonio Enriquez Gomez, and became majordomo to Louis XIII., to whom he dedicated *Luis dado de Dios á Anna* (Paris, 1645). Some twelve years later he removed to Amsterdam, avowed his conversion to Judaism, and was burned in effigy at Seville on the 14th of April 1660. He is supposed to have returned to France, and to have died there in the following year. Three of his plays, *El Gran Cardenal de España, don Gil de Albornoz*, and the two parts of *Fernan Mendes Pinto* were received with great applause at Madrid about 1629; in 1635 he contributed a sonnet to Montalban's collection of posthumous panegyrics on Lope de Vega, to whose dramatic school Enriquez Gomez belonged. The *Academias morales de las Musas*, consisting of four plays (including *A lo que obliga el honor*, which recalls Calderon's *Médico de su honra*), was published at Bordeaux in 1642; *La Torre de Babilonia*, containing the two parts of *Fernan Mendes Pinto*, appeared at Rouen in 1647; and in the preface to his poem, *El Samson Nazareno* (Rouen, 1656), Enriquez Gomez gives the titles of sixteen other plays issued, as he alleges, at Seville. There is no foundation for the theory that he wrote the plays ascribed to Fernando de Zárate. His dramatic works, though effective on the stage, are disfigured by extravagant incidents and preciosity of diction. The latter defect is likewise observable in the mingled prose and verse of *La Culpa del primer peregrino* (Rouen, 1644) and the dialogues entitled *Politica Angélica* (Rouen, 1647). Enriquez Gomez is best represented by *El Siglo Pitagórico y Vida de don Gregorio Guadaña* (Rouen, 1644), a striking picaresque novel in prose and verse which is still reprinted.

ENSCHEDE, a town in the province of Overysel, Holland, near the Prussian frontier, and a junction station 5 m. by rail S.E. of Hengelo. Pop. (1900) 23,141. It is important as the centre of the flourishing cotton-spinning and weaving industries of the Twente district; while by the railway via Gronau and

Koesfeld to Dortmund it is in direct communication with the Westphalian coalfields. Enschede possesses several churches, an industrial trade school, and a large park intended for the benefit of the working classes. About two-thirds of the town was burnt down in 1862.

ENSENADA, CENON DE SOMODEVILLA, Marques de la (1702–1781), Spanish statesman, was born at Alesanco near Logrono on the 2nd of June 1702. When he had risen to high office it was said that his pedigree was distinguished, but nothing is known of his parents—Francisco de Somodevilla and his wife Francisca de Bengoechea,—nor is anything known of his own life before he entered the civil administration of the Spanish navy as a clerk in 1720. He served in administrative capacities at the relief of Ceuta in that year and in the reoccupation of Oran in 1731. His ability was recognized by Don Jose Patiños, the chief minister of King Philip V. Somodevilla was much employed during the various expeditions undertaken by the Spanish government to put the king's sons by his second marriage with Elizabeth Farnese, Charles and Philip, on the thrones of Naples and Parma. In 1736 Charles, afterwards King Charles III. of Spain, conferred on him the Neapolitan title of Marques de la Ensenada. The name can be resolved into the three Spanish words "en se nada," meaning "in himself nothing" The courtly flattery of the time, and the envy of the nobles who disliked the rise of men of Ensenada's class, seized upon this poor play on words; an *Ensenada* is, however, a roadstead or small bay. In 1742 he became secretary of state and war to Philip, duke of Parma. In the following year (11th of April 1743), on the death of Patiños's successor Campillo, he was chosen by Philip V. as minister of finance, war, the navy and the Indies (*i.e.* the Colonies). Ensenada met the nomination with a becoming *nolo episcopari*, professing that he was incapable of filling the four posts at once. His reluctance was overborne by the king, and he became in fact prime minister at the age of forty-one. During the remainder of the king's reign, which lasted till the 11th of July 1746, and under his successor Ferdinand VI. until 1754, Ensenada was the effective prime minister. His administration is notable in Spanish history for the vigour of his policy of internal reform. The reports on the finances and general condition of the country, which he drew up for the new king on his accession, and again after peace was made with England at Aix-la-Chapelle on the 18th of October 1748, are very able and clear-sighted. Under his direction the despotism of the Bourbon kings became paternal. Public works were undertaken, shipping was encouraged, trade was fostered, numbers of young Spaniards were sent abroad for education. Many of them abused their opportunity, but on the whole the prosperity of the country revived, and the way was cleared for the more sweeping innovations of the following reign. Ensenada was a strong partizan of a French alliance and of a policy hostile to England. Sir B. Keene, the English minister, supported the Spanish court party opposed to him, and succeeded in preventing him from adding the foreign office to others which he held. Ensenada would probably have fallen sooner but for the support he received from the Portuguese queen, Barbara. In 1754 he offended her by opposing an exchange of Spanish and Portuguese colonial possessions in America which she favoured. On the 20th of July of that year he was arrested by the king's order, and sent into mild confinement at Granada, which he was afterwards allowed to exchange for Puerto de Santa Maria. On the accession of Charles III. in 1759, he was released from arrest and allowed to return to Madrid. The new king named him as member of a commission appointed to reform the system of taxation. Ensenada could not renounce the hope of again becoming minister, and entered into intrigues which offended the king. On the 18th of April 1766 he was again exiled from court, and ordered to go to Medina del Campo. He had no further share in public life, and died on the 2nd of December 1781. Ensenada acquired wealth in office, but he was never accused of corruption. Though, like most of his countrymen, he suffered from the mania for grandeur, and was too fond of imposing schemes out of all proportion with the resources of the state, he was undoubtedly an able and patriotic man, whose administration was beneficial to Spain.

For his administration see W. Coxe, *Memoirs of the Kings of Spain of the House of Bourbon* (London, 1815), but the only complete account of Ensenada is by Don Antonio Rodriguez Villa, *Don Cenon de Somodevilla, Marques de la Ensenada* (Madrid, 1878). (D. H.)

ENSIGN (through the Fr. *enseigne* from the Latin plural *insignia*), a distinguishing token, emblem or badge such as symbols of office, or in heraldry, the ornament or sign, such as the crown, coronet or mitre borne above the charge or arms. The word is more particularly used of a military or naval standard or banner. In the British navy, ensign has a specific meaning, and is the name of a flag having a red, white or blue ground, with the Union Jack in the upper corner next the staff. The white ensign (which is sometimes further distinguished by having the St George's Cross quartered upon it) is only used in the royal navy and the royal yacht squadron, while the blue and red ensigns are the badges of the naval reserve, some privileged companies, and the merchant service respectively (see Flag). Until 1871 the lowest grade of commissioned officers in infantry regiments of the British army had the title of ensign (now replaced by that of second lieutenant). It is the duty of the officers of this rank to carry the colours of the regiment (see Colours, Military). In the 16th century ensign was corrupted into "ancient," and was used in the two senses of a banner and the bearer of the banner. In the United States navy, the title ensign superseded in 1862 that of *passed midshipman*. It designates an officer ranking with second lieutenant in the army.

ENSILAGE, the process of preserving green food for cattle in an undried condition in a silo (from Gr. *σιρός*, Lat. *sirus*, a pit for holding grain), *i.e.* a pit, an erection above ground, or stack, from which air has been as far as possible excluded. The fodder which is the result of the process is called silage. In various parts of Germany a method of preserving green fodder precisely similar to that used in the case of *Sauerkraut* has prevailed for upwards of a century. Special attention was first directed to the practice of ensilage by a French agriculturist, Auguste Goffart of the district of Sologne, near Orleans, who in 1877 published a work (*Manuel de la culture et de l'ensilage des mais et autres fourrages verts*) detailing the experiences of many years in preserving green crops in silos. An English translation of Goffart's book by J. B. Brown was published in New York in 1879, and, as various experiments had been previously made in the United States in the way of preserving green crops in pits, Goffart's experience attracted considerable attention. The conditions of American dairy farming proved eminently suitable for the ensiling of green maize fodder; and the success of the method was soon indisputably demonstrated among the New England farmers. The favourable results obtained in America led to much discussion and to the introduction of the system in the United Kingdom, where, with different conditions, success has been more qualified.

It has been abundantly proved that ensilage forms a wholesome and nutritious food for cattle. It can be substituted for root crops with advantage, because it is succulent and digestible; milk resulting from it is good in quality and taste; it can be secured largely irrespective of weather; it carries over grass from the period of great abundance and waste to times when none would otherwise be available; and a larger number of cattle can be supported on a given area by the use of ensilage than is possible by the use of green crops.

Early silos were made of stone or concrete either above or below ground, but it is recognized that air may be sufficiently excluded in a tightly pressed stack, though in this case a few inches of the fodder round the sides is generally useless owing to mildew. In America round erections made of wood and 35 or 40 ft. in depth are most commonly used. The crops suitable for ensilage are the ordinary grasses, clovers, lucerne, vetches, oats, rye and maize, the latter being the most important silage crop in America; various weeds may also be stored in silos with good results, notably spurrey (*Spergula arvensis*), a most troublesome plant in poor light soils. As a rule the crop should be mown when in full flower, and deposited in the silo on the day of its cutting. Maize is cut a few days before it is ripe and is shredded before being elevated into the silo. Fair, dry weather is not essential; but it is found that when moisture, natural and extraneous, exceeds 75% of the whole, good results are not obtained. The material is spread in uniform layers over the floor of the silo, and closely packed and trodden down. If possible, not more than a foot or two should be added daily, so as to allow the mass to settle down closely, and to heat uniformly throughout. When the silo is filled or the stack built, a layer of straw or some other dry porous substance may be spread over the surface. In the silo the pressure of the material, when chaffed, excludes air from all but the top layer; in the case of the stack extra pressure is applied by means of planks or other weighty objects in order to prevent excessive heating.

The closeness with which the fodder is packed determines the nature of the resulting silage by regulating the chemical changes which occur in the stack. When closely packed, the supply of oxygen is limited; and the attendant acid fermentation brings about the decomposition of the carbohydrates present into acetic, butyric and lactic acids. This product is named "sour silage." If, on the other hand, the fodder be unchaffed and loosely packed, or the silo be built gradually, oxidation proceeds more rapidly and the temperature rises; if the mass be compressed when the temperature is 140°–160° F., the action ceases and "sweet silage" results. The nitrogenous ingredients of the fodder also suffer change: in making sour silage as much as one-third of the albuminoids may be converted into amino and ammonium compounds; while in making "sweet silage" a less proportion is changed, but they become less digestible. In extreme cases, sour silage acquires a most disagreeable odour. On the other hand it keeps better than sweet silage when removed from the silo.

ENSTATITE, a rock-forming mineral belonging to the group of orthorhombic pyroxenes. It is a magnesium metasilicate, $MgSiO_3$, often with a little iron replacing the magnesium: as the iron increases in amount there is a transition to bronzite (*q.v.*), and with still more iron to hypersthene (*q.v.*). Bronzite and hypersthene were known long before enstatite, which was first described by G. A. Kenngott in 1855, and named from *ἐνστάτης*, "an opponent," because the mineral is almost infusible before the blowpipe: the material he described consisted of imperfect prismatic crystals, previously thought to be scapolite, from the serpentine of Mount Zdjar near Schönberg in Moravia. Crystals suitable for goniometric measurement were later found in the meteorite which fell at Breitenbach in the Erzgebirge, Bohemia. Large crystals, a foot in length and mostly altered to steatite, were found in 1874 in the apatite veins traversing mica-schist and hornblende-schist at the apatite mine of Kjörrestad, near Brevig in southern Norway. Isolated crystals are of rare occurrence, the mineral being usually found as an essential constituent of igneous rocks; either as irregular masses in plutonic rocks (norite, peridotite, pyroxenite, &c.) and the serpentines which have resulted by their alteration, or as small idiomorphic crystals in volcanic rocks (trachyte, andesite). It is also a common constituent of meteoric stones, forming with olivine the bulk of the material: here it often forms small spherical masses, or chondrules, with an internal radiated structure.

Enstatite and the other orthorhombic pyroxenes are distinguished from those of the monoclinic series by their optical characters, viz. straight extinction, much weaker double refraction and stronger pleochroism: they have prismatic cleavages (with an angle of 88° 16′) as well as planes of parting parallel to the planes of symmetry in the prism-zone. Enstatite is white, greenish or brown in colour; its hardness is 5½, and sp. gr. 3·2–3·3. (L. J. S.)

ENTABLATURE (Lat. *in*, and *tabula*, a tablet), the architectural term for the superstructure carried by the columns in the classic orders (*q.v.*). It usually consists of three members, the architrave (the supporting member carried from column to column, pier or wall); the frieze (the decorative member); and the cornice (the projecting and protective member). Sometimes the frieze is omitted, as in the entablature of the portico of the caryatides of the Erechtheum. There is every reason to believe that the frieze did not exist in the archaic temple of Diana at Ephesus; and it is not found in the Lycian tombs, which are reproductions in the rock of timber structures based on early Ionian work.

ENTADA, in botany, a woody climber belonging to the family *Leguminosae* and common throughout the tropics. The best-known species is *Entada scandens*, the sword-bean, so called from its large woody pod, 2 to 4 ft. in length and 3 to 4 in. broad, which contains large flat hard polished chestnut-coloured seeds or "beans." The seeds are often made into snuff-boxes or match-boxes, and a preparation from the kernel is used as a drug by the natives in India. The seeds will float for a long time in water, and are often thrown up on the north-western coasts of Europe, having been carried by the Gulf-stream from the West Indies; they retain their vitality, and under favourable conditions will germinate. Linnaeus records the germination of a seed on the coast of Norway.

ENTAIL (from Fr. *tailler*, to cut; the old derivation from *tales haeredes* is now abandoned), in law, a limited form of succession (*q.v.*). In architecture, the term "entail" denotes an ornamental device sunk in the ground of stone or brass, and subsequently filled in with marble, mosaic or enamel.

ENTASIS (from Gr. *ἐντείνειν*, to stretch a line or bend a bow), in architecture, the increment given to the column (*q.v.*), to correct the optical illusion which produces an apparent hollowness in an extended straight line. It was referred to by Vitruvius (iii. 3), and was first noticed in the columns of the Doric orders in Greek temples by Allason in 1814, and afterwards measured and verified by Penrose. It varies in different temples, and is not found in some: it is most pronounced in the temple of Jupiter Olympius, most delicate in the Erechtheum. The entasis is almost invariably introduced in the spires of English churches.

ENTERITIS (Gr. *ἔντερον*, intestine), a general medical term for inflammation of the bowels. According to the anatomical part specially attacked, it is subdivided into duodenitis, jejunitis, ileitis, typhlitis, appendicitis, colitis, proctitis. The chief sympton is diarrhoea. The term "enteric fever" has recently come into use instead of "typhoid" for the latter disease; but see TYPHOID FEVER.

ENTHUSIASM, a word originally meaning inspiration by a divine afflatus or by the presence of a god. The Gr. *ἐνθουσιασμός*, from which the word is adapted, is formed from the verb *ἐνθουσιάζειν*, to be *ἔνθεος*, possessed by a god (*θεός*). Applied by the Greeks to manifestations of divine "possession," by Apollo, as in the case of the Pythia, or by Dionysus, as in the case of the Bacchantes and Maenads, it was also used in a transferred or figurative sense; thus Socrates speaks of the inspiration of poets as a form of enthusiasm (Plato, *Apol. Soc.* 22 c). Its uses, in a religious sense, are confined to an exaggerated or wrongful belief in religious inspiration, or to intense religious fervour or emotion. Thus a Syrian sect of the 4th century was known as "the Enthusiasts"; they believed that by perpetual prayer, ascetic practices and contemplation, man could become inspired by the Holy Spirit, in spite of the ruling evil spirit, which the fall had given to him. From their belief in the efficacy of prayer (*εὐχή*), they were also known as Euchites. In ordinary usage, "enthusiasm" has lost its peculiar religious significance, and means a whole-hearted devotion to an ideal, cause, study or pursuit; sometimes, in a depreciatory sense, it implies a devotion which is partisan and is blind to difficulties and objections. (See further INSPIRATION, for a comparison of the religious meanings of "enthusiasm," "ecstasy" and "fanaticism.")

ENTHYMEME (Gr. *ἐν*, *θυμός*), in formal logic, the technical name of a syllogistic argument which is incompletely stated. Any one of the premises may be omitted, but in general it is that one which is most obvious or most naturally present to the mind. In point of fact the full formal statement of a syllogism is rare, especially in rhetorical language, when the deliberate omission of one of the premises has a dramatic effect. Thus the suppression of the conclusion may have the effect of emphasizing the idea which necessarily follows from the premises. Far commoner is the omission of one of the premises which is either too clear to need statement or of a character which makes its omission desirable. A famous instance quoted in the *Port Royal Logic*, pt. iii. ch. xiv., is Medea's remark to Jason in Ovid's *Medea*, "Servare potui, perdere an possim rogas?" where the major premise "Qui servare, perdere possunt" is understood. This use of the word enthymeme differs from Aristotle's original application of it to a syllogism based on probabilities or signs (ἐξ *εἰκότων ἢ σημείων*), *i.e.* on propositions which are generally valid (*εἰκότα*) or on particular facts which may be held to justify a general principle or another particular fact (*Anal. prior.* β xxvii. 70 a 10).

See beside text-books on logic, Sir W. Hamilton's *Discussions* (1547); Mansel's ed. of Aldrich, Appendix F; H W. B. Joseph, *Introd. to Logic*, chap. xvi.

ENTOMOLOGY (Gr. *ἔντομα*, insects, and *λόγος*, a discourse), the science that treats of insects, *i.e.* of the animals included in the class Hexapoda of the great phylum (or sub-phylum) Arthropoda. The term, however, is somewhat elastic in its current use, and students of centipedes and spiders are often reckoned among the entomologists. As the number of species of insects is believed to exceed that of all other animals taken together, it is no wonder that their study should form a special division of zoology with a distinctive name.

Beetles (Scarabaei) are the subjects of some of the oldest sculptured works of the Egyptians, and references to locusts, bees and ants are familiar to all readers of the Hebrew scriptures. The interest of insects to the eastern races was, however, economic, religious or moral. The science of insects began with Aristotle, who included in a class "Entoma" the true insects, the arachnids and the myriapods, the Crustacea forming another class ("Malacostraca") of the "Anaema" or "bloodless animals." For nearly 2000 years the few writers who dealt with zoological subjects followed Aristotle's leading.

In the history of the science, various lines of progress have to be traced. While some observers have studied in detail the structure and life-history of a few selected types (insect anatomy and development), others have made a more superficial examination of large series of insects to classify them and determine their relationships (systematic entomology), while others again have investigated the habits and life-relations of insects (insect bionomics). During recent years the study of fossil insects (palaeoëntomology) has attracted much attention.

The foundations of modern entomology were laid by a series of wonderful memoirs on anatomy and development published in the 17th and 18th centuries. Of these the most famous are M. Malpighi's treatise on the silkworm (1669) and J. Swammerdam's *Biblia naturae*, issued in 1737, fifty years after its author's death, and containing observations on the structure and life-history of a series of insect types. Aristotle and Harvey (*De generatione animalium*, 1651) had considered the insect larva as a prematurely hatched embryo and the pupa as a second egg. Swammerdam, however, showed the presence under the larval cuticle of the pupal structures. His only unfortunate contribution to entomology—indeed to zoology generally—was his theory of pre-formation, which taught the presence within the egg of a perfectly formed but miniature adult. A year before Malpighi's great work appeared, another Italian naturalist, F. Redi, had disproved by experiment the spontaneous generation of maggots from putrid flesh, and had shown that they can only develop from the eggs of flies.

Meanwhile the English naturalist, John Ray, was studying the classification of animals; he published, in 1705, his *Methodus insectorum*, in which the nature of the metamorphosis received due weight. Ray's "Insects" comprised the Arachnids, Crustacea, Myriapoda and Annelida, in addition to the Hexapods. Ray was the first to formulate that definite conception of the species which was adopted by Linnaeus and emphasized by his binominal nomenclature. In 1735 appeared the first edition of the *Systema naturae* of Linnaeus, in which the "Insecta" form a group equivalent to the Arthropoda of modern zoologists, and are divided into seven orders, whose names—Coleoptera, Diptera, Lepidoptera, &c., founded on the nature of the wings—have become firmly established. The fascinating subjects of insect bionomics and life-history were dealt with in the classical memoirs (1734–1742) of the Frenchman R. A. F. de Réaumur, and (1752–1778) of the Swede C. de Geer. The freshness, the air of leisure, the enthusiasm of discovery that mark the work of these old writers have lessons for the modern professional zoologist, who at times feels burdened with the accumulated knowledge of a century and a half. From the end of the 18th century until the present day, it is only possible to enumerate the outstanding features in the progress of entomology. In the realm of classification, the work of Linnaeus was continued in Denmark by J. C. Fabricius (*Systema entomologica*, 1775), and extended in France by G. P. B. Lamarck (*Animaux sans vertèbres*, 1801) and G. Cuvier (*Leçons d'anatomie comparée*, 1800–1805), and in England by W. E. Leach (*Trans. Linn. Soc.* xi., 1815). These three authors definitely separated the Arachnida, Crustacea and Myriapoda as classes distinct from the Insecta (see HEXAPODA). The work of J. O. Westwood (*Modern Classification of Insects*, 1839–1840) connects these older writers with their successors of to-day.

In the anatomical field the work of Malpighi and Swammerdam was at first continued most energetically by French students. P. Lyonnet had published in 1760 his elaborate monograph on the goat-moth caterpillar, and H. E. Strauss-Dürckheim in 1828 issued his great treatise on the cockchafer. But the name of J. C. L. de Savigny, who (*Mém. sur les animaux sans vertèbres*, 1816) established the homology of the jaws of all insects whether biting or sucking, deserves especial honour. Many anatomical and developmental details were carefully worked out by L. Dufour (in a long series of memoirs from 1811 to 1860) in France, by G. Newport ("Insecta" in *Encyc. Anat. and Physiol.*, 1839) in England, and by H. Burmeister (*Handbuch der Entomologie*, 1832) in Germany. Through the 19th century, as knowledge increased, the work of investigation became necessarily more and more specialized. Anatomists like F. Leydig, F. Müller, B. T. Lowne and V. Graber turned their attention to the detailed investigation of some one species or to special points in the structure of some particular organs, using for the elucidation of their subject the ever-improving microscopical methods of research.

Societies for the discussion and publication of papers on entomology were naturally established as the number of students increased. The Société Entomologique de France was founded in 1832, the Entomological Society of London in 1834. Few branches of zoology have been more valuable as a meeting-ground for professional and amateur naturalists than entomology, and not seldom has the amateur—as in the case of Westwood—developed into a professor. During the pre-Linnaean period, the beauty of insects—especially the Lepidoptera—had attracted a number of collectors; and these "Aurelians"—regarded as harmless lunatics by most of their friends—were the forerunners of the systematic students of later times. While the insect fauna of European countries was investigated by local naturalists, the spread of geographical exploration brought ever-increasing stores of exotic material to the great museums, and specialization—either in the fauna of a small district or in the world-wide study of an order or a group of families—became constantly more marked in systematic work. As examples may be instanced the studies of A. H. Haliday and H. Loew on the European Diptera, of John Curtis on British insects, of H. T. Stainton and O. Staudinger on the European Lepidoptera, of R. M'Lachlan on the European and of H. A. Hagen on the North American Neuroptera, of D. Sharp on the *Dyticidae* and other families of Coleoptera of the whole world.

The embryology of insects is entirely a study of the last century. C. Bonnet indeed observed in 1745 the virgin-reproduction of Aphids, but it was not until 1842 that R. A. von Kölliker described the formation of the blastoderm in the egg of the midge *Chironomus*. Later A. Weismann (1863–1864) traced details of the growth of embryo and of pupa among the Diptera, and A. Kovalevsky in 1871 first described the formation of the germinal layers in insects. Most of the recent work on the embryology of insects has been done in Germany or the United States, and among numerous students V. Graber, K. Heider, W. M. Wheeler and R. Heymons may be especially mentioned.

The work of de Réaumur and de Geer on the bionomics and life-history of insects has been continued by numerous observers, among whom may be especially mentioned in France J. H. Fabre and C. Janet, in England W. Kirby and W. Spence, J. Lubbock (Lord Avebury) and L. C. Miall, and in the United States C. V. Riley. The last-named may be considered the founder of the strong company of entomological workers now labouring in America. Though Riley was especially interested in the bearings of insect life on agriculture and industry—economic entomology (*q. v.*)—he and his followers have laid the science generally under a deep obligation by their researches.

After the publication of C. Darwin's *Origin of Species* (1859) a fresh impetus was given to entomology as to all branches of zoology, and it became generally recognized that insects form a group convenient and hopeful for the elucidation of certain problems of animal evolution. The writings of Darwin himself and of A. R. Wallace (both at one time active entomological collectors) contain much evidence drawn from insects in favour of descent with modification. The phylogeny of insects has since been discussed by F. Brauer, A. S. Packard and many others; mimicry and allied problems by H. W. Bates, F. Müller, E. B. Poulton and M. C. Piepers; the bearing of insect habits on theories of selection and use-inheritance by A. Weismann, G. W. and E. Peckham, G. H. T. Eimer and Herbert Spencer; variation by W. Bateson and M. Standfuss.

BIBLIOGRAPHY.—References to the works of the above authors, and to many others, will be found under HEXAPODA and the special articles on various insect orders. Valuable summaries of the labours of Malpighi, Swammerdam and other early entomologists are given in L. C. Miall and A. Denny's *Cockroach* (London, 1886), and L. Henneguy's *Les Insectes* (Paris, 1904). (G. H. C.)

ENTOMOSTRACA. This zoological term, as now restricted, includes the Branchiopoda, Ostracoda and Copepoda. The Ostracoda have the body enclosed in a bivalve shell-covering, and normally unsegmented. The Branchiopoda have a very variable number of body-segments, with or without a shield, simple or bivalved, and some of the postoral appendages normally branchial. The Copepoda have normally a segmented body, not enclosed in a bivalved shell-covering, the segments not exceeding eleven, the limbs not branchial.

Under the heading CRUSTACEA the Entomostraca have already been distinguished not only from the Thyrostraca or Cirripedes, but also from the Malacostraca, and an intermediate group of which the true position is still disputed. The choice is open to maintain the last as an independent subclass, and to follow Claus in calling it the Leptostraca, or to introduce it among the Malacostraca as the Nebaliacea, or with Packard and Sars to make it an entomostracan subdivision under the title Phyllocarida. At present it comprises the single family *Nebaliidae*. The bivalved carapace has a jointed rostrum, and covers only the front part of the body, to which it is only attached quite in front, the valve-like sides being under control of an adductor muscle. The eyes are stalked and movable. The first antennae have a lamellar appendage at the end of the peduncle, a decidedly non-entomostracan feature. The second antennae, mandibles and two pairs of maxillae may also be claimed as of malacostracan type. To these succeed eight pairs of foliaceous branchial appendages on the front division of the body, followed on the hind division by four pairs of powerful bifurcate swimming feet and two rudimentary pairs, the number, though not the nature, of these appendages being malacostracan. On the other hand, the two limbless segments that precede the caudal furca are decidedly non-malacostracan. The family was long limited to the single genus *Nebalia* (Leach), and the single species *N. bipes* (O. Fabricius). Recently Sars has added a Norwegian species, *N. typhlops*, not blind but weak-eyed. There are also now two more genera, *Paranebalia* (Claus, 1880), in which the branchial feet are much longer than in *Nebalia*, and *Nebaliopsis* (Sars, 1887), in which they are much shorter. All the species are marine.

BRANCHIOPODA.—In this order, exclusion of the Phyllocarida will leave three suborders of very unequal extent, the Phyllopoda, Cladocera, Branchiura. The constituents of the last have often been classed as Copepoda, and among the Branchiopods must be regarded as aberrant, since the "branchial tail" implied in the name has no feet, and the actual feet are by no means obviously branchial.

Phyllopoda.—This "leaf-footed" suborder has the appendages which follow the second maxillae variable in number, but all foliaceous and branchial. The development begins with a free nauplius stage. In the outward appearance of the adults there is great want of uniformity, one set having their limbs sheltered by no carapace, another having a broad shield over most of them, and a third having a bivalved shell-cover within which the whole body can be enclosed. In accord with these differences the sections may be named Gymnophylla, Notophylla, Conchophylla. The equivalent terms applied by Sars are Anostraca, Notostraca, Conchostraca, involving a termination already appropriated to higher divisions of the Crustacean class, for which it ought to be reserved.

1. Gymnophylla.—These singular crustaceans have long soft flexible bodies, the eyes stalked and movable, the first antennae small and filiform, the second lamellar in the female, in the male prehensile; this last character gives rise to some very fanciful developments. There are three families, two of which form companies rather severely limited. Thus the *Polyartemiidae*, which compensate themselves for their stumpy little tails by having nineteen instead of the normal eleven pairs of branchial feet, consist exclusively of *Polyartemia forcipata* (Fischer, 1851). This species from the high north of Europe and Asia carries green eggs, and above them a bright pattern in ultramarine (Sars, 1896, 1897). The *Thamnocephalidae* have likewise but a single species, *Thamnocephalus platyurus* (Packard, 1877), which justifies its title "bushy-head of the broad tail" by a singularity at each end. Forward from the head extends a long ramified appendage described as the "frontal shrub," backward from the fourth abdominal segment of the male spreads a fin-like expansion which is unique. In the ravines of Kansas, pools supplied by torrential rains give birth to these and many other phyllopods, and in turn "millions of them perish by the drying up of the pools in July" (Packard). The remaining family, the *Branchipodidae*, includes eight genera. In the long familiar *Branchipus*, *Chirocephalus* and *Streptocephalus* the males have frontal appendages, but these are wanting in the "brine-shrimp" *Artemia*, and the same want helps to distinguish *Branchinecta* (Verrill, 1869) from the old genus *Branchipus*. Of *Branchiopsyllus* (Sars, 1897) the male is not yet known, but in his genera of the same date, the Siberian *Artemiopsis* and the South African *Branchipodopsis* (1898), there is no such appendage. Of the last genus the type species *B. hodgsoni* belongs to Cape Colony, but the specimens described were born and bred and observed in Norway. For the study of freshwater Entomostraca large possibilities are now opened to the naturalist. A parcel of dried mud, coming for example from Palestine or Queensland, and after an indefinite interval of time put into water in England or elsewhere, may yield him living forms, both new and old, in the most agreeable variety. Some caution should be used against confounding accidentally introduced indigenous species with those reared from the imported eggs. Those, too, who send or bring the foreign soil should exercise a little thought in the choice of it, since dry earth that has never had any Entomostraca near it at home will not become fertile in them by the mere fact of exportation.

2. Notophylla.—In this division the body is partly covered by a broad shield, united in front with the head; the eyes are sessile, the first antennae are small, the second rudimentary or wanting; of the numerous feet, sometimes sixty-three pairs, exceeding the number of segments to which they are attached, the first pair are more or less unlike the rest, and in the female the eleventh have the epipod and exopod (flabellum and sub-apical lobe of Lankester) modified to form an ovisac. Development begins with a nauplius stage. Males are very rare. The single family *Apodidae* contains only two genera, *Apus* and its very near neighbour *Lepidurus*. *Apus australiensis* (Spencer and Hall, 1896) may rank as the largest of the Entomostraca, reaching in the male, from front of shield to end of telson, a length of 70 mm., in the female of 64 mm. In a few days, or at most a fortnight, after a rainfall numberless specimens of these sizes were found swimming about, "and as not a single one was to be found in the water-pools prior to the rain, these must have been developed from the egg." Similarly, in Northern India *Apus himalayanus* was "collected from a stagnant pool in a jungle four days after a shower of rain had fallen," following a drought of four months (Packard).

3. **Conchophylla.**—Though concealed within the bivalved shell-cover, the mouth-parts are nearly as in the Gymnophylla, but the flexing of the caudal part is in contrast, and the biramous second antennae correspond with what is only a larval character in the other phyllopods. In the male the first one or two pairs of feet are modified into grasping organs. The small ova are crowded beneath the dorsal part of the valves. The development usually begins with a nauplius stage (Sars, 1896, 1900). There are four families: (*a*) The *Limnadiidae*, with feet from 18 to 32 pairs, comprise four (or five) genera. Of these *Limnadella* (Girard, 1855) has a single eye. It remains rather obscure, though the type species originally "was discovered in great abundance in a roadside puddle subject to desiccation." *Limnadia* (Brongniart, 1820) is supposed to consist of species exclusively parthenogenetic. But when asked to believe that males never occur among these amazons, one cannot but remember how hard it is to prove a negative. (*b*) The *Lynceidae*, with not more than twelve pairs of feet. This family is limited to the species, widely distributed, of the single genus *Lynceus*, established by O. F. Müller in 1776 and 1781, and first restricted by Leach in 1816 in the *Encyclopaedia Britannica* (art. "Annulosa," of that edition). Leach there assigns to it the single species *L. brachyurus* (Müller), and as this is included in the genus *Limnetis* (Lovén, 1846), that genus must be a synonym of *Lynceus* as restricted. (*c*) *Leptestheriidae*. *Estheria* (Rüppell, 1837) was instituted for the species *dahalacensis*, which Sars includes in his genus *Leptestheria* (1898); but *Estheria* was already appropriated, and of its synonyms *Cyzicus* (Audouin, 1837) is lost for vagueness, while *Isaura* (Joly, 1842) is also appropriated, so that *Leptestheria* becomes the name of the typical genus, and determines the name of the family. (*d*) *Cyclestheriidae*. This family consists of the single species *Cyclestheria hislopi* (Baird), reported from India, Ceylon, Celebes, Australia, East Africa and Brazil. Sars (1887) having had the opportunity of raising it from dried Australian mud, found that, unlike other phyllopods, but like the Cladocera, the parent keeps its brood within the shell until their full development.

Cladocera.—In this suborder the head is more or less distinct, the rest of the body being in general laterally compressed and covered by a bivalved test. The title "branching horns" alludes to the second antennae, which are two-branched except in the females of *Holopedium*, with each branch setiferous, composed of only two to four joints. The mandibles are without palp. The pairs of feet are four to six. The eye is single, and in addition to the eye there is often an "eye-spot," *Monospilus* being unique in having the eye-spot alone and no eye, while *Leydigiopsis* (Sars, 1901) has an eye with an eye-spot equal to it or larger. The heart has a pair of venous ostia, often blending into one, and an anterior arterial aorta. Respiration is conducted by the general surface, by the branchial lamina (external branch) of the feet, and the vesicular appendage (when present) at the base of this branch. The "abdomen," behind the limbs, is usually very short, occasionally very long. The "postabdomen," marked off by the two postabdominal setae, usually has teeth or spines, and ends in two denticulate or ciliate claws, or it may be rudimentary, as in *Polyphemus*. Many species have a special glandular organ at the back of the head, which *Sida crystallina* uses for attaching itself to various objects. The Leydigian or nuchal organ is supposed to be auditory and to contain an otolith. The female lays two kinds of eggs—"summer-eggs," which develop without fertilization, and "winter-eggs" or resting eggs, which require to be fertilized. The latter in the *Daphniidae* are enclosed in a modified part of the mother's shell, called the ephippium from its resemblance to a saddle in shape and position. In other families a less elaborate case has been observed, for which Scourfield has proposed the term protoephippium. In *Leydigia* he has recently found a structure almost as complex as that of the *Daphniidce*. In some families the resting eggs escape into the water without special covering. Only the embryos of *Leptodora* are known to hatch out in the nauplius stage. *Penilia* (Dana, 1849) is perhaps the only exclusively marine genus. The great majority of the Cladocera belong to fresh water, but their adaptability is large, since *Moina rectirostris* (O. F. Müller) can equally enjoy a pond at Blackheath, and near Odessa live in water twice as salt as that of the ocean. In point of size a Cladoceran of 5 mm. is spoken of as colossal.

Dr Jules Richard in his revision (1895) retains the sections proposed by Sars in 1865, Calyptomera and Gymnomera. The former, with the feet for the most part concealed by the carapace, is subdivided into two tribes, the Ctenopoda, or "comb-feet," in which the six pairs of similar feet, all branchial and nonprehensile, are furnished with setae arranged like the teeth of a comb, and the Anomopoda, or "variety-feet," in which the front feet differ from the rest by being more or less prehensile, without branchial laminae.

The Ctenopoda comprise two families: (*a*) the *Holopediidae*, with a solitary species, *Holopedium gibberum* (Zaddach), queerly clothed in a large gelatinous involucre, and found in mountain tarns all over Europe, in large lakes of N. America, and also in shallow ponds and waters at sea-level; (*b*) the *Sididae*, with no such involucre, but with seven genera, and rather more than twice as many species. Of *Diaphanosoma modiglianii* Richard says that at different points of Lake Toba in Sumatra millions of specimens were obtained, among which he had not met with a single male.

The Anomopoda are arranged in four families, all but one very extensive. (*a*) *Daphniidae*. Of the seven genera, the cosmopolitan *Daphnia* contains about 100 species and varieties, of which Thomas Scott (1899) observes that "scarcely any of the several characters that have at one time or another been selected as affording a means for discriminating between the different forms can be relied on as satisfactory." Though this may dishearten the systematist, Scourfield (1900) reminds us that "It was in a water-flea that Metschnikoff first saw the leucocytes (or phagocytes) trying to get rid of disease germs by swallowing them, and was so led to his epoch-making discovery of the part played by these minute amoeboid corpuscles in the animal body." For *Scapholeberis mucronata* (O. F. Müller), Scourfield has shown how it is adapted for movement back downwards in the water along the underside of the surface film, which to many small crustaceans is a dangerously disabling trap. (*b*) *Bosminidae*. To *Bosmina* (Baird, 1845) Richard added *Bosminopsis* in 1895. (*c*) *Macrotrichidae*. In this family *Macrothrix* (Baird, 1843) is the earliest genus, among the latest being *Grimaldina* (Richard, 1892) and *Jheringula* (Sars, 1900). Dried mud and vegetable débris from S. Paulo in Brazil supplied Sars with representatives of all the three in his Norwegian aquaria, in some of which the little *Macrothrix elegans* "multiplied to such an extraordinary extent as at last to fill up the water with immense shoals of individuals." "The appearance of male specimens was always contemporary with the first ephippial formation in the females." For *Streblocerus pygmaeus*, grown under the same conditions, Sars observes: "This is perhaps the smallest of the Cladocera known, and is hardly more than visible to the naked eye," the adult female scarcely exceeding 0·25 mm. Yet in the next family *Alonella nana* (Baird) disputes the palm and claims to be the smallest of all known Arthropoda. (*d*) *Chydoridae*. This family, so commonly called *Lynceidae*, contains a large number of genera, among which one may usually search in vain, and rightly so, for the genus *Lynceus*. The key to the riddle is to be found in the *Encyclopaedia Britannica* for 1816. There, as above explained, Leach began the subdivision of Müller's too comprehensive genus, the result being that *Lynceus* belongs to the Phyllopoda, and *Chydorus* (Leach, 1816) properly gives its name to the present family, in which the doubly convoluted intestine is so remarkable. Of its many genera, *Leydigia*, *Leydigiopsis*, *Monospilus* have been already mentioned. *Dadaya macrops* (Sars, 1901), from South America and Ceylon, has a very large eye and an eye-spot fully as large, but it is a very small creature, odd in its behaviour, moving by jumps at the very surface of the water. "To the naked eye it looked like a little black atom darting about in a most wonderful manner."

The Gymnomera, with a carapace too small to cover the feet, which are all prehensile, are divided also into two tribes, the Onychopoda, in which the four pairs of feet have a toothed maxillary process at the base, and the Haplopoda, in which there are six pairs of feet, without such a process. To the *Polyphemidae*, the well-known family of the former tribe, Sars in 1897 added two remarkable genera, *Cercopagis*, meaning "tail with a sling," and *Apagis*, "without a sling," for seven species from the Sea of Azov. The Haplopoda likewise have but a single family, the *Leptodoridae*, and this has but the single genus *Leptodora* (Lilljeborg, 1861). Dr Richard (1895, 1896) gives a Cladoceran bibliography of 601 references.

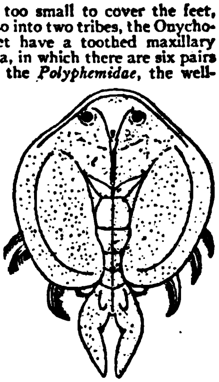

FIG. 1.—*Dolops ranarum* (Stuhlmann).

Branchiura.—This term was introduced by Thorell in 1864 for the *Argulidae*, a family which had been transferred to the Branchiopoda by Zenker in 1854, though sometimes before and since united with the parasitic Copepoda. Though the animals have an oral siphon, they do not carry ovisacs like the siphonostomous copepods, but glue their eggs in rows to extraneous objects. Their lateral, compound, feebly movable eyes agree with those of the Phyllopoda. The family are described by Claus as "intermittent parasites," because when gorged they leave their hosts, fishes or frogs, and swim about in freedom for a considerable period. The long-known *Argulus* (O. F. Müller) has the second maxillae transformed into suckers, but in *Dolops* (Audouin, 1837) (fig. 1), the name of which supersedes the more familiar *Gyropeltis* (Heller, 1857), these effect attachment by ending in strong hooks (Bouvier, 1897). A third genus, *Chonopeltis* (Thiele, 1900), has suckers, but has lost its first antennae, at least in the female.

Ostracoda.—The body, seldom in any way segmented, is wholly encased in a bivalved shell, the caudal part strongly inflexed, and almost always ending in a furca. The limbs, including antennae and mouth organs, never exceed seven definite pairs. The first antennae never have more than eight joints. The young usually pass through several stages of development after leaving the egg, and this commonly after, even long after, the egg has left the maternal shell. Parthenogenesis is frequent.

The four tribes instituted by Sars in 1865 were reduced to two by G. W. Müller in 1894, the Myodocopa, which almost always have a heart, and the Podocopa, which have none.

Myodocopa.—These have the furcal branches broad, lamellar, with at least three pairs of strong spines or ungues. Almost always the shell has a rostral sinus. Müller divides the tribe into three families, *Cypridinidae*, *Halocypridae*, and the heartless *Polycopidae*, which constituted the tribe Cladocopa of Sars. From the first of these Brady and Norman distinguish the Asteropidae (fig. 3), remarkable for seven pairs of long branchial leaves which fold over the hinder extremity of the animal, and the *Sarsiellidae*, still somewhat obscure, besides adding the *Rutidermatidae*, knowledge of which is based on skilful maceration of minute and long-dried specimens. The *Halocypridae* are destitute of compound lateral eyes, and have the sexual orifice unsymmetrically placed.

Podocopa.—In these the furcal branches are linear or rudimentary, the shell is without rostral sinus, and, besides distinguishing characters of the second antennae, they have always a branchial plate well developed on the first maxillae, which is inconstant in the other tribe. There are five families: (*a*) *Cyprididae* (? including *Cypridopsidae* of Brady and Norman). In some of the genera parthenogenetic propagation is carried to such an extent that of the familiar *Cypris* it is said, "until quite lately males in this genus were unknown; and up to the present time no male has been found in the British Islands" (Brady and Norman, 1896). On the other hand, the ejaculatory duct with its verticillate sac in the male of *Cypris* and other genera is a feature scarcely less remarkable. (*b*) *Bairdiidae*, which have the valves smooth, with the hinge untoothed. (*c*) *Cytheridae* (? including *Paradoxostomatidae* of Brady and Norman), in which the valves are usually sculptured, with toothed hinge. Of this family the members are almost exclusively marine, but *Limnicythere* is found in fresh water, and *Xestoleberis bromeliarum* (Fritz Müller) lives in the water that collects among the leaves of Bromelias, plants allied to the pine-apples. (*d*) *Darwinulidae*, including the single species *Darwinula stevensoni*, Brady and Robertson, described as "perhaps the most characteristic Entomostracan of the East Anglian Fen District." (*e*) *Cytherellidae*, which, unlike the Ostracoda in general, have the hinder part of the body segmented, at least ten segments being distinguishable in the female. They have the valves broad at both ends, and were placed by Sars in a separate tribe, called Platycopa.

The range in time of the Ostracoda is so extended that, in G. W. Müller's opinion, their separation into the families now living may have already taken place in the Cambrian period. Their range in space, including carriage by birds, may be co-extensive with the distribution of water, but it is not known what height of temperature or how much chemical adulteration of the water they can sustain, how far they can penetrate underground, nor what are the limits of their activity between the floor and the surface of aquatic expanses, fresh or saline. In individual size they have never been important, and of living forms the largest is one of recent discovery, *Crossophorus africanus*, a Cypridinid about three-fifths of an inch (15·5 mm.) long; but a length of one or two millimetres is more common, and it may descend to the seventy-fifth of an inch. By multitude they have been, and still are, extremely important.

Though the exterior is more uniform than in most groups of Crustacea, the bivalved shell or carapace may be strongly calcified and diversely sculptured (fig. 2), or membranaceous and polished, hairy or smooth, oval or round or bean-shaped, or of some less simple pattern; the valves may fit neatly, or one overlap the other, their hinge may have teeth or be edentulous, and their front part may be excavated for the protrusion of the antennae or have no such "rostral sinus." By various modifications of their valves and appendages the creatures have become adapted for swimming, creeping, burrowing, or climbing, some of them combining two or more of these activities, for which their structure seems at the first glance little adapted. Considering the imprisonment of the ostracod body within the valves, it is more surprising that the *Asteropidae* and *Cypridinidae* should have a pair of compound and sometimes large eyes, in addition to the median organ at the base of the "frontal tentacle," than that other members of the group should be limited to that median organ of sight, or have no eyes at all. The median eye when present may have or not have a lens, and its three pigment-cups may be close together or wide apart and the middle one rudimentary. As might be expected, in thickened and highly embossed valves thin spaces occur over the visual organ. The frontal organ varies in form and apparently in function, and is sometimes absent. The first antennae, according to the family, may assist in walking, swimming, burrowing, climbing, grasping, and besides they carry sensory setae, and sometimes they have suckers on their setae (see Brady and Norman on *Cypridina norvegica*). The second antennae are usually the chief motor-organs for swimming, walking and climbing. The mandibles are normally five-jointed, with remnants of an outer branch on the second joint, the biting edge varying from strong development to evanescence, the terminal joints or "palp" giving the organ a leg-like appearance and function, which disappears in suctorial genera such as *Paracytherois*. The variable first maxillae are seldom pediform, their function being concerned chiefly with nutrition, sensation and respiration. The variability in form and function of the second maxillae is sufficiently shown by the fact that G. W. Müller, our leading authority, adopts the confusing plan of calling them second maxillae in the *Cypridinidae* (including *Asteropidae*), maxillipeds in the *Halocypridae* and *Cyprididae*, and first legs in the *Bairdiidae*, *Cytheridae*, *Polycopidae* and *Cytherellidae*, so that in his fine monograph he uses the term first leg in two quite different senses. The first legs, meaning thereby the sixth pair of appendages, are generally pediform and locomotive, but sometimes unjointed, acting as a kind of brushes to cleanse the furca, while in the *Polycopidae* they are entirely wanting. The second legs are sometimes wanting, sometimes pediform and locomotive, sometimes strangely metamorphosed into the "vermiform organ," generally long, many-jointed, and distally armed with retroverted spines, its function being that of an extremely mobile cleansing foot, which can insert itself among the eggs in the brood-space, between the branchial leaves of *Asterope* (fig. 3), and even range over the external surface of the valves. The "brush-formed" organs of the Podocopa are medially placed, and, in spite of their sometimes forward situation, Müller believes among other possibilities that they and the penis in the *Cypridinidae* may be alike remnants of a third pair of legs, not homologous with the penis of other Ostracoda (Podocopa included). The furca is, as a rule, a powerful motor-organ, and has its laminae edged with strong teeth (ungues) or setae or both. The young, though born with valves, have at first a nauplian body, and pass through various stages to maturity.

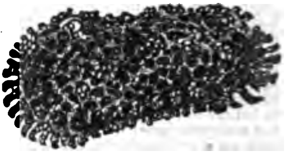

Fig. 2.—*Cythereis ornata* (G. W. Müller). One eye-space is shown above on the left.

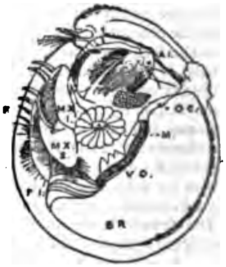

Fig. 3.—*Asterope arthuri.* Left valve removed.

M,	End of adductor muscle.
OC,	Eye.
AI,	Second antenna.
MX.	1, First maxilla.
MX.	2, Second maxilla.
P. 1,	First foot.
V.O,	Vermiform organ.
BR,	Seven branchial leaves.
F.	Projecting ungues of the furca.

Brady and Norman, in their *Monograph of the Ostracoda of the North Atlantic and North-Western Europe* (1889), give a bibliography of 125 titles, and in the second part (1896) they give 55 more. The lists are not meant to be exhaustive, any more than G. W. Müller's literature list of 125 titles in 1894. They do not refer to Latreille, 1802, with whom the term Ostracoda originates.

Copepoda.—The body is not encased in a bivalved shell; its articulated segments are at most eleven, those behind the genital segment being without trace of limbs, but the last almost always carrying a furca. Sexes separate, fertilization by spermatophores. Ova in single or double or rarely several packets, attached as ovisacs or egg-strings to the genital openings, or enclosed in a dorsal marsupium, or deposited singly or occasionally in bundles. The youngest larvae are typical nauplii. The next, the copepodid or cyclopid, stage is characterized by a cylindrical segmented body, with fore- and hind-body distinct, and by having at most six cephalic limbs and two pairs of swimming feet.

The order thus defined (see Giesbrecht and Schmeil, *Das Tierreich*, 1898), with far over a thousand species (Hansen, 1900), embraces forms of extreme diversity, although, when species are known in all their phases and both sexes, they constantly tend to prove that there are no sharply dividing lines between the free-living, the semi-parasitic, and those which in adult life are wholly parasitic and then sometimes grotesquely unlike the normal standard. Giesbrecht and Hansen have shown that the mouth-organs consist of mandibles, first and second maxillae and maxillipeds; and Claus himself relinquished his long maintained hypothesis that the last two pairs were the separated exopods and endopods of a single pair of appendages. Thorell's classification (1859) of Gnathostoma, Poecilostoma, Siphonostoma, based on the mouth-organs, was long followed, though almost at the outset shown by Claus to depend on the erroneous supposition that the Poecilostoma were devoid of mandibles. Brady added a new section, Chonio-stomata, in 1894, and another, Leptostomata, in 1900, each for a single species. Canu in 1892 proposed two groups, Monoporodelphya and Diporodelphya, the copulatory openings of the female being paired in the latter, unpaired in the former. It may be questioned whether this distinction, however important in itself, would lead to a satisfactory grouping of families. In the same year Giesbrecht proposed his division of the order into Gymnoplea and Podoplea.

In appearance an ordinary Copepod is divided into fore- and hind-body, of its eleven segments the composite first being the head, the next five constituting the thorax, and the last five the abdomen. The coalescence of segments, though frequent, does not after a little experience materially confuse the counting. But there is this peculiarity, that the middle segment is sometimes continuous with the broader fore-body, sometimes with the narrower hind-body. In the former case the hind-body, consisting only of the abdomen, forms a pleon or tail-part devoid of feet, and the species so constructed are Gymnoplea, those of the naked or footless pleon. In the latter case the middle segment almost always carries with it to the hind-body a pair of rudimentary limbs, whence the term Podoplea, meaning species that have a pleon with feet. It may be objected that hereby the term pleon is used in two different senses, first applying to the abdomen alone and then to the abdomen plus the last thoracic segment. Even this verbal flaw would be obviated if Giesbrecht could prove his tentative hypothesis, that the Gymnoplea may have lost a pre-genital segment of the abdomen, and the Podoplea may have lost the last segment of the thorax. The classification is worked out as follows:—

1. *Gymnoplea.*—First segment of hind-body footless, bearing the orifices of the genital organs (in the male unsymmetrically placed); last foot of the fore-body in the male a copulatory organ; neither, or only one, of the first pair of antennae in the male geniculating; cephalic limbs abundantly articulated and provided with many plumose setae; heart generally present. Animals usually free-living, pelagic (Giesbrecht and Schmeil).

This group, with 65 genera and four or five-hundred species, is divided by Giesbrecht into tribes: (*a*) Amphaskandria. In this tribe the males have both antennae of the first pair as sensory organs. There is but one family, the *Calanidae*, but this is a very large one, with 26 genera and more than 100 species. Among them is the cosmopolitan *Calanus finmarchicus*, the earliest described (by Bishop Gunner in 1770) of all the marine free-swimming Copepoda. Among them also is the peacock Calanid, *Calocalanus pavo* (Dana), with its highly ornamented antennae and gorgeous tail, the most beautiful species of the whole order (fig. 4). (*b*) Heterarthrandria. Here the males have one or the other of the first pair of antennae modified into a grasping organ for holding the female. There are four families, the *Diaptomidae* with 27 genera, the *Pontellidae* with 10, the *Pseudocyclopidae* and *Candaciidae* each with one genus. The first of these families is often called *Centropagidae*, but, as Sars has pointed out, *Diaptomus* (Westwood, 1836) is the oldest genus in it. Of 177 species valid in the family Giesbrecht and Schmeil assign 67 to *Diaptomus*. In regard to one of its species Dr Brady says: "In one instance, at least (Talkin Tarn, Cumberland) I have seen the net come up from a depth of 6 or 8 ft. below the surface with a dense mass consisting almost entirely of *D. gracilis*." The length of this net-filling species is about a twentieth of an inch.

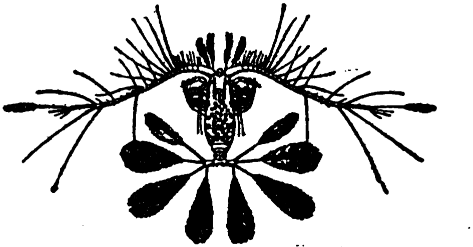

FIG. 4.—*Calocalanus pavo* (Dana).

2. *Podoplea.*—The first segment of the hind-body almost always with rudimentary pair of feet; orifices of the genital organs (symmetrically placed in both sexes) in the following segment; neither the last foot of the fore-body nor the rudimentary feet just mentioned acting as a copulatory organ in the male; both or neither of the first pair of antennae in the male geniculating; cephalic limbs less abundantly articulated and with fewer plumose setae or none, but with hooks and clasping setae. Heart almost always wanting. Free-living (rarely pelagic) or parasitic (Giesbrecht and Schmeil).

This group is also divided by Giesbrecht into two tribes, Ampharthrandria and Isokerandria. In 1892 he distinguished the former as those in which the first antennae of the male have both members modified for holding the female, and the genital openings of the female have a ventral position, sometimes in close proximity, sometimes strongly lateral; the latter as those in which the first antennae of the male are similar to those of the female, the function of holding her being transferred to the male maxillipeds, while the genital openings of the female are dorsal, though at times strongly lateral. In 1899, with a view to the many modifications exhibited by parasitic and semi-parasitic species, the definitions, stripped of a too hampering precision, took a different form: (*a*) Ampharthrandria. "Swimming Podoplea with geniculating first antennae in the male sex, and descendants of such; first antennae in female and male almost always differently articulated." The families occupy fresh water as well as the sea. Naturally "descendants" which have lost the characteristic feature of the definition cannot be recognized without some further assistance than the definition supplies. Of the families comprised, the *Mormonillidae* consist only of *Mormonilla* (Giesbrecht), and are not mentioned by Giesbrecht in 1899 in the grouping of this section. The *Thaumatoessidae* include *Thaumatoessa* (Kröyer), established earlier than its synonym *Thaumaleus* (Kröyer), or than *Monstrilla* (Dana, 1849). The species are imperfectly known. The defect of mouth-organs probably does not apply to the period of youth, which some of them spend parasitically in the body-cavity of worms (Giard, 1896). To the *Cyclopidae* six genera are allotted by Giesbrecht in 1900. *Cyclops* (O. F. Müller, 1776), though greatly restricted since Müller's time, still has several scores of species abundantly peopling inland waters of every kind and situation, without one that can be relied on as exclusively marine like the species of *Oithona* (Baird). The *Misophriidae* are now limited to *Misophria* (Boeck). The presence of a heart in this genus helps to make it a link between the Podoplea and Gymnoplea, though in various other respects it approaches the next family. The *Harpacticidae* owe their name to the genus *Arpacticus* (Milne-Edwards, 1840). Brady in 1880 assigns to this family 33 genera and 81 species. Canu (1892) distinguishes eight sub-families, *Longipediinae*, *Peltidiinae*, *Tachidiinae*, *Amymoninae*, *Harpacticinae*, *Idyinae*, *Canthocamptinae* (for which *Canthocamptinae* should be read), and *Nannopinae*, adding *Stenheliinae* (Brady) without distinctive characters for it. The *Ascidicolidae* have variable characters, showing a gradual adaptation to parasitic life in Tunicates. Giesbrecht (1900) considers Canu quite right in grouping together in this single family those parasites of ascidians, simple and compound, which had been previously distributed among families with the more or less significant names *Notodelphyidae*, *Doropygidae*, *Buproridae*, *Schizoproctidae*, *Kossmechtridae*, *Enterocolidae*, *Enteropsidae*. Further, he includes in it his own *Enterognathus comatulae*, not from an ascidian, but from the intestine of the beautiful starfish *Antedon rosaceus*. The *Asterocheridae*, which have a good swimming capacity, except in the case of *Cancerilla tubulata* (Dalyell), lead a semi-parasitic life on echinoderms, sponges, &c., imbibing their food. Giesbrecht, displacing the older name *Ascomyzontidae*, assigns to this family 21 genera in five subfamilies, and suggests that the long-known but still puzzling *Nicothoë* from the gills of the lobster might be placed in an additional subfamily, or be made the representative of a closely related family. The *Dichelestiidae*, on account of their sometimes many-jointed first antennae, are referred also to this tribe by Giesbrecht. (*b*) Isokerandria. "Swimming Podoplea without geniculating first antennae in the male sex, and descendants of such. First antennae of male and female almost always articulated alike." To this tribe Giesbrecht assigns the families *Clausidiidae*, *Corycaeidae*, *Oncaeidae*, *Lichomolgidae*, *Ergasilidae*, *Bomolochidae*, *Clausiidae*, *Nereicolidae*. Here also must for the time be placed the *Caligidae*, *Philichthyidae* (*Philichthydae* of Vogt, Carus, Claus), *Lernaeidae*, *Chondracanthidae*, *Sphaeronellidae* (better known as *Choniostomatidae*, from H. J. Hansen's remarkable study of the group), *Lernaeopodidae*, *Herpyllobiidae*, *Entomolepidae*. For the distinguishing marks of all these, the number of their genera and species, their habits and transformations and dwellings, the reader must be referred to the writings of specialists. Sars (1901) proposed seven suborders—Calanoida, Harpacticoida, Cyclopoida, Notodelphoida, Monstrilloida, Caligoida, Lernaeoida.

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ENTRAGUES, CATHERINE HENRIETTE DE BALZAC D' (1579–1633), marquise de Verneuil, mistress of Henry IV., king of France, was the daughter of Charles Balzac d'Entragues and of Marie Touchet, mistress of Charles IX. Ambitious and intriguing, she succeeded in inducing Henry IV. to promise to marry her after the death of Gabrielle d'Estrées, a promise which led to bitter scenes at court when shortly afterwards Henry married Marie de' Medici. She carried her spite so far as to be deeply compromised in the conspiracy of Marshal Biron against the king in 1606, but escaped with a slight punishment, and in 1608 Henry actually took her back into favour again. She seems then to have been involved in the Spanish intrigues which preceded the death of the king in 1610.

See H. de la Ferrière, *Henri IV. le roi, l'amoureux* (Paris, 1890).

ENTRECASTEAUX, JOSEPH-ANTOINE BRUNI D' (1739–1793), French navigator, was born at Aix in 1739. At the age of fifteen he entered the navy. In the war of 1778 he commanded a frigate of thirty-two guns, and by his clever seamanship was successful in convoying a fleet of merchant vessels from Marseilles to the Levant, although they were attacked by two pirate vessels, each of which was larger than his own ship. In 1785 he was appointed to the command of the French fleet in the East Indies, and two years later he was named governor of the Mauritius and the Isle of Bourbon. While in command of the East India fleet he made a voyage to China, an achievement which, in 1791, led the French government to select him to command an expedition which it was sending out to seek some tidings of the unfortunate La Pérouse, of whom nothing had been heard since February 1788. Rear-admiral d'Entrecasteaux's expedition comprised the "Recherche" and "L'Esperance," with Captain Huon de Kermadec as second in command. No tidings were obtained of the missing navigator, but in the course of his search Entrecasteaux made important geographical discoveries. He traced the outlines of the eastern coast of New Caledonia, made extensive surveys round the Tasmanian coast, and touched at several places on the south coast of New Holland. The two ships entered Storm Bay, Tasmania, on the 21st of April 1792, and remained there until the 16th of May, surveying and naming the d'Entrecasteaux Channel, the entrances to the Huon and Derwent rivers, Bruni Island, Recherche Bay, Port Esperance and various other localities. Excepting the name of the river Derwent (originally called Riviere du Nord by its French discoverers), these foregoing appellations have been retained. Leaving Tasmania the expedition sailed northward for the East Indies, and while coasting near the island of Java, Entrecasteaux was attacked by scurvy and died on the 20th of July 1793.

ENTRE MINHO E DOURO (popularly called *Minho*), a former province of Northern Portugal; bounded on the N. by Galicia in Spain, E. by Traz-os-Montes, S. by Beira and W. by the Atlantic Ocean. Pop. (1900) 1,170,361; area 2790 sq. m. Though no longer officially recognized, the old provincial name remains in common use. The coast-line of Entre Minho e Douro is level and unbroken except by the estuaries of the main rivers; inland, the elevation gradually increases towards the north and east, where several mountain ranges mark the frontier. Of these, the most important are the Serra da Peneda (4728 ft. between the rivers Minho and Limia; the Serra do Gerez (4357 ft.), on the Galician border; the Serra da Cabreira (4021 ft.), immediately to the south; and the Serra de Marão (4642 ft.), in the extreme south-east. As its name implies, the province is bounded by two great rivers, the Douro (*q.v.*) on the south, and the Minho (Spanish *Miño*) on the north; but a small tract of land south of the Douro estuary is included also within the provincial boundary. There are three other large rivers which, like the Minho, flow west-south-west into the Atlantic. The Limia or Antela (Spanish *Linia*) rises in Galicia, and reaches the sea at Vianna do Castello; the Cavado springs from the southern foot hills of La Raya Seca, on the northern frontier of Traz-os-Montes, and forms, at its mouth, the small harbour of Espozende; and the Ave descends from its sources in the Serra da Cabreira to Villa do Conde, where it enters the Atlantic. A large right-hand tributary of the Douro, the Tamega, rises in Galicia, and skirts the western slopes of the Serra de Marão.

The climate is mild, except among the mountains, and such plants as heliotrope, fuchsias, palms, and aloes thrive in the open throughout the year. Wheat and maize are grown on the plains, and other important products are wine, fruit, olives and chestnuts. Fish abound along the coast and in the main rivers; timber is obtained from the mountain forests, and dairy-farming and the breeding of pigs and cattle are carried on in all parts. As the province is occupied by a hardy and industrious peasantry, and the density of population (419·5 per sq. m.) is more than twice that of any other province on the Portuguese mainland, the soil is very closely cultivated. The methods and implements of the farmers are, however, most primitive, and at the beginning of the 20th century is was not unusual to see a mule, or even a woman, harnessed with the team of oxen to an old-fashioned wooden plough. Small quantities of coal, iron, antimony, lead and gold are mined; granite and slate are quarried; and there are mineral springs at Monção (pop. 2283) on the Minho. The Oporto-Corunna railway traverses the western districts and crosses the Spanish frontier at Tuy; its branch lines give access to Braga, Guimarães and Povoa de Varzim; and the Oporto-Salamanca railway passes up the Douro valley. The greater part of the north and west can only be reached by road, and even the chief highways are ill-kept. In these regions the principal means of transport is the springless wooden cart, drawn by one or more of the tawny and under-sized but powerful oxen, with immense horns and elaborately carved yoke, which are characteristic of northern Portugal. For administrative purposes the province is divided into three districts: Vianna do Castello in the north, Braga in the centre, Oporto in the south. The chief towns are separately described; they include Oporto (167,955), one of the greatest wine-producing cities in the world; Braga (24,202), the seat of an archbishop who is primate of Portugal; the seaports of Povoa de Varzim (12,623) and Vianna do Castello (9990); and Guimarães (9104), a place of considerable historical interest.

ENTREPÔT (a French word, from the Lat. *interpositum*, that which is placed between), a storehouse or magazine for the temporary storage of goods, provisions, &c.; also a place where goods, which are not allowed to pass into a country duty free, are stored under the superintendence of the custom house authorities till they are re-exported. In a looser sense, any town which has a considerable distributive trade is called an *entrepôt*. The word is also used attributively to indicate the kind of trade carried on in such towns.

ENTRE RIOS (Span. "between rivers"), a province of the eastern Argentine Republic, forming the sourthern part of a region sometimes described as the Argentine Mesopotamia, bounded N. by Corrientes, E. by Uruguay with the Uruguay river as the boundary line, S. by Buenos Aires and W. by Santa Fé, the Paraná river forming the boundary line with these two provinces. Pop. (1895) 292,019; (1905, est.) 376,600. The province has an area of 28,784 sq. m., consisting for the most part of an undulating, well-watered and partly-wooded plain, terminating in a low, swampy district of limited extent in the angle between the two great rivers. The great forest of Monteil occupies an extensive region in the N., estimated at nearly one-fifth the area of the province. Its soil is exceptionally fertile and its climate is mild and healthy. The province is sometimes called the "garden of Argentina," which would probably be sufficiently correct had its population devoted as much energy to agriculture as they have to political conflict and civil war. Its principal industry is that of stock-raising, exporting live cattle, horses, hides, jerked beef, tinned and salted meats, beef extract, mutton and wool. Its agricultural products are also important, including wheat, Indian corn, barley and fruits. Lime, gypsum and firewood are also profitable items in its export trade. The Paraná and Uruguay rivers provide exceptional facilities for the shipment of produce and the Entre Rios railways, consisting of a trunk line running E. and W. across the province from Paraná to Concepción del Uruguay and several tributary branches, afford ample transportation facilities to the ports. Another railway line follows the Uruguay from Concordia northward into Corrientes. Entre Rios has been one of the most turbulent of the Argentine provinces, and has suffered severely from political disorder and civil war. Comparative quiet reigned from 1842 to 1870 under the autocratic rule of Gen. J. J. Urquiza. After his assassination in 1870 these partizan conflicts were renewed for two or three years, and then the province settled down to a life of comparative peace, followed by an extraordinary development in her pastoral and agricultural industries. Among these is the slaughtering and packing of beef, the exportation of which has reached large proportions. The capital is Paraná, though the seat of government was originally located at Concepción del Uruguay, and was again transferred to that town during Urquiza's domination. Concepción del Uruguay, or Concepción (founded 1778), is a flourishing town and port on the Uruguay, connected by railway with an extensive producing region which gives it an important export trade, and is the seat of a national college and normal school. Its population was estimated at 9000 in 1905. Other large towns are Gualeguay and Gualeguaychú

ENVOY (Fr. *envoyé*, "sent"), a diplomatic agent of the second rank. The word *envoyé* comes first into general use in this connexion in the 17th century, as a translation of the Lat. *ablegatus* or *missus* (see DIPLOMACY). Hence the word envoy is commonly used of any one sent on a mission of any sort.

ENZIO (*c.* 1220–1272), king of Sardinia, was a natural son of the emperor Frederick II. His mother was probably a German, and his name, Enzio, is a diminutive form of the German *Heinrich*. His father had a great affection for him, and he was probably present at the battle of Cortenuova in 1237. In 1238 he was married, in defiance of the wishes of Pope Gregory IX., to Adelasia, widow of Ubaldo Visconti and heiress of Torres and Gallura in Sardinia. Enzio took at once the title of king of Torres and Gallura, and in 1243 that of king of Sardinia, but he only spent a few months in the island, and his sovereignty existed in name alone. In July 1239 he was appointed imperial vicegerent in Italy, and sharing in his father's excommunication in the same year, took a prominent part in the war which broke out between the emperor and the pope. He commenced his campaign by subduing the march of Ancona, and in May 1241 was in command of the forces which defeated the Genoese fleet at Meloria, where he seized a large amount of booty and captured a number of ecclesiastics who were proceeding to a council summoned by Gregory to Rome. Later he fought in Lombardy. In 1248 he assisted Frederick in his vain attempt to take Parma, but was wounded and taken prisoner by the Bolognese at Fossalta on the 26th of May 1249. His captivity was a severe blow to the Hohenstaufen cause in Italy, and was soon followed by the death of the emperor. He seems to have been well treated by the people of Bologna, where he remained a captive until his death on the 14th of March 1272. He was apparently granted a magnificent funeral, and was buried in the church of St Dominic at Bologna. During his imprisonment Enzio is said to have been loved by Lucia da Viadagola, a well-born lady of Bologna, who shared his captivity and attempted to procure his release. Some doubt has, however, been cast upon this story, and the same remark applies to another which tells how two friends had almost succeeded in freeing him from prison concealed in a wine-cask, when he was recognized by a lock of his golden hair. His marriage with Adelasia had been declared void by the pope in 1243, and he left one legitimate, and probably two illegitimate daughters. Enzio forms the subject of a drama by E. B. S. Raupach and of an opera by A. F. B. Dulk.

See F. W. Grossman, *König Enzio* (Göttingen, 1883); and H. Blasius, *König Enzio* (Breslau, 1884).

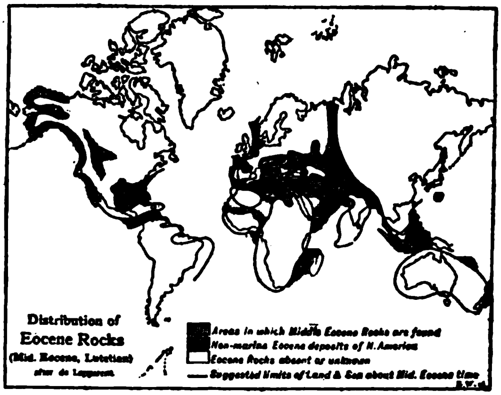
ENZYME (Gr. *ἔνζυμος*, leavened, from *ἐν*, in, and *ζύμη*, leaven), a term, first suggested by Kühne, for an unorganized ferment (see FERMENTATION), a group of substances, in the constitution of plants and animals, which decompose certain carbon compounds occurring in association with them. See also PLANTS: *Physiology*; NUTRITION, &c.

EOCENE (Gr. *ἠώς*, dawn, *καινός*, recent), in geology, the name suggested by Sir C. Lyell in 1833 for the lower subdivision of the rocks of the Tertiary Era. The term was intended to convey the idea that this was the period which saw the dawn of the recent or existing forms of life, because it was estimated that among the fossils of this period only 3½ % of the species are still living. Since Lyell's time much has been learned about the fauna and flora of the period, and many palaeontologists doubt if any of the Eocene *species* are still extant, unless it be some of the lowest forms of life. Nevertheless the name is a convenient one and is in general use. The Eocene as originally defined was not long left intact, for E. Beyrich in 1854 proposed the term "Oligocene" for the upper portion, and later, in 1874, K. Schimper suggested "Paleocene" as a separate appellation for the lower portion. The Oligocene division has been generally accepted as a distinct period, but "Paleocene" is not so widely used.

In north-western Europe the close of the Cretaceous period was marked by an extensive emergence of the land, accompanied, in many places, by considerable erosion of the Mesozoic rocks; a prolonged interval elapsed before a relative depression of the land set in and the first Eocene deposits were formed. The early Eocene formations of the London-Paris-Belgian basin were of fresh-water and brackish origin; towards the middle of the period they had become marine, while later they reverted to the original type. In southern and eastern Europe changes of sea-level were less pronounced in character; here the late Cretaceous seas were followed without much modification by those of the Eocene period, so rich in foraminiferal life. In many other regions, the great gap which separates the Tertiary from the Mesozoic rocks in the neighbourhood of London and Paris does not exist, and the boundary line is difficult to draw. Eocene strata succeed Cretaceous rocks without serious unconformity in the Libyan area, parts of Denmark, S.E. Alps, India, New Zealand and central N. America. The unconformity is marked in England, parts of Egypt, on the Atlantic coastal plain and in the eastern gulf region of N. America, as well as in the marine Eocene of western Oregon. The clastic Flysch formation of the

Carpathians and northern Alps appears to be of Eocene age in the upper and Cretaceous in the lower part. The Eocene sea covered at various times a strip of the Atlantic coast from New Jersey southward and sent a great tongue or bay up the Mississippi valley; similar epicontinental seas spread over parts of the Pacific border, but the plains of the interior with the mountains on the west were meanwhile being filled with terrestrial and lacustrine deposits which attained an enormous development. This great extension of non-marine formations in the Eocene of different countries has introduced difficulties in the way of exact correlation; it is safer, therefore, in the present state of knowledge, to make no attempt to find in the Eocene strata of America and India, &c., the precise equivalent of subdivisions that have been determined with more or less exactitude in the London-Paris-Belgian area.

It is possible that in Eocene times there existed a greater continuity of the northern land masses than obtains to-day. Europe at that time was probably united with N. America through Iceland and Greenland; while on the other side, America may have joined Asia by the way of Alaska. On the other hand, the great central, mediterranean sea which stretched across the Eurasian continents sent an arm northward somewhere just east of the Ural mountains, and thus divided the northern land mass in that region. S. America, Australia and perhaps Africa *may* have been connected more or less directly with the Antarctic continent.


Distribution of Eocene Rocks (Mid. Eocene, Lutetian) after de Lapparent.
Areas in which Middle Eocene Rocks are found
Non-marine Eocene deposits of N. America
Eocene Rocks absent or unknown
Suggested limits of Land & Sea about Mid. Eocene time
B.V.

Associated, no doubt, with the crustal movements which closed the Cretaceous and inaugurated the Eocene period, there were local and intermittent manifestations of volcanic activity throughout the period. Diabases, gabbros, serpentines, soda-potash granites, &c., are found in the Eocene of the central and northern Apennines. Tuffs occur in the Veronese and Vicentin Alps—Ronca and Spelecco schists. Tuffs, basalts and other igneous rocks appear also in Montana, Wyoming, California, Oregon, Washington, Idaho, Colorado; also in Central America, the Antillean region and S. America.

It has been very generally assumed by geologists, mainly upon the evidence of plant remains, that the Eocene period opened with a temperate climate in northern latitudes; later, as indicated by the London Clay, Alum Bay and Bournemouth beds, &c., the temperature appears to have been at least subtropical. But it should be observed that the frequent admixture of temperate forms with what are now tropical species makes it difficult to speak with certainty as to the degree of warmth experienced. The occurrence of lignites in the Eocene of the Paris basin, Tirol and N. America is worthy of consideration in this connexion. On the other hand, the coarse boulder beds in the lower Flysch have been regarded as evidence of local glaciation; this would not be inconsistent with a period of widespread geniality of climate, as is indicated by the large size of the nummulites and the dispersion of the marine Mollusca, but the evidence for glaciation is not yet conclusive.

Eocene Stratigraphy.—In Britain, with the exception of the Bovey beds (*q.v.*) and the leaf-bearing beds of Antrim and Mull, Eocene rocks are confined to the south-eastern portion of England. They lie in the two well-marked synclinal basins of London and Hampshire which are conterminous in the western area (Hampshire, Berkshire), but are separated towards the east by the denuded anticline of the Weald. The strata in these two basins have been grouped in the following manner:—

	London Basin.	*Hampshire Basin.*
Upper	Upper Bagshot Sands.	Headon Hill and Barton Sands.
Middle	Middle Bagshot Beds and part of Lower Bagshot Beds.	Bracklesham Beds and leaf beds of Bournemouth and Alum Bay.
Lower	Part of Lower Bagshot Beds, London Clay, Blackheath and Oldhaven Beds, Woolwich and Reading Beds, Thanet Sands.	London Clay and the equivalent Bognor Beds, Woolwich and Reading Beds.

The Thanet sands have not been recognized in the Hampshire basin; they are usually pale yellow and greenish sands with streaks of clay and at the base; resting on an evenly denuded surface of chalk is a very constant layer of green-coated, well-rounded chalk flint pebbles. It is a marine formation, but fossils are scarce except in E. Kent, where it attains its most complete development. The Woolwich and Reading beds (see **Reading Beds**) contain both marine and estuarine fossils. In western Kent, between the Woolwich beds and the London Clay are the Oldhaven beds or Blackheath pebbles, 20 to 40 ft., made up almost entirely of well-rounded flint pebbles set in sand; the fossils are marine and estuarine. The London Clay, 500 ft. thick, is a marine deposit consisting of blue or brown clay with sandy layers and septarian nodules; its equivalent in the Hampshire area is sometimes called the Bognor Clay, well exposed on the coast of Sussex. The Bagshot, Bracklesham and Barton beds will be found briefly described under those heads.

Crossing the English Channel, we find in northern France and Belgium a series of deposits identified in their general characters with those of England. The anticlinal ridge of the English Weald is prolonged south-eastwards on to the continent, and separates the Belgian from the French Eocene areas much as it separates the areas of London and Hampshire; and it is clear that at the time of deposition all four regions were intimately related and subject to similar variations of marine and estuarine conditions. With a series of strata so variable from point to point it is natural that many purely local phases should have received distinctive names; in the Upper Eocene of the Paris basin the more important formations are the highly fossiliferous marine sands known as the "Sands of Beauchamp" and the local fresh-water limestone, the "Calcaire de St Ouen." The Middle Eocene is represented by the well-known "Calcaire grossier," about 90 ft. thick. The beds in this series vary a good deal lithologically, some being sandy, others marly or glauconitic; fossils are abundant. The Upper Calcaire grossier or "Caillasses" is a fresh-water formation; the middle division is marine; while the lower one is partly marine, partly of fresh-water origin. The numerous quarries and mines for building stone in the neighbourhood of Paris have made it possible to acquire a very precise knowledge of this division, and many of the beds have received trade names, such as "Rochette," "Roche," "Banc franc," "Banc vert," "Cliquart," "Saint Nom; the two last named are dolomitic. Below these limestones are the nummulitic sands of Cuise and Soissons. The Lower Eocene contains the lignitic plastic clay (*argile plastique*) of Soissons and elsewhere; the limestones of Rilly and Sézanne and the greenish glauconitic sands of Bracheux. The relative position of the above formations with respect to those of Belgium and England will be seen from the table of Eocene strata. The Eocene deposits of southern Europe differ in a marked manner from those of the Anglo-Parisian basin. The most important feature is the great development of nummulitic limestone with thin marls and nummulitic sandstones. The sea in which the nummulitic limestones were formed occupied the site of an enlarged Mediterranean communicating with similar waters right round the world, for these rocks are found not only in southern Europe, including all the Alpine tracts, Greece and Turkey and southern Russia, but they are well developed in northern Africa, Asia Minor, Palestine, and they may be followed through Persia, Baluchistan, India, into China, Tibet, Japan, Sumatra, Borneo and the Philippines. The nummulitic limestones are frequently hard and crystalline, especially where they have been subjected to elevation and compression as in the Alpine region, 10,000 ft. above the sea, or from 16,000, to 20,000 ft., in the central Asian plateau. Besides being a wide-spread formation the nummulitic limestone is locally several thousand feet thick.

While the foraminiferal limestones were being formed over most of southern Europe, a series of clastic beds were in course of formation in the Carpathians and the northern Alpine region, viz. the Flysch and the Vienna sandstone. Some portions of this Alpine Eocene are coarsely conglomeratic, and in places there are boulders of non-local rocks of enormous dimensions included in the argillaceous or sandy matrix. The occurrence of these large boulders together with the scarceness of fossils has suggested a glacial origin for the formation; but the evidence hitherto collected is not conclusive. C. W. von Gümbel has classified the Eocene of the northern Alps (Bavaria, &c.) as follows:—

Upper Eocene	Flysch and Vienna sandstone, with younger nummulitic beds and Häring group.
Middle "	Kressenberg Beds, with older nummulitic beds.
Lower "	Burberg Beds, Greensands with small nummulites.

The Häring group of northern Tirol contains lignite beds of some importance. In the southern and S.E. Alps the following divisions are recognized.

Upper Eocene	Macigno or Tassello—Vienna Sandstone, conglomerates, marls and shales.
Middle "	Nummulitic limestones, three subdivisions.
Lower "	Liburnian stage (or Proteocene), foraminiferal limestones with fresh-water intercalations at the top and bottom, the *Cosina* beds, fresh-water in the middle of the series.

In the central and northern Apennines the Eocene strata have been subdivided by Prof. F. Sacco into an upper Bartonian, a middle Parisian and a lower Suessonian series. In the middle member are the representatives of the Flysch and the Macigno. These Eocene strata are upwards of 5500 ft. thick. In northern Africa the nummulitic limestones and sandstones are widely spread; the lower portions comprise the Libyan group and the shales of Esneh on the Nile (Flandrien), the *Alveolina* beds of Sokotra and others; the Mokattam stage of Egypt is a representative of the later Eocene. Much of the N. African Eocene contains phosphatic beds. In India strata of Eocene age are extensively developed; in Sind the marine Ranikot beds, 1500 to 2000 ft., consisting of clays with gypsum and lignite, shales and sandstones; these beds have, side by side with Eocene nummulites, a few fossils of Cretaceous affinities. Above the Ranikot beds are the massive nummulitic limestones and sandstones of the Kirthar group; these are succeeded by the nummulitic limestones and shales at the base of the Nari group. In the southern Himalayan region the nummulitic phase of Eocene deposit is well developed, but there are difficulties in fixing the line of demarcation between this and the younger formations. The lower part of the Sirmur series of the Simla district may belong to this period; it is subdivided into the Kasauli group and the Dagshai group with the Subâthu group at the base. Beneath the thick nummulitic Eocene limestone of the Salt Range are shales and marls with a few coal seams. The marine Eocene rocks of N. America are most extensively developed round the coast of the Gulf of Mexico, whence they spread into the valley of the Mississippi and, as a comparatively narrow strip, along the Atlantic coastal plain to New Jersey.

The series in Alabama, which may be taken as typical of the Gulf coast Eocene, is as follows:—

Upper Jacksonian, White limestone of Alabama (and Vicksburg?).

Middle Claibornian	Claiborne series. Buhrstone series.
Lower	Chickasawan Sands and lignites. Midwayan or Clayton formation, limestones.

The above succession is not fully represented in the Atlantic coast states.

On the Pacific coast marine formations are found in California and Oregon; such are the Tejon series with lignite and oil; the Escondido series of S. California (7000 ft.), part of the Pascadero series of the Santa Cruz Mountains; the Pulaski, Tyee, Arago and Coaledo beds—with coals—in Oregon. In the Puget formation of Washington we have a great series of sediments, largely of brackish water origin, and in parts coal-bearing. The total thickness of this formation has been estimated at 20,000 ft. (it may prove to be less than this), but it is probable that only the lower portion is of Eocene age. The most interesting of the N. American Eocene deposits are those of the Rocky Mountains and the adjacent western plains, in Wyoming, Nevada, Nebraska, Colorado, &c.; they are of terrestrial, lacustrine or aeolian origin, and on this account and because they were not strictly synchronous, there is considerable difficulty in placing them in their true position in the time-scale. The main divisions or groups are generally recognized as follows:—

		Mammalian Zonal Forms.
Upper	[1] Uinta Group, 800 ft. (? = Jacksonian).	*Diplacodon.* *Telmatotherium.*
Middle	[2] Bridger Group, 2000 ft. (? = Claibornian)	*Uintatherium.*
Lower	[3] Wind River Group, 800 ft. . .	*Bathyopsis.*
	[4] Wasatch Group, 2000 ft. (? = Chickasawan)	*Coryphodon.*
Basal	[5] Torrejon Group, 300 ft. . . .	*Pantolambda.*
	[6] Puerco Group, 500 to 1000 ft. . .	*Polymastodon.*

The Fort Union beds of Canada and parts of Montana and N. Dakota are probably the oldest Eocene strata of the Western Interior; they are some 2000 ft. thick and possibly are equivalent to the Midwayan group. But in these beds, as in those known as Arapahoe, Livingston, Denver, Ohio and Ruby, which are now often classed as belonging to the upper Laramie formation, it is safer to regard them as a transitional series between the Mesozoic and Tertiary systems. There is, however, a marked unconformity between the Eocene Telluride or San Miguel and Poison Canyon formations of Colorado and the underlying Laramie rocks.

Many local aspects of Eocene rocks have received special names, but too little is known about them to enable them to be correctly placed in the Eocene series. Such are the Clarno formation (late Eocene) of the John Day basin, Oregon, the Pinyon conglomerate of Yellowstone Park, the Sphinx conglomerate of Montana, the Whitetail conglomerate of Arizona, the Manti shales of Utah, the Mojave formation of S. California and the Amyzon formation of Nevada.

Of the Eocene of other countries little is known in detail. Strata of this age occur in Central and S. America (Patagonia-Megellanian series—Brazil, Chile, Argentina), in S. Australia (and in the Great Australian Bight), New Zealand, in Seymour Island near Graham Land in the Antarctic Regions, Japan, Java, Borneo, New Guinea, Moluccas, Philippines, New Caledonia, also in Greenland, Bear Island, Spitzbergen and Siberia.

Organic Life of the Eocene Period.—As it has been observed above, the name Eocene was given to this period on the ground that in its fauna only a small percentage of *living* species were present; this estimation was founded upon the assemblage of invertebrate remains in which, from the commencement of this period until the present day, there has been comparatively little change. The real biological interest of the period centres around the higher vertebrate types. In the marine mollusca the most noteworthy change is the entire absence of ammonoids, the group which throughout the Mesozoic era had taken so prominent a place, but disappeared completely with the close of the Cretaceous. Nautiloids were more abundant than they are at present, but as a whole the Cephalopods took a more subordinate part than they had done in previous periods. On the other hand, Gasteropods and Pelecypods found in the numerous shallow seas a very suitable environment and flourished exceedingly, and their shells are often preserved in a state of great perfection and in enormous numbers. Of the Gasteropod genera *Cerithium* with its estuarine and lagoonal forms *Potamides*, *Potamidopsis*, &c., is very characteristic; *Rostellaria*, *Voluta*, *Fusus*, *Pleurotoma*, *Conus*, *Typhis*, may also be cited. *Cardium*, *Venericardia*, *Crassatella*, *Corbulomya*, *Cytherea*, *Lucina*, *Anomia*, *Ostrea* are a few of the many Pelecypod genera. Echinoderms were represented by abundant sea-urchins, *Echinolampas*, *Linthia*, *Conoclypeus*, &c. Corals flourished on the numerous reefs and approximated to modern forms (*Trochosmilia*, *Dendrophyllia*). But by far the most abundant marine organisms were the foraminifera which flourished in the warm seas in countless myriads. Foremost among these are the *Nummulites*, which by their extraordinary numerical development and great size, as well as by their wide distribution, demand special recognition. Many other genera of almost equal importance as rock builders, lived at the same time: *Orthophragma*, *Operculina*, *Assilina*, *Orbitolites*, *Miliola*, *Alveolina*. Crustacea were fairly abundant (*Xanthopsis*, *Portunus*), and most of the orders and many families of modern insects were represented.

When we turn to the higher forms of life, the reptiles and mammals, we find a remarkable contrast between the fauna of the Eocene and those periods which preceded and succeeded it. The great group of Saurian reptiles, whose members had held dominion on land and sea during most of the Mesozoic time, had completely disappeared by the beginning of the Eocene; in their place placental mammals made their appearance and rapidly became the dominant group. Among the early Eocene mammals no trace can be found of the numerous and clearly-marked orders with which we are familiar to-day; instead we find obscurely differentiated forms, which cannot be fitted without violence into any of the modern orders. The early placental mammals were generalized types (with certain non-placental characters) with potentialities for rapid divergence and development in the direction of the more specialized modern orders. Thus, the Creodonta foreshadowed the Carnivora, the

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[1] South of the Uinta Mts. in Utah.
[2] Fort Bridger Basin.
[3] Wind river in Wyoming.
[4] Wasatch Mts. in Utah.
[5] Torrejon in New Mexico.
[6] Puerco river, New Mexico.

Stages.		Paris Basin.	England.	Belgian Basin.	Mediterranean regions and Great Central sea.	Flysch Phase.	North America.
Bartonien.[1]		Limestone of Saint-Ouen. Sands of Mortefontaine. Sands of Beauchamp. Sands of Auvers.	Barton beds. Upper Bagshot sands.	Sands of Lede.	Nummulitic limestones, sandstones and shales.	Upper part of the Alpine Flysch and Vienna and Carpathian sandstones. Macigno of the Apennines and Maritime Alps.	Uinta Group and Jacksonian.
Lutétien.		Calcaire grossier.	Bracklesham and Bournemouth beds. Lower Bagshot sands.	Laekenien. Bruxellien. Panisélien.			Bridger Group and Claibornian.
Yprésien.		Nummulitic sands of Soissons and Sands of Cuise and Aizy.	Alum Bay leaf beds.	Sands of Mons en Pévèle. Flanders Clay.			Wind River Group. Wasatch Group and
Landénien.	Sparnacien.	Plastic Clay and lignite beds.	London Clay. Oldhaven beds. Woolwich and Reading beds.	Upper Landénien sands. Sands of Ostricourt. Landénien tuffeau. Marls of Gelinden.			Chickasawan.
	Thanetien.	Limestones of Rilly and Sézanne. Sands of Rilly and Bracheux.	Thanet sands.				Torrejon Group and Midwayan. Puerco Group.

Condylarthra presaged the herbivorous groups; but before the close of this period, so favourable were the conditions of life to a rapid evolution of types, that most of the great *orders* had been clearly defined, though none of the Eocene *genera* are still extant. Among the early carnivores were *Arctocyon*, *Palaeonictis*, *Amblyctonus*, *Hyaenodon*, *Cynodon*, *Provivera*, *Patriofelis*. The primitive dog-like forms did not appear until late in the period, in Europe; and true cats did not arrive until later, though they were represented by *Eusmilus* in the Upper Eocene of France. The primitive ungulates (Condylarths) were generalized forms with five effective toes, exemplified in *Phenacodus*. The gross Amblypoda, with five-toed stumpy feet (*Coryphodon*), were prominent in the early Eocene; particularly striking forms were the *Dinoceratidae*, *Dinoceras*, with three pairs of horns or protuberances on its massive skull and a pair of huge canine teeth projecting downwards; *Tinoceras*, *Uintatherium*, *Loxophodon*, &c.; these elephantine creatures, whose remains are so abundant in the Eocene deposits of western America, died out before the close of the period. The divergence of the hoofed mammals into the two prominent divisions, the odd-toed and even-toed, began in this period, but the former did not get beyond the three-toed stage. The least differentiated of the odd-toed group were the Lophiodonts: tapirs were foreshadowed by *Systemodon* and similar forms (*Palaeotherium*, *Paloplotherium*); the peccary-like *Hyracotherium* was a forerunner of the horse, *Hyrochinus* was a primitive rhinoceros. The evolution of the horse through such forms as *Hyracotherium*, *Pachynolophus*, *Eohippus*, &c., appears to have proceeded along parallel lines in Eurasia and America, but the true horse did not arrive until later. Ancestral deer were represented by *Dichobune*, *Amphitragulus* and others, while many small hog-like forms existed (*Diplopus*, *Eohyus*, *Hyopotamus*, *Homacodon*). The primitive stock of the camel group developed in N. America in late Eocene time and sent branches into S. America and Eurasia. The edentates were very generalized forms at this period (Ganodonta); the rodents (Tillodontia) attained a large size for members of this group, *e.g. Tillotherium*. The Insectivores had Eocene forerunners, and the Lemuroids—probable ancestors of the apes—were forms of great interest, *Anaptomorphus*, *Microsyops*, *Heterohyus*, *Microchoerus*, *Coenopithecus*; even the Cetaceans were well represented by *Zeuglodon* and others.

The non-placental mammals although abundant were taking a secondary place; *Didelphys*, the primitive opossum, is noteworthy on account of its wide geographical range.

Among the birds, the large flightless forms, *Eupterornis*, *Gastornis*, were prominent, and many others were present, such as the ancestral forms of our modern gulls, albatrosses, herons, buzzards, eagles, owls, quails, plovers. Reptiles were poorly represented, with the exception of crocodilians, tortoises, turtles and some large snakes.

The flora of the Eocene period, although full of interest, does not convey the impression of newness that is afforded by the fauna of the period. The reason for this difference is this: the newer flora had been introduced and had developed to a considerable extent in the Cretaceous period, and there is no sharp break between the flora of the earlier and that of the later period; in both we find a mixed assemblage—what we should now regard as tropical palms, growing side by side with mild-temperate trees. Early Eocene plants in N. Europe, oaks, willows, chestnuts (Castanea), laurels, indicate a more temperate climate than existed in Middle Eocene when in the Isle of Wight, Hampshire and the adjacent portions of the continent, palms, figs, cinnamon flourished along with the cactus, magnolia, sequoia, cypress and ferns. The late Eocene flora of Europe was very similar to its descendant in modern Australasia.

See A. de Lapparent, *Traité de géologie*, vol. iii. (5th ed., 1906), which contains a good general account of the period, with numerous references to original papers. Also R. B. Newton, *Systematic List of the Frederick E. Edwards Collection of British Oligocene and Eocene Mollusca in the British Museum* (*Natural History*) (1891), pp. 299-325; G. D. Harris, "A Revision of our Lower Eocenes," *Proc. Geologists' Assoc.* x., 1887–1888; W. B. Clark, "Correlation Papers: Eocene" (1891), *U.S. Geol. Survey Bull. No. 83*. For more recent literature consult *Geological Literature added to the Geological Society's Library*, published annually by the society. (J. A. H.)

EON DE BEAUMONT, CHARLES GENEVIÈVE LOUISE AUGUSTE ANDRÉ TIMOTHÉE D' (1728–1810), commonly known as the CHEVALIER D'EON, French political adventurer, famous for the supposed mystery of his sex, was born near Tonnerre in Burgundy, on the 7th of October 1728. He was the son of an advocate of good position, and after a distinguished course of study at the Collège Mazarin he became a doctor of law by special dispensation before the usual age, and adopted his father's profession. He began literary work as a contributor to Fréron's *Année littéraire*, and attracted notice as a political writer by two works on financial and administrative questions, which he published in his twenty-fifth year. His reputation increased so rapidly that in 1755 he was, on the recommendation of Louis François, prince of Conti, entrusted by Louis XV. (who had originally started his "secret" foreign policy—*i.e.* by undisclosed agents behind the backs of his ministers—in favour of the prince of Conti's ambition to be king of Poland) with a secret mission to the court of Russia. It was on this occasion that he is said for the first time to have assumed the dress of a woman, with the connivance, it is supposed, of the French court.[1] In this disguise he obtained the appointment of reader to the empress Elizabeth, and won her over entirely to the views of his royal master, with whom he maintained a secret correspondence during the whole of his diplomatic career. After a year's absence he returned to Paris to be immediately charged with a second mission to St Petersburg, in which he figured in his true sex, and as brother of the reader who had been at the Russian court the year before. He played an important part in the negotiations between the courts of Russia, Austria and France during the Seven Years' War. For these diplomatic services he was rewarded with the decoration of the grand cross of St Louis. In 1759 he served with the French army on the Rhine as aide-de-camp to the marshal de Broglie, and was wounded during the campaign. He had held for some years previously a commission in a regiment of dragoons, and was distinguished for his skill in military exercises, particularly in fencing. In 1762, on the return of the duc de Nivernais, d'Eon, who had been secretary to his embassy, was appointed his successor, first as resident agent and then as minister plenipotentiary at the court of Great Britain. He had not been long in this position when he lost the favour of his sovereign, chiefly, according to his own account, through the adverse influence of Madame de Pompadour, who was jealous of him as a secret correspondent of the king. Superseded by count de Guerchy, d'Eon showed his irritation by denying the genuineness of the letter of appointment, and by raising an action against Guerchy for an attempt to poison him. Guerchy, on the other hand, had previously commenced an action against d'Eon for libel, founded on the publication by the latter of certain state documents of which he had possession in his official capacity. Both parties succeeded in so far as a true bill was found against Guerchy for the attempt to murder, though by pleading his privilege as ambassador he escaped a trial, and d'Eon was found guilty of the libel. Failing to come up for judgment when called on, he was outlawed. For some years afterwards he lived in obscurity, appearing in public chiefly at fencing matches. During this period rumours as to the sex of d'Eon, originating probably in the story of his first residence at St Petersburg as a female, began to excite public interest. In 1774 he published at Amsterdam a book called *Les Loisirs du Chevalier d'Eon*, which stimulated gossip. Bets were frequently laid on the subject, and an action raised before Lord Mansfield in 1777 for the recovery of one of these bets brought the question to a judicial decision, by which d'Eon was declared a female. A month after the trial he returned to France, having received permission to do so as the result of negotiations in which Beaumarchais was employed as agent. The conditions were that he was to deliver up certain state documents in his possession, and to wear the dress of a female. The reason for the latter of these stipulations has never been clearly explained, but he complied with it to the close of his life. In 1784 he received permission to visit London for the purpose of bringing back his library and other property. He did not, however, return to France, though after the Revolution he sent a letter, using the name of Madame d'Eon, in which he offered to serve in the republican army. He continued to dress as a lady, and took part in fencing matches with success, though at last in 1796 he was badly hurt in one. He died in London on the 22nd of May 1810. During the closing years of his life he is said to have enjoyed a small pension from George III. A post-mortem examination of the body conclusively established the fact that d'Eon was a man.

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[1] Bartonien from Barton, England.
Lutétien ,, Lutetia = Paris.
Yprésien ,, Ypres, Flanders.
Landénien ,, Landen, Belgium.
Thanetien ,, The Isle of Thanet.
Sparnacien ,, Sparnacum = Épernay.
Laekenien ,, Laeken, Belgium.
Bruxellien ,, Brussels.
Panisélien ,, Mont Panisel, near Mons.

Other names that have been applied to subdivisions of the Eocene not included in the table are Parisien and Suessonien (Soissons); Ludien (Ludes in the Paris basin) and Priabonien (Priabona in the Vicentine Alps); Heersien (Heer near Maastricht) and Wemmelien (Wemmel, Belgium); very many more might be mentioned.

The best modern accounts are in the duc de Broglie's *Le Secret du roi* (1888); Captain J. Buchan Telfer's *Strange Career of the Chevalier d'Eon* (1888); Octave Homberg and Fernand Jousselin, *Le Chevalier d'Eon* (1904); and A. Lang's *Historical Mysteries* (1904).

EÖTVÖS, JÓZSEF, Baron (1813–1871), Hungarian writer and statesman, the son of Baron Ignacz Eötvös and the baroness Lilian, was born at Buda on the 13th of September 1813. After an excellent education he entered the civil service as a vice-notary, and was early introduced to political life by his father. He also spent many years in western Europe, assimilating the new ideas both literary and political, and making the acquaintance of the leaders of the Romantic school. On his return to Hungary he wrote his first political work, *Prison Reform*; and at the diet of 1839–1840 he made a great impression by his eloquence and learning. One of his first speeches (published, with additional matter, in 1841) warmly advocated Jewish emancipation. Subsequently, in the columns of the *Pesti Hirlap*, Eötvös disseminated his progressive ideas farther afield, his standpoint being that the necessary reforms could only be carried out administratively by a responsible and purely national government. The same sentiments pervade his novel *The Village Notary* (1844–1846), one of the classics of the Magyar literature, as well as in the less notable romance *Hungary in 1514*, and the comedy *Long live Equality!* In 1842 he married Anna Rosty, but his happy domestic life did not interfere with his public career. He was now generally regarded as one of the leading writers and politicians of Hungary, while the charm of his oratory was such that, whenever the archduke palatine Joseph desired to have a full attendance in the House of Magnates, he called upon Eötvös to address it. The February revolution of 1848 was the complete triumph of Eötvös' ideas, and he held the portfolio of public worship and instruction in the first responsible Hungarian ministry. But his influence extended far beyond his own department. Eötvös, Deák and Széchényi represented the pacific, moderating influence in the council of ministers, but when the premier, Batthyány, resigned, Eötvös, in despair, retired for a time to Munich. Yet, though withdrawn from the tempests of the War of Independence, he continued to serve his country with his pen. His *Influence of the Ruling Ideas of the 19th Century on the State* (Pest, 1851–1854, German editions at Vienna and Leipzig the same year) profoundly influenced literature and public opinion in Hungary. On his return home, in 1851, he kept resolutely aloof from all political movements. In 1859 he published *The Guarantees of the Power and Unity of Austria* (Ger. ed. Leipzig, same year), in which he tried to arrive at a compromise between personal union and ministerial responsibility on the one hand and centralization on the other. After the Italian war, however, such a halting-place was regarded as inadequate by the majority of the nation. In the diet of 1861 Eötvös was one of the most loyal followers of Deák, and his speech in favour of the "Address" (see Deák, Francis) made a great impression at Vienna. The enforced calm which prevailed during the next few years enabled him to devote himself once more to literature, and, in 1866, he was elected president of the Hungarian academy. In the diets of 1865 and 1867 he fought zealously by the side of Deák, with whose policy he now completely associated himself. On the formation of the Andrássy cabinet (Feb. 1867) he once more accepted the portfolio of public worship and education, being the only one of the ministers of 1848 who thus returned to office. He had now, at last, the opportunity of realizing the ideals of a lifetime. That very year the diet passed his bill for the emancipation of the Jews; though his further efforts in the direction of religious liberty were less successful, owing to the opposition of the Catholics. But his greatest achievement was the National Schools Act, the most complete system of education provided for Hungary since the days of Maria Theresa. Good Catholic though he was (in matters of religion he had been the friend and was the disciple of Montalembert), Eötvös looked with disfavour on the dogma of papal infallibility, promulgated in 1870, and when the bishop of

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[1] But see Lang's *Historical Mysteries*, pp. 241-242, where this traditional account is discussed and rejected.

Fehérvár proclaimed it, Eötvös cited him to appear at the capital *ad audiendum verbum regium*. He was a constant defender of the composition with Austria (*Ausgleich*), and during the absence of Andrássy used to preside over the council of ministers; but the labours of the last few years were too much for his failing health, and he died at Pest on the 2nd of February 1871. On the 3rd of May 1879 a statue was erected to him at Pest in the square which bears his name.

Eötvös occupied as prominent a place in Hungarian literature as in Hungarian politics. His peculiarity, both as a politician and as a statesman, lies in the fact that he was a true philosopher, a philosopher at heart as well as in theory; and in his poems and novels he clothed in artistic forms all the great ideas for which he contended in social and political life. The best of his verses are to be found in his ballads, but his poems are insignificant compared with his romances. It was *The Carthusians*, written on the occasion of the floods at Pest in 1838, that first took the public by storm. The Magyar novel was then in its infancy, being chiefly represented by the historico-epics of Jósiká. Eötvös first modernized it, giving prominence in his pages to current social problems and political aspirations. The famous *Village Notary* came still nearer to actual life, while *Hungary in 1514*, in which the terrible Dozsa *Jacquerie* (see DOZSA) is so vividly described, is especially interesting because it rightly attributes the great national catastrophe of Mohács to the blind selfishness of the Magyar nobility and the intense sufferings of the people. Yet, as already stated, all these books are written with a moral purpose, and their somewhat involved and difficult style is, nowadays at any rate, a trial to those who are acquainted with the easy, brilliant and lively novels of Jókai.

The best edition of Eötvös' collected works is that of 1891, in 17 vols. Comparatively few of his writings have been translated, but there are a good English version (London, 1850) and numerous German versions of *The Village Notary*, while *The Emancipation of the Jews* has been translated into Italian and German (Pest, 1841-1842), and a German translation of *Hungary in 1514*, under the title of *Der Bauernkrieg in Ungarn* was published at Pest in 1850.

See A. Bán, *Life and Art of Baron Joseph Eötvös* (Hung.) (Budapest, 1902); Zoltan Ferenczi, *Baron Joseph Eötvös* (Hung.) (Budapest, 1903) [this is the best biography]; and M. Berkovics, *Baron Joseph Eotvos and the French Literature* (Hung.) (Budapest, 1904). (R. N. B.)

EPAMINONDAS (*c.* 418–362), Theban general and statesman, born about 418 B.C. of a noble but impoverished family. For his education he was chiefly indebted to Lysis of Tarentum, a Pythagorean exile who had found refuge with his father Polymnis. He first comes into notice in the attack upon Mantineia in 385, when he fought on the Spartan side and saved the life of his future colleague Pelopidas. In his youth Epaminondas took little part in public affairs; he held aloof from the political assassinations which preceded the Theban insurrection of 379. But in the following campaigns against Sparta he rendered good service in organizing the Theban defence. In 371 he represented Thebes at the congress in Sparta, and by his refusal to surrender the Boeotian cities under Theban control prevented the conclusion of a general peace. In the ensuing campaign he commanded the Boeotian army which met the Peloponnesian levy at Leuctra, and by a brilliant victory on this site, due mainly to his daring innovations in the tactics of the heavy infantry, established at once the predominance of Thebes among the land-powers of Greece and his own fame as the greatest and most original of Greek generals. At the instigation of the Peloponnesian states which armed against Sparta in consequence of this battle, Epaminondas in 370 led a large host into Laconia; though unable to capture Sparta he ravaged its territory and dealt a lasting blow at Sparta's predominance in Peloponnesus by liberating the Messenians and rebuilding their capital at Messene. Accused on his return to Thebes of having exceeded the term of his command, he made good his defence and was re-elected boeotarch. In 369 he forced the Isthmus lines and secured Sicyon for Thebes, but gained no considerable successes. In the following year he served as a common soldier in Thessaly, and upon being reinstated in command contrived the safe retreat of the Theban army from a difficult position. Returning to Thessaly next year at the head of an army he procured the liberation of Pelopidas from the tyrant Alexander of Pherae without striking a blow. In his third expedition (366) to Peloponnesus, Epaminondas again eluded the Isthmus garrison and won over the Achaeans to the Theban alliance. Turning his attention to the growing maritime power of Athens, Epaminondas next equipped a fleet of 100 triremes, and during a cruise to the Propontis detached several states from the Athenian confederacy. When subsequent complications threatened the position of Thebes in Peloponnesus he again mustered a large army in order to crush the newly formed Spartan league (362). After some masterly operations between Sparta and Mantineia, by which he nearly captured both these towns, he engaged in a decisive battle on the latter site, and by his vigorous shock tactics gained a complete victory over his opponents (see MANTINEIA). Epaminondas himself received a severe wound during the combat, and died soon after the issue was decided.

His title to fame rests mainly on his brilliant qualities both as a strategist and as a tactician; his influence on military art in Greece was of the greatest. For the purity and uprightness of his character he likewise stood in high repute; his culture and eloquence equalled the highest Attic standard. In politics his chief achievement was the final overthrow of Sparta's predominance in the Peloponnese; as a constructive statesman he displayed no special talent, and the lofty pan-Hellenic ambitions which are imputed to him at any rate never found a practical expression.

Cornelius Nepos, *Vita Epaminondae*; Diodorus xv. 52-88; Xenophon, *Hellenica*, vii.; L. Pomtow, *Das Leben des Epaminondas* (Berlin, 1870); von Stein, *Geschichte der spartanischen und thebanischen Hegemonie* (Dorpat, 1884), pp. 123 sqq.; H. Swoboda in Pauly-Wissowa, *Realencyclopädie*, v. pt. 2 (Stuttgart, 1905), pp. 2674-2707; also ARMY: *History*, § 6. (M. O. B. C.)

EPARCH, an official, a governor of a province of Roman Greece, *ἔπαρχος*, whose title was equivalent to, or represented that of the Roman *praefectus*. The area of his administration was called an eparchy (*ἐπαρχία*). The term survives as one of the administrative units of modern Greece, the country being divided into nomarchies, subdivided into eparchies, again subdivided into demarchies (see GREECE: *Local Administration*). "Eparch" and "eparchy" are also used in the Russian Orthodox Church for a bishop and his diocese respectively.

EPAULETTE (a French word, from *épaule*, a shoulder), properly a shoulder-piece, and so applied to the shoulder-knot of ribbon to which a scapulary was attached, worn by members of a religious order. The military usage was probably derived from the metal plate (*épaulière*) which protected the shoulder in the defensive armour of the 16th century. It was first used merely as a shoulder knot to fasten the baldric, and the application of it to mark distinctive grades of rank was begun in France at the suggestion, it is said, of Charles Louis Auguste Fouquet, duc de Belle-Isle, in 1759. In modern times it always appears as a shoulder ornament for military and naval uniforms. At first it consisted merely of a fringe hanging from the end of the shoulder-strap or cord over the sleeve, but towards the end of the 18th century it became a solid ornament, consisting of a flat shoulder-piece, extended beyond the point of the shoulder into an oval plate, from the edge of which hangs a thick fringe, in the case of officers of gold or silver. The epaulette is worn in the British navy by officers above the rank of sub-lieutenant; in the army it ceased to be worn about 1855. It is worn by officers in the United States navy above the rank of ensign; since 1872 it is only worn by general officers in the army. In most other countries epaulettes are worn by officers, and in the French army by the men also, with a fringe of worsted, various distinctions of shape and colour being observed between ranks, corps and arms of the service. The "scale" is similar to the epaulette, but has no fringe.

ÉPÉE, CHARLES-MICHEL, ABBÉ DE L' (1712–1789), celebrated for his labours in behalf of the deaf and dumb, was born at Paris on the 25th of November 1712, being the son of the king's architect. He studied for the church, but having declined to sign a religious formula opposed to the doctrines of the Jansenists, he was denied ordination by the bishop of his diocese. He then devoted himself to the study of law; but about the time of his admission to the bar of Paris, the bishop of Troyes granted him ordination, and offered him a canonry in his cathedral. This bishop died soon after, and the abbé, coming to Paris, was, on account of his relations with Soanen, the famous Jansenist, deprived of his ecclesiastical functions by the archbishop of Beaumont. About the same time it happened that he heard of two deaf mutes whom a priest lately dead had been endeavouring to instruct, and he offered to take his place. The Spaniard Pereira was then in Paris, exhibiting the results he had obtained in the education of deaf mutes; and it has been affirmed that it was from him that Épée obtained his manual alphabet. The abbé, however, affirmed that he knew nothing of Pereira's method; and whether he did or not, there can be no doubt that he attained far greater success than Pereira or any of his predecessors, and that the whole system now followed in the instruction of deaf mutes virtually owes its origin to his intelligence and devotion. In 1755 he founded, for this beneficent purpose, a school which he supported at his own expense until his death, and which afterwards was succeeded by the "Institution Nationale des Sourds Muets à Paris," founded by the National Assembly in 1791. He died on the 23rd of December 1789. In 1838 a bronze monument was erected over his grave in the church of Saint Roch. He published various books on his method of instruction, but that published in 1784 virtually supersedes all others. It is entitled *La Véritable Manière d'instruire les sourds et muets, confirmée par une longue expérience.* He also began a *Dictionnaire général des signes*, which was completed by his successor, the abbé Sicard.

ÉPÉE-DE-COMBAT, a weapon still used in France for duelling, and there and elsewhere (blunted, of course) for exercise and amusement in fencing (*q.v.*). It has a sharp-pointed blade, about 35 in. long, without any cutting edge, and the guard, or shell, is bowl-shaped, having its convexity towards the point. The *épée* is the modern representative of the small-sword, and both are distinguished from the older rapier, mainly by being several inches shorter and much lighter in weight. The small-sword (called thus in opposition to the heavy cavalry broadsword), was worn by gentlemen in full dress throughout the 18th century, and it still survives in the modern English court costume.

Fencing practice was originally carried on without the protection of any mask for the face. Wire masks were not invented till near 1780 by a famous fencing-master, La Boëssière the elder, and did not come into general use until much later. Consequently, in order to avoid dangerous accidents to the face, and especially the eyes, it was long the rigorous etiquette of the fencing-room that the point should always be kept low.

In the 17th century a Scottish nobleman, who had procured the assassination of a fencing-master in revenge for having had one of his eyes destroyed by the latter at sword-play, pleaded on his trial for murder that it was the custom to "spare the face."

Rowlandson's well-known drawing of a fencing bout, dated 1787, shows two accomplished amateurs making a foil assault without masks, while in the background a less practised one is having a wire mask tied on.

For greater safety the convention was very early arrived at that no hits should count in a fencing-bout except those landing on the breast. Thus sword-play soon became so unpractical as to lose much of its value as a training for war or the duel. For, hits with "sharps" take effect wherever they are made, and many an expert fencer of the old school has been seriously wounded, or lost his life in a duel, through forgetting that very simple fact.

Strangely enough, when masks began to be generally worn, and the *fleuret* (*anglice*, "foil," a cheap and light substitute for the real épée) was invented, fencing practice became gradually even more conventional than before. No one seems to have understood that with masks all the conventions could be safely done away with, root and branch, and sword-practice might assume all the semblance of reality. Nevertheless it should be clearly recognized that the basis of modern foil-fencing was laid with the épée or small-sword alone, in and before the days of Angelo, of Danet, and the famous chevalier de St George, who were among the first to adopt the fleuret also. All the illustrious French professors who came after them, such as La Boëssière the younger, Lafaugère, Jean Louis, Cordelois, Grisier, Bertrand and Robert, with amateurs like the baron d'Ezpeléta, were foil-players pure and simple, whose reputations were gained before the modern épée play had any recognized status. It was reserved for Jacob, a Parisian fencing-master, to establish in the last quarter of the 19th century a definite method of the épée, which differed essentially from all its forerunners. He was soon followed by Baudry, Spinnewyn, Laurent and Ayat. The methods of the four first-named, not differing much *inter se*, are based on the perception that in the real sword fight, where hits are effective on all parts of the person, the "classical" bent-arm guard, with the foil inclining upwards, is hopelessly bad. It offers a tempting mark in the exposed sword-arm itself, while the point requires a movement to bring it in line for the attack, which involves a fatal loss of time. The épée is really in the nature of a short lance held in one hand, and for both rapidity and precision of attack, as well as for the defence of the sword-arm and the body behind it, a position of guard *with the arm almost fully extended, and épée in line with the forearm*, is far the safest. Against this guard the direct lunge at the body is impossible, except at the risk of a mutual or double hit (*le coup des deux veuves*). No safe attack at the face or body can be made without first binding or beating, opposing or evading the adverse blade, and such an attack usually involves an initial forward movement. Beats and binds of the blade, with retreats of the body, or counter attacks with opposition, replace the old foil-parries in most instances, except at close quarters. And much of the offensive is reduced to thrusts at the wrist or forearm, intended to disable without seriously wounding the adversary. The direct lunge (*coup-droit*) at the body often succeeds in tournaments, but usually at the cost of a counter hit, which, though later in time, would be fatal with sharp weapons.

Ayat's method, as might be expected from a first-class foil-player, is less simple. Indeed for years, too great simplicity marked the most successful épée-play, because it usually gained its most conspicuous victories over those who attempted a foil defence, and whose practice gave them no safe strokes for an attack upon the extended blade. But by degrees the épéists themselves discovered new ways of attacking with comparative safety, and at the present day a complete épée-player is master of a large variety of attractive as well as scientific movements, both of attack and defence.

It was mainly by amateurs that this development was achieved. Perhaps the most conspicuous representative of the new school is J. Joseph-Renaud, a consummate swordsman, who has also been a champion foil-player. Lucien Gaudin, Alibert and Edmond Wallace may be also mentioned as among the most skilful amateurs, Albert Ayat and L. Bouché as professors—all of Paris. Belgium, Italy and England have also produced épéists quite of the first rank

The épée lends itself to competition far better than the foil, and the revival of the small-sword soon gave rise in France to "pools" and "tournaments" in which there was the keenest rivalry between all comers.

In considering the épée from a British point of view, it may be mentioned that it was first introduced publicly in London by C. Newton-Robinson at an important assault-at-arms held in the Steinway Hall on the 4th May 1900. Professor Spinnewyn was the principal demonstrator, with his pupil, the late Willy Sulzbacher. The next day was held at the Inns of Court R. V. School of Arms, Lincoln's Inn, the first English open épée tournament for amateurs. It was won by W. Sulzbacher, C. Newton-Robinson being second, and Paul Ettlinger, a French resident in London, third. This was immediately followed by the institution of the Épée Club of London, which, under the successive residencies of a veteran swordsman, Sir Edward Jenkinson, and of Lord Desborough, subsequently held annual open international tournaments. The winners were: in 1901, Willy Sulzbacher; 1902, Robert Montgomerie; 1903, the marquis de Chasseloup-Laubat; 1904, J. J.-Renaud; 1905, R. Montgomerie. In 1906 the Amateur Fencing Association for the first time recognized the best-placed Englishman, Edgar Seligman (who was the actual winner), as the English épée champion. In 1907 R. Montgomerie was again the winner, in 1908 C. L. Daniell, in 1909 R. Montgomerie.

Among the most active of the English amateurs who were the earliest to perceive the wonderful possibilities of épée-play, it is right to mention Captain Hutton, Lord Desborough, Sir Cosmo Duff-Gordon, Bart., Sir Charles Dilke, Bart., Lord Howard de Walden, Egerton Castle, A. S. Cope, R.A., W. H. C. Staveley, C. F. Clay, Lord Morpeth, Evan James, Paul King, J. B. Cunliffe, John Norbury, Jr., Theodore A. Cook, John Jenkinson, R. Montgomerie, S. Martineau, E. B. Milnes, H. J. Law, R. Merivale, the Marquis of Dufferin, Hugh Pollock, R. W. Doyne, A. G. Ross, the Hon. Ivor Guest and Henry Balfour.

Among foreign amateurs who did most to promote the use of the épée in England were Messrs P. Ettlinger, Anatole Paroissien, J. Joseph-Renaud, W. Sulzbacher, René Lacroix, H. G. Berger and the Marquis de Chasseloup-Laubat.

Épée practice became popular among Belgian and Dutch fencers about the same time as in England, and this made it possible to set on foot international team-contests for amateurs, which have done much to promote good feeling and acquaintanceship among swordsmen of several countries. In 1903 a series of international matches between teams of six was inaugurated in Paris. Up to 1909 the French team uniformly won the first place, with Belgium or England second.

English fencers who were members of these international teams were Lord Desborough, Theodore A. Cook, Bowden, Cecil Haig, J. Norbury, Jr., R. Montgomerie, John Jenkinson, F. Townsend, W. H. C. Staveley, S. Martineau, C. L. Daniell, W. Godden, Captain Haig, M. D. V. Holt, Edgar Seligman, C. Newton-Robinson, A. V. Buckland, P. M. Davson, E. M. Amphlett and L. V. Fildes. In 1906 a British épée team of four, consisting of Lord Desborough, Sir Cosmo Duff-Gordon, Bart., Edgar Seligman and C. Newton-Robinson, with Lord Howard de Walden and Theodore Cook as reserves (the latter acting as captain of the team), went to Athens to compete in the international match at the Olympic games. After defeating the Germans rather easily, the team opposed and worsted the Belgians. It thus found itself matched against the French in the final, the Greek team having been beaten by the French and the Dutch eliminated by the Belgians. After a very close fight the result was officially declared a tie. This was the first occasion upon which an English fencing team had encountered a French one of the first rank upon even terms. In fighting off the tie, however, the French were awarded the first prize and the Englishmen the second.

In the Olympic games of London, 1908, the Épée International Individual Tournament was won by Alibert (France), but Montgomerie, Haig and Holt (England) took the 4th, 5th, and 8th places in the final pool. The result of the International Team competition was also very creditable to the English representatives, Daniell, Haig, Holt, Montgomerie and Amphlett, who by defeating the Dutch, Germans, Danes and Belgians took second place to the French. Egerton Castle was captain of the English team.

In open International Tournaments on the Continent, English épéists have also been coming to the front. None had won such a competition up to 1909 outright, but the following had reached the final pool: C. Newton-Robinson, Brussels, 1901 (10th), Étretat, 1904 (6th); E. Seligman, Copenhagen, 1907 (2nd), and Paris, 1909 (12th); R. Montgomerie, Paris, 1909 (5th); and E. M. Amphlett, Paris, 1909 (10th).

The method of ascertaining the victor in épée "tournaments" is by dividing the competitors into "pools," usually of six or eight fencers. Each of these fights an assault for first hit only, with every other member of the same pool, and he who is least often hit, or not at all, is returned the winner. If the competitors are numerous, fresh pools are formed out of the first two, three or four in each pool of the preliminary round, and so on, until a small number are left in for a final pool, the winner of which is the victor of the tournament.

Épée fencing can be, and often is, conducted indoors, but one of its attractions consists in its fitness for open-air practice in pleasant gardens.

In the use of the épée the most essential points are (1) the position of the sword-arm, which, whether fully extended or not, should always be so placed as to ensure the protection of the wrist, forearm and elbow from direct thrusts, by the intervention of the guard or shell; (2) readiness of the legs for *instant* advance or retreat; and (3) the way in which the weapon is held, the best position (though hard to acquire and maintain) being that adopted by J. J. Renaud with the fingers *over* the grip, so that a downward beat does not easily disarm.

The play of individuals is determined by their respective temperaments and physical powers. But every fencer should be always ready to deliver a well-aimed, swift, direct thrust at any exposed part of the antagonist's arm, his mask or thigh. Very tall men, who are usually not particularly quick on their legs, should not as a rule attack, otherwise than by direct thrusts, when matched against shorter men. For if they merely extend their sword-arm in response to a simple attack, their longer reach will ward it off with a stop or counter-thrust. Short men can only attack them safely by beating, binding, grazing, pressing or evading the blade, and the taller fencers must be prepared with all the well-known parries and counters to such offensive movements, as well as with the stop-thrust to be made either with advancing opposition or with a retreat. Fencers of small stature must be exceedingly quick on their feet, unless they possess the art of parrying to perfection, and even then, if slow to shift ground, they will continually be in danger. With plenty of room, the quick mover can always choose the moment when he will be within distance, for an attack which his slower opponent will be always fearing and unable to prevent or anticipate.

It is desirable to put on record the modern form of the weapon. An average épée weighs, complete, about a pound and a half, while a foil weighs approximately one-third less. The épée blade is exactly like that of the old small-sword after the abandonment of the "*colichemarde*" form, in which the "*forte*" of the blade was greatly thickened. In length from guard or shell to point it measures about 35 in., and in width at the shell about $\frac{11}{16}$ths of an inch. From this it gradually and regularly tapers to the point. There is no cutting edge. The side of the épée which is usually held uppermost is slightly concave, the other is strengthened with a midrib, nearly equal in thickness and similar in shape to either half of the true blade. The material is tempered steel. There is a haft or tang about 8 in. long, which is pushed through a circular guard or shell ("*coquille*") of convex form, the diameter of which is normally 5 in. and the convexity 1¾ in. The shell is of steel or aluminium, and if of the latter metal, sometimes fortified at the centre with a disk of steel the size of a crown piece. The insertion of the haft or tang through the shell may be either central or excentric to the extent of about 1 in., for the better protection of the outside of the forearm.

After passing through the shell, the haft of the blade is inserted in a grip or handle ("*poignet*"), averaging 7 in. in length and of quadrangular section, which is made of tough wood covered with leather, india-rubber, wound cord or other strong material with a rough surface. The grip is somewhat wider than its vertical thickness when held in the usual way, and it diminishes gradually from shell to pommel for convenience of holding. It should have a slight lateral curvature, so that in executing circular movements the pommel is kept clear of the wrist. The pommel, usually of steel, is roughly spherical or eight-sided, and serves as a counterbalance. The end of the haft is riveted through it, except in the case of "*épées démontables*," which are the most convenient, as a blade may be changed by simply unscrewing or unlocking the pommel.

An épée is well balanced and light in hand when, on poising the blade across the forefinger, about 1 in. in advance of the shell, it is in equilibrium.

For practice, the point is blunted to resemble the flat head of a nail, and is made still more incapable of penetration by winding around it a small ball of waxed thread, such as cobblers use. This is called the "button." In competitions various forms of "*boutons marqueurs*," all of which are unsatisfactory, are occasionally used. The "*pointe d'arrêt*," like a small tin-tack placed head downwards on the flattened point of the épée, and fastened on by means of the waxed thread, is, on the contrary, most useful, by fixing in the clothes, to show where and when a good hit has been made. The point need only protrude about $\frac{1}{16}$th of an inch from the button. There are several kinds of pointes d'arrêt. The best is called, after its inventor, the "Léon Sazie," and has three blunt points of hardened steel each slightly excentric. The single point is sometimes prevented by the thickness of the button from scoring a good hit.

A mask of wire netting is used to protect the face, and a stout glove on the sword hand. It is necessary to wear strong clothes and to pad the jacket and trousers at the most exposed parts, in case the blade should break unnoticed. A vulnerable spot, which ought to be specially padded, is just under the sword-arm.

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EPERJES, a town of Hungary, capital of the county of Sáros, 190 m. N.E. of Budapest by rail. Pop. (1900) 13,098. It is situated on the left bank of the river Tarcza, an affluent of the Theiss, and has been almost completely rebuilt since a great fire in 1887. Eperjes is one of the oldest towns of Hungary, and is still partly surrounded by its old walls. It is the seat of a Greek-Catholic bishop, and possesses a beautiful cathedral built in the 18th century in late Gothic style. It possesses manufactures of cloth, table-linen and earthenware, and has an active trade in wine, linen, cattle and grain. About 2 m. to the south is Sóvár with important salt-works.

In the same county, 28 m. by rail N. of Eperjes, is situated the old town of *Bártfa* (pop. 6098), which possesses a Gothic church from the 14th century, and an interesting town-hall, dating from the 15th century, and containing very valuable archives. In its neighbourhood, surrounded by pine forests, are the baths of Bártfa, with twelve mineral springs—iodate, ferruginous and alkaline—used for bathing and drinking.

About 6 m. N.W. of Eperjes is situated the village of Vörösvágás, which contains the only opal mine in Europe. The opal was mined here 800 years ago, and the largest piece hitherto found, weighing 2940 carats and estimated to have a value of £175,000, is preserved in the Court Museum at Vienna.

Eperjes was founded about the middle of the 12th century by a German colony, and was elevated to the rank of a royal free town in 1347 by Louis I. (the Great). It was afterwards fortified and received special privileges. The Reformation found many early adherents here, and the town played an important part during the religious wars of the 17th century. It became famous by the so-called "butchery of Eperjes," a tribunal instituted by the Austrian general Caraffa in 1687, which condemned to death and confiscated the property of a great number of citizens accused of Protestantism. During the 16th and the 17th centuries its German educational establishments enjoyed a wide reputation.

ÉPERNAY, a town of northern France, capital of an arrondissement in the department of Marne, 88 m. E.N.E. of Paris on the main line of the Eastern railway to Châlons-sur-Marne. Pop. (1906) 20,291. The town is situated on the left bank of the Marne at the extremity of the pretty valley of the Cubry, by which it is traversed. In the central and oldest quarter the streets are narrow and irregular; the surrounding suburbs are modern and more spacious, and that of La Folie, on the east, contains many handsome villas belonging to rich wine merchants. The town has also extended to the right bank of the Marne. One of its churches preserves a portal and stained-glass windows of the 16th century, but the other public buildings are modern. Épernay is best known as the principal *entrepôt* of the Champagne wines, which are bottled and kept in extensive vaults in the chalk rock on which the town is built. The manufacture of the apparatus and material used in the champagne industry occupies many hands, and the Eastern Railway Company has important workshops here. Brewing, and the manufacture of sugar and of hats and caps, are also carried on. Épernay is the seat of a sub-prefect and has tribunals of first instance and of commerce, and communal colleges for girls and boys.

Épernay (*Sparnacum*) belonged to the archbishops of Reims from the 5th to the 10th century, at which period it came into the possession of the counts of Champagne. It suffered severely during the Hundred Years' War, and was burned by Francis I. in 1544. It resisted Henry of Navarre in 1592, and Marshal Biron fell in the attack which preceded its capture. In 1642 it was, along with Château-Thierry, erected into a duchy and assigned to the duke of Bouillon.

ÉPERNON, a town of northern France in the department of Eure-et-Loir, at the confluence of the Drouette and the Guesle, 17 m. N.E. of Chartres by rail. Pop. (1906) 2370. It belonged originally to the counts of Montfort, who, in the 11th century, built a castle here of which the ruins are still left, and granted a charter to the town. In the 13th century it became an independent lordship, which remained attached to the crown of Navarre till, in the 16th century, it was sold by King Henry (afterwards King Henry IV. of France) to Jean Louis de Nogaret, for whom it was raised to the rank of a duchy in 1581. The new duke of Épernon was one of the favourites of Henry III., who were called *les Mignons*; the king showered favours upon him, giving him the posts of colonel-general in the infantry and of admiral of France. Under the reign of Henry IV. he made himself practically independent in his government of Provence. He was instrumental in giving the regency to Marie de' Medici in 1610, and as a result exercised a considerable influence upon the government. During his governorship of Guienne in 1622 he had some scandalous scenes with the parlement and the archbishop of Bordeaux. He died in 1642. His eldest son, Henri de Nogaret de la Valette, duke of Candale, served under Richelieu, in the armies of Guienne, of Picardy and of Italy. The second son of Jean Louis de Nogaret, Bernard, who was born in 1592, and died in 1661, was, like his father, duke of Épernon, colonel-general in the infantry and governor of Guienne. After his death, the title of duke of Épernon was borne by the families of Goth and of Pardaillan.

EPHEBEUM (from Gr. *ἔφηβος*, a young man), in architecture, a large hall in the ancient Palaestra furnished with seats (Vitruvius v. 11), the length of which should be a third larger than the width. It served for the exercises of youths of from sixteen to eighteen years of age.

EPHEBI (Gr. *ἐπί*, and *ἥβη*, *i.e.* "those who have reached puberty"), a name specially given, in Athens and other Greek towns, to a class of young men from eighteen to twenty years of age, who formed a sort of college under state control. On the completion of his seventeenth year the Athenian youth attained his civil majority, and, provided he belonged to the first three property classes and passed the scrutiny (*δοκιμασία*) as to age, civic descent and physical capability, was enrolled on the register of his deme (ληξιαρχικὸν γραμματεῖον). He thereby at once became liable to the military training and duties, which, at least in the earliest times, were the main object of the Ephebia. In the time of Aristotle the names of the enrolled ephebi were engraved on a bronze pillar (formerly on wooden tablets) in front of the council-chamber. After admission to the college, the ephebus took the oath of allegiance, recorded in Pollux and Stobaeus (but not in Aristotle), in the temple of Aglaurus, and was sent to Munychia or Acte to form one of the garrison. At the end of the first year of training, the ephebi were reviewed, and, if their performance was satisfactory, were provided by the state with a spear and a shield, which, together with the *chlamys* (cloak) and *petasus* (broad-brimmed hat), made up their equipment. In their second year they were transferred to other garrisons in Attica, patrolled the frontiers, and on occasion took an active part in war. During these two years they were free from taxation, and were not allowed (except in certain cases) to appear in the law courts as plaintiffs or defendants. The ephebi took part in some of the most important Athenian festivals. Thus during the Eleusinia they were told off to fetch the sacred objects from Eleusis and to escort the image of Iacchus on the sacred way. They also performed police duty at the meetings of the ecclesia.

After the end of the 4th century B.C. the institution underwent a radical change. Enrolment ceased to be obligatory, lasted only for a year, and the limit of age was dispensed with. Inscriptions attest a continually decreasing number of ephebi, and with the admission of foreigners the college lost its representative national character. This was mainly due to the weakening of the military spirit and the progress of intellectual culture. The military element was no longer all-important, and the ephebia became a sort of university for well-to-do young men of good family, whose social position has been compared with that of the Athenian "knights" of earlier times. The institution lasted till the end of the 3rd century A.D.

It is probable that the ephebia was in existence in the 5th century B.C., and controlled by the Areopagus and strategus as its moral and military supervisors. In the 4th century their place was taken by ten *sophronistae* (one for each tribe), who, as the name implies, took special interest in the morals of those under them, their military training being in the hands of experts, of whom the chief were the *hoplomachus*, the *acontistes*, the *toxotes* and the *aphetes* (instructors respectively in the use of arms, javelin-throwing, archery and the use of artillery engines). Later, the *sophronistae* were superseded by a single official called *cosmetes*, elected for a year by the people, who appointed the instructors. When the ephebia instead of a military college became a university, the military instructors were replaced by philosophers, rhetoricians, grammarians and artists. In Roman imperial times several new officials were introduced, one of special importance being the director of the Diogeneion, where youths under age were trained for the ephebia. At this period the college of ephebi was a miniature city; its members called themselves "citizens," and it possessed an archon, strategus, herald and other officials, after the model of ancient Athens.

There is an extensive class of inscriptions, ranging from the 3rd century B.C. to the 3rd century A.D., containing decrees relating to the ephebi, their officers and instructors, and lists of the same, and a whole chapter (42) of the Aristotelian *Constitution of Athens* is devoted to the subject. The most important treatises on the subject are: W. Dittenberger, *De ephebis Atticis* (Göttingen, 1863); A. Dumont, *Essai sur l'éphébie attique* (1875–1876); L. Grasberger, *Erziehung und Unterricht im klassichen Altertum*, iii. (Würzburg, 1881); J. P. Mahaffy, *Old Greek Education* (1881); P. Girard, *L'Éducation athénienne au Vᵉ et IVᵉ siècle avant J.-C.* (2nd ed., 1891), and article in Daremberg and Saglio's *Dictionnaire des antiquités* which contains further bibliographical references; G. Gilbert, *The Constitutional Antiquities of Athens* (Eng. tr., 1895); G. Busolt, *Die griechischen Staats- und Rechtsaltertümer* (1892); T. Thalheim and J. Öhler in Pauly-Wissowa, *Realencyclopädie der classischen Altertumswissenschaft*, v. pt. 2 (1905); W. W. Capes, *University Life in Ancient Athens* (1877).

EPHEMERIS (Greek for a "diary"), a table giving for stated times the apparent position and other numerical particulars relating to a heavenly body. The *Astronomical Ephemeris*, familiarly known as the "Nautical Almanac," is a national annual publication containing ephemerides of the principal or more conspicuous heavenly bodies, elements and other data of eclipses, and other matter useful to the astronomer and navigator. The governments of the United Kingdom, United States, France, Germany and Spain publish such annals.

EPHESIANS, EPISTLE TO THE. This book of the New Testament, the most general and least occasional and polemic of all the Pauline epistles, a large section of which seems almost like the literary elaboration of a theological topic, may best be described as a solemn oration, addressed to absent hearers, and intended not primarily to clarify their minds but to stir their emotions. It is thus a true letter, but in the grand style, verging on the nature not of an essay but a poem. *Ephesians* has been called "the crown of St Paul's writings," and whether it be measured by its theological or its literary interest and importance, it can fairly dispute with *Romans* the claim to be his greatest epistle. In the public and private use of Christians some parts of *Ephesians* have been among the most favourite of all New Testament passages. Like its sister Epistle to the Colossians, it represents, whoever wrote it, deep experience and bold use of reflection on the meaning of that experience; if it be from the pen of the Apostle Paul, it reveals to us a distinct and important phase of his thought.

To the nature of the epistle correspond well the facts of its title and address. The title "To the Ephesians" is found in the Muratorian canon, in Irenaeus, Tertullian and Clement of Alexandria, as well as in all the earliest MSS. and versions. Marcion, however (*c.* A.D. 150), used and recommended copies with the title "To the Laodiceans." This would be inexplicable if Eph. i.1 had read in Marcion's copies, as it does in most ancient authorities, "To the saints which are at Ephesus"; but in fact the words ἐν Ἐφέσῳ of verse 1 were probably absent. They were not contained in the text used by Origen (d. 253); Basil (d. 379) says that "ancient copies" omitted the words; and they are actually omitted by Codices B (Vaticanus, 4th century) and ℵ (Sinaiticus, 4th century), together with Codex 67 (11th century). The words "in Ephesus" were thus probably originally lacking in the address, and were inserted from the suggestion of the title. Either the address was general ("to the saints who are also faithful") or else a blank was left. In the latter case the name may have been intended to be supplied orally, in communicating the letter, or a different name may have been written in each of the individual copies. Under any of these hypotheses the address would indicate that we have a circular letter, written to a group of churches, doubtless in Asia Minor. This would account for the general character of the epistle, as well as for the entire and striking absence of personal greetings and of concrete allusions to existing circumstances among the readers. It appears to have drawn its title, "To the Ephesians," from one of the churches for which it was intended, perhaps the one from which a copy was secured when Paul's epistles were collected, shortly before or after the year 100. That our epistle is the one referred to in Col. iv. 16, which was to be had by the Colossians from Laodicea, is not unlikely. Such an identification doubtless led Marcion to alter the title in his copies.

The structure of *Ephesians* is epistolary; it opens with the usual salutation (i.1-2) and closes with a brief personal note and formal farewell (vi.21-24). In the intervening body of the epistle the writer also follows the regular form of a letter. In an ordinary Greek letter (as the papyri show) we should find the salutation followed by an expression of gratification over the correspondent's good health and of prayer for its continuance. Paul habitually expanded and deepened this, and, in this case, that paragraph is enormously enlarged, so that it may be regarded as including chapters i.-iii., and as carrying the main thought of the epistle. Chapters iv.-vi. merely make application of the main ideas worked out in chapters i.-iii. Throughout the epistle we have a singular combination of the seemingly desultory method of a letter, turning aside at a word and straying wherever the mood of the moment leads, with the firm, forward march of earnest and mature thought. In this combination resides the doubtless unconscious but nevertheless real literary art of the composition.

The fundamental theme of the epistle is *The Unity of Mankind in Christ*, and hence the Unity and Divinity of the Church of Christ. God's purpose from eternity was to unite mankind in Christ, and so to bring human history to its goal, the New Man, the measure of the stature of the fulness of Christ. Those who have believed in Christ are the present representatives and result of this purpose; and a clear knowledge of the purpose itself, the secret of the ages, has now been revealed to men. This theme is not formally discussed, as in a theological treatise, but is rather, as it were, celebrated in lofty eulogy and application. First, in chapters i.-iii., under the mask of a conventional congratulatory paragraph, the writer declares at length the privileges which this great fact confers upon those who by faith receive the gift of God, and he is thus able to touch on the various aspects of his subject. Then, in chapters iv.-vi., he turns, with a characteristic and impressive "therefore," to set forth the obligations which correspond to the privileges he has just expounded. This author is indeed interested to prosecute vigorous and substantial thinking, but the mainspring of his interest is the conviction that such thought is significant for inner and outer life.

The relationship, both literary and theological, between the epistle to the *Ephesians* and that to the *Colossians* (*q.v.*) is very close. It is to be seen in many of the prominent ideas of the two writings, especially in the developed view of the central position of Christ in the whole universe; in the conception of the Church as Christ's body, of which He is the head; in the thought of the great Mystery, once secret, now revealed. There is further resemblance in the formal moral code, arranged by classes of persons, and having much the same contents in the two epistles (Eph. v. 22-vi. 9; Col. iii. 18-iv. 1). In both, also, Tychicus carries the letter, and in almost identical language the readers are told that he will by word of mouth give fuller information about the apostle's affairs (Eph. vi. 21-22; Col. iv. 7-8). Moreover, in a great number of characteristic phrases and even whole verses the two are alike. Compare, for instance, Eph. i. 7, Col. i. 14; Eph. i. 10, Col. i. 20; Eph. i. 21, Col. i. 16; Eph. i. 22, 23, Col. i. 18, 19; Eph. ii. 5, Col. ii. 13; Eph. ii. 11, Col. ii. 11; Eph. ii. 16, Col. i. 20; Eph. iii. 2, 3, Col. i. 25, 26, and many other parallels. Only a comparison in detail will give a true impression of the extraordinary degree of resemblance. Yet the two epistles do not follow the same course of thought, and their contents cannot be successfully exhibited in a common synoptical abstract. Each has its independent occasion, purpose, character and method; but they draw largely on a common store of thought and use common means of expression.

The question of the authorship of *Ephesians* is less important to the student of the history of Christian thought than in the case of most of the Pauline epistles, because of the generalness of tone and the lack of specific allusion in the work. It purports to be by Paul, and was held to be his by Marcion and in the Muratorian canon, and by Irenaeus, Tertullian and Clement of Alexandria, all writing at the end of the 2nd century. No doubt of the Pauline authorship was expressed in ancient times; nor is there any lack of early use by writers who make no direct quotation, to raise doubts as to the genuineness of the epistle. The influence of its language is probably to be seen in Ignatius, Polycarp and Hermas, less certainly in the epistle of Barnabas. Some resemblances of expression in Clement of Rome and in Second Clement may have significance. There is here abundant proof that the epistle was in existence, and was highly valued and influential with leaders of Christian thought, about the year 100, when persons who had known Paul well were still living.

To the evidence given above may be added the use of *Ephesians* in the First Epistle of Peter. If the latter epistle could be finally established as genuine, or its date fixed, it would give important evidence with regard to *Ephesians*; but in the present state of discussion we must confine ourselves to pointing out the fact. Some of the more striking points of contact are the following: Eph. i. 3, 1 Peter i. 3; Eph. i. 20, 21, 1 Peter iii. 22; Eph. ii. 2, 3, iv. 17, 1 Peter iv. 3; Eph. ii. 21, 22, 1 Peter ii. 5; Eph. v. 22, 1 Peter iii. 1, 2; Eph. v. 25, 1 Peter iii. 7, 8; Eph. vi. 5, 1 Peter ii. 18, 19. A similar relation exists between *Romans* and *1 Peter*. In both cases the dependence is clearly on the part of *1 Peter*; for ideas and phrases that in *Ephesians* and *Romans* have their firm place in closely wrought sequences, are found in *1 Peter* with less profound significance and transformed into smooth and pointed maxims and apophthegmatic sentences.

Objections to the genuineness of *Ephesians* have been urged since the early part of the 19th century. The influence of Schleiermacher, whose pupil Leonhard Usteri in his *Entwickelung der paulinischen Lehrbegriffs* (1824) expressed strong doubts as to *Ephesians*, carried weight. He held that Tychicus was the author. De Wette first (1826) doubted, then (1843) denied that the epistle was by Paul. The chief attack came, however, from Baur (1845) and his colleagues of the Tübingen school. Against the genuineness have appeared Ewald, Renan, Hausrath, Hilgenfeld, Ritschl, Pfleiderer, Weizsäcker, Holtzmann, von Soden, Schmiedel, von Dobschütz and many others. On the other hand, the epistle has been defended by Bleek, Neander, Reuss, B. Weiss, Meyer, Sabatier, Lightfoot, Hort, Sanday, Bacon, Jülicher, Harnack, Zahn and many others. In recent years a tendency has been apparent among critics to accept *Ephesians* as a genuine work of Paul. This has followed the somewhat stronger reaction in favour of *Colossians*.

Before speaking of the more fundamental grounds urged for the rejection of *Ephesians*, we may look at various points of detail which are of less significance.

(1) The style has unquestionably a slow and lumbering movement, in marked contrast with the quick effectiveness of *Romans* and *Galatians*. The sentences are much longer and less vivacious, as any one can see by a superficial examination. But nevertheless there are parts of the earlier epistles where the same tendency appears (*e.g.* Rom. iii. 23-26), and on the whole the style shows Paul's familiar traits. (2) The vocabulary is said to be peculiar. But it can be shown to be no more so than that of *Galatians* (Zahn, *Einleitung*, i. pp. 365 ff.). On the other hand, some words characteristic of Paul's use appear (notably διό, five times), and the most recent and careful investigation of Paul's vocabulary (Nägeli, *Wortschatz der paulinischen Briefe*, 1905) concludes that the evidence speaks for Pauline authorship. (3) Certain phrases have aroused suspicion, for instance, "the devil" (vi. 11, instead of Paul's usual term "Satan"); "his holy apostles and prophets" (iii. 5, as smacking of later fulsomeness); "I Paul" (iii. 1); "unto me, who am less than the least of all the saints" (iii. 8, as exaggerated). But these cases, when properly understood and calmly viewed, do not carry conviction against the epistle. (4) The relation of *Ephesians* to *Colossians* would be a serious difficulty only if *Colossians* were held to be not by Paul. Those who held to the genuineness of *Colossians* find it easier to explain the resemblances as the product of the free working of the same mind, than as due to a deliberate imitator. Holtzmann's elaborate and very ingenious theory (1872) that *Colossians* has been expanded, on the basis of a shorter letter of Paul, by the same later hand which had previously written the whole of *Ephesians*, has not met with favour from recent scholars.

But the more serious difficulties which to many minds still stand in the way of the acceptance of the epistle have come from the developed phase of Pauline theology which it shows, and from the general background and atmosphere of the underlying system of thought, in which the absence of the well-known earlier controversies is remarkable, while some things suggest the thought of John and a later age. Among the most important points in which the ideas and implications of *Ephesians* suggest an authorship and a period other than that of Paul are the following:

(*a*) The union of Gentiles and Jews in one body is already accomplished. (*b*) The Christology is more advanced, uses

Alexandrian terms, and suggests the ideas of the Gospel of John. (*c*) The conception of the Church as the body of Christ is new. (*d*) There is said to be a general softening of Pauline thought in the direction of the Christianity of the 2nd century, while very many characteristic ideas of the earlier epistles are absent.

With regard to the changed state of affairs in the Church, it must be said that this can be a conclusive argument only to one who holds the view of the Tübingen scholars, that the Apostolic Age was all of a piece and was dominated solely by one controversy. The change in the situation is surely not greater than can be imagined within the lifetime of Paul. That the epistle implies as already existent a developed system of Gnostic thought such as only came into being in the 2nd century is not true, and such a date is excluded by the external evidence. As to the other points, the question is, whether the admittedly new phase of Paul's theological thought is so different from his earlier system as to be incompatible with it. In answering this question different minds will differ. But it must remain possible that contact with new scenes and persons, and especially such controversial necessities as are exemplified in *Colossians*, stimulated Paul to work out more fully, under the influence of Alexandrian categories, lines of thought of which the germs and origins must be admitted to have been present in earlier epistles. It cannot be maintained that the ideas of *Ephesians* directly contradict either in formulation or in tendency the thought of the earlier epistles. Moreover, if *Colossians* be accepted as Pauline (and among other strong reasons the unquestionable genuineness of the epistle to Philemon renders it extremely difficult not to accept it), the chief matters of this more advanced Christian thought are fully legitimated for Paul.

On the other hand, the characteristics of the thought in *Ephesians* give some strong evidence confirmatory of the epistle's own claim to be by Paul. (*a*) The writer of Eph. ii. 11-22 was a Jew, not less proud of his race than was the writer of Rom. ix.-xi. or of Phil. iii. 4 ff. (*b*) The centre in all the theology of the epistle is the idea of redemption. The use of Alexandrian categories is wholly governed by this interest. (*c*) The epistle shows the same panoramic, pictorial, dramatic conception of Christian truth which is everywhere characteristic of Paul. (*d*) The most fundamental elements in the system of thought do not differ from those of the earlier epistles.

The view which denies the Pauline authorship of *Ephesians* has to suppose the existence of a great literary artist and profound theologian, able to write an epistle worthy of Paul at his best, who, without betraying any recognizable motive, presented to the world in the name of Paul an imitation of *Colossians*, incredibly laborious and yet superior to the original in literary workmanship and power of thought, and bearing every appearance of earnest sincerity. It must further be supposed that the name and the very existence of this genius were totally forgotten in Christian circles fifty years after he wrote. The balance of evidence seems to lie on the side of the genuineness of the Epistle.

If *Ephesians* was written by Paul, it was during the period of his imprisonment, either at Caesarea or at Rome (iii. 1, iv. 1, vi. 20). At very nearly the same time he must have written *Colossians* and *Philemon*; all three were sent by Tychicus. There is no strong reason for holding that the three were written from Caesarea. For Rome speaks the greater probability of the metropolis as the place in which a fugitive slave would try to hide himself, the impression given in *Colossians* of possible opportunity for active mission work (Col. iv. 3, 4; cf. Acts xxviii. 30, 31), the fact that *Philippians*, which in a measure belongs to the same group, was pretty certainly written from Rome. As to the Christians addressed, they are evidently converts from heathenism (ii. 1, 11-13, 17 f., iii. 1, iv. 17); but they are not merely Gentile Christians at large, for Tychicus carries the letter to them, Paul has some knowledge of their special circumstances (i. 15), and they are explicitly distinguished from "all the saints" (iii. 18, vi. 18). We may most naturally think of them as the members of the churches of Asia. The letter is very likely referred to in Col. iv. 16, although this theory is not wholly free from difficulties.

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For a guide to other literature see W. Lock, art. "Ephesians, Epistle to," in Hastings's *Dictionary of the Bible*, the various works of Holtzmann above referred to, and T. K. Abbott's *Commentary*, pp. 35-40. (J. H. Rs.)

EPHESUS, an ancient Ionian city on the west coast of Asia Minor. In historic times it was situate on the lower slopes of the hills, Coressus and Prion, which rise out of a fertile plain near the mouth of the river Caÿster, while the temple and precinct of Artemis or Diana, to the fame of which the town owed much of its celebrity, were in the plain itself, E.N.E. at a distance of about a mile. But there is reason to think both town and shrine had different sites in pre-Ionian times, and that both lay farther south among the foot-hills of Mt. Solmissus. The situation of the city was such as at all times to command a great commerce. Of the three great river basins of Ionia and Lydia, those of the Hermus, Caÿster and Maeander, it commanded the second, and had already access by easy passes to the other two.

The earliest inhabitants assigned to Ephesus by Greek writers are the "Amazons," with whom we hear of Leleges, Carians and Pelasgi. In the 11th century B.C., according to tradition (the date is probably too early), Androclus, son of the Athenian king Codrus, landed on the spot with his Ionians and a mixed body of colonists; and from his conquest dates the history of the Greek Ephesus. The deity of the city was Artemis; but we must guard against misconception when we use that name, remembering that she bore close relation to the primitive Asiatic goddess of nature, whose cult existed before the Ionian migration at the neighbouring Ortygia, and that she always remained the virgin-mother of all life and especially wild life, and an embodiment of the fertility and productive power of the earth. The well-known monstrous representation of her, as a figure with many breasts, swathed below the waist in grave-clothes, was probably of late and alien origin. In early Ionian times she seems to have been represented as a natural matronly figure, sometimes accompanied by a child, and to have been a more typically Hellenic goddess than she became in the Hellenistic and Roman periods.

Twice in the period 700-500 B.C. the city owed its preservation to the interference of the goddess; once when the swarms of the Cimmerians overran Asia Minor in the 7th century and burnt the Artemision itself; and once when Croesus besieged the town in the century succeeding, and only retired after it had solemnly dedicated itself to Artemis, the sign of such dedication being the stretching of a rope from city to sanctuary. Croesus was eager in every way to propitiate the goddess, and since about this time her temple was being restored on an enlarged scale, he presented most of the columns required for the building as well as some cows of gold. That is to say, these gifts were probably paid for out of the proceeds of the sequestration of the property of a rich Lydian merchant, Sadyattes, which Croesus presented to Ephesus (Nic. Damasc. fr. 65). To counteract, perhaps, the growing Lydian influence, Athens, the mother-city of Ephesus, despatched one of her noblest citizens, Aristarchus, to restore law on the basis of the Solonian constitution. The labours of Aristarchus seem to have borne fruit. It was an Ephesian follower of his, Hermodorus, who aided the Decemviri at Rome in their compilation of a system of law. And in the same generation Heraclitus, probably a descendant of Codrus, quitted his hereditary magistracy in order to devote himself to philosophy, in which his name became almost as great as that of any Greek. Poetry had long flourished at Ephesus. From very early times the Homeric poems found a home and admirers there; and to Ephesus belong the earliest elegiac poems of Greece, the war songs of Callinus, who flourished in the 7th century B.C. and was the model of Tyrtaeus. The city seems to have been more than once under tyrannical rule in the early Ionian period; and it fell thereafter first to Croesus of Lydia, and then to Cyrus, the Persian, and when the Ionian revolt against Persia broke out in the year 500 B.C. under the lead of Miletus, the city remained submissive to Persian rule. When Xerxes returned from the march against Greece, he honoured the temple of Artemis, although he sacked other Ionian shrines, and even left his children behind at Ephesus for safety's sake. We hear again of Persian respect for the temple in the time of Tissaphernes (411 B.C.). After the final Persian defeat at the Eurymedon (466 B.C.), Ephesus for a time paid tribute to Athens, with the other cities of the coast, and Lysander first and Agesilaus afterwards made it their headquarters. To the latter fact we owe a contemporary description of it by Xenophon. In the early part of the 4th century it fell again under Persian influence, and was administered by an oligarchy.

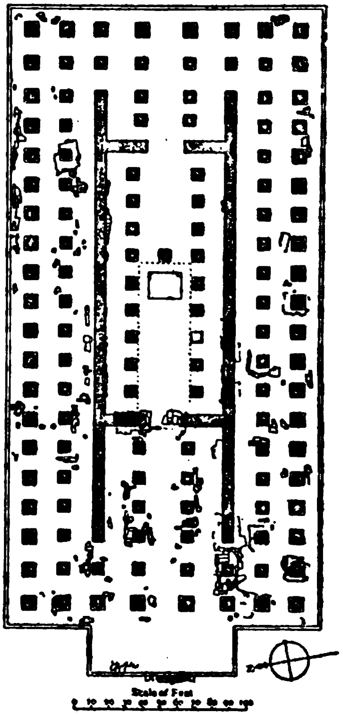
Alexander was received by the Ephesians in 334, and established democratic government. Soon after his death the city fell into the hands of Lysimachus, who introduced fresh Greek colonists from Lebedus and Colophon and, it is said, by means of an artificial inundation compelled those who still dwelt in the plain by the temple to migrate to the city on the hills, which he surrounded by a solid wall. He renamed the city after his wife Arsinoë, but the old name was soon resumed. Ephesus was very prosperous during the Hellenistic period, and is conspicuous both then and later for the abundance of its coinage, which gives us a more complete list of magistrates' names than we have for any other Ionian city. The Roman coinage is remarkable for the great variety and importance of its types. After the defeat of Antiochus the Great, king of Syria, by the Romans, Ephesus was handed over by the conquerors to Eumenes, king of Pergamum, whose successor, Attalus Philadelphus, unintentionally worked the city irremediable harm. Thinking that the shallowness of the harbour was due to the width of its mouth, he built a mole part-way across the latter; the result, however, was that the silting up of the harbour proceeded more rapidly than before. The third Attalus of Pergamum bequeathed Ephesus with the rest of his possessions to the Roman people, and it became for a while the chief city, and for longer the first port, of the province of Asia, the richest in the empire. Henceforth Ephesus remained subject to the Romans, save for a short period, when, at the instigation of Mithradates Eupator of Pontus, the cities of Asia Minor revolted and massacred their Roman residents. The Ephesians even dragged out and slew those Romans who had fled to the precinct of Artemis for protection, notwithstanding which sacrilege they soon returned from their new to their former masters, and even had the effrontery to state, in an inscription preserved to this day, that their defection to Mithradates was a mere yielding to superior force. Sulla, after his victory over Mithradates, brushed away their pretexts, and inflicting a very heavy fine told them that the punishment fell far short of their deserts. In the civil wars of the 1st century B.C. the Ephesians twice supported the unsuccessful party, giving shelter to, or being made use of by, first, Brutus and Cassius, and afterwards Antony, for which partisanship or weakness they paid very heavily in fines.

All this time the city was gradually growing in wealth and in devotion to the service of Artemis. The story of St Paul's doings there illustrates this fact, and the sequel is very suggestive, —the burning, namely, of books of sorcery of great value. Addiction to the practice of occult arts had evidently become general in the now semi-orientalized city. The Christian Church which Paul planted there was governed by Timothy and John, and is famous in Christian tradition as a nurse of saints and martyrs. According to local belief, Ephesus was also the last home of the Virgin, who was lodged near the city by St John and there died. But to judge from the Apocalyptic Letter to this Church (as shown by Sir W. M. Ramsay), the latter showed a dangerous tendency to lightness and reaction, and later events show that the pagan tradition of Artemis continued very strong and perhaps never became quite extinct in the Ephesian district. It was, indeed, long before the spread of Christianity threatened the old local cult. The city was proud to be termed *neocorus* or servant of the goddess. Roman emperors vied with wealthy natives in lavish gifts, one Vibius Salutaris among the latter presenting a quantity of gold and silver images to be carried annually in procession. Ephesus contested stoutly with Smyrna and Pergamum the honour of being called the first city of Asia; each city appealed to Rome, and we still possess rescripts in which the emperors endeavoured to mitigate the bitterness of the rivalry. One privilege Ephesus secured; the Roman governor of Asia always landed and first assumed office there: and it was long the provincial centre of the official cult of the emperor, and seat of the Asiarch. The Goths destroyed both city and temple in the year A.D. 262, and although the city revived and the cult of Artemis continued, neither ever recovered its former splendour. A general council of the Christian Church was held there in 431 in the great double church of St Mary, which is still to be seen. On this occasion Nestorius was condemned, and the honour of the Virgin established as *Theotokus*, amid great popular rejoicing, due, doubtless, in some measure to the hold which the cult of the virgin Artemis still had on the city. (On this council see below.) Thereafter Ephesus seems to have been gradually deserted owing to its malaria; and life transferred itself to another and higher site near the Artemision, the name of which, Ayassoluk (written by early Arab geographers *Ayathulukh*), is now known to be a corruption of the title of St John *Theológos*, given to a great cathedral built on a rocky hill near the present railway station, in the time of Justinian I. This church was visited by Ibn Batuta in A.D. 1333; but few traces are now visible. The ruins of the Artemision, after serving as a quarry to local builders, were finally covered deep with mud by the river Caÿster, or one of its left bank tributaries, the Selinus, and the true site remained unsuspected until 1869.

Excavations.—The first light thrown on the topography of Ephesus was due to the excavations conducted by the architect, J. T. Wood, on behalf of the trustees of the British Museum, during the years 1863–1874. He first explored the Odeum and the Great Theatre situate in the city itself, and in the latter place had the good fortune to find an inscription which indicated to him in what direction to search for the Artemision; for it stated that processions came to the city from the temple by the Magnesian gate and returned by the Coressian. These two gates were next identified, and following up that road which issued from the Magnesian gate, Wood lighted first on a ruin which he believed to be the tomb of Androclus, and afterwards on an angle of the peribolus wall of the time of Augustus. After further tentative explorations, he struck the actual pavement of the Artemision on the last day of 1869.

The Artemision.—Wood removed the whole stratum of superficial deposit, nearly 20 ft. deep, which overlay the huge area of the temple, and exposed to view not only the scanty remains of the latest edifice, built after 350 B.C., but the platform of an earlier temple, now known to be that of the 6th century to which Croesus contributed. Below this he did not find any remains. He discovered and sent to England parts of several sculptured drums (*columnae caelatae*) of the latest temple, and archaic sculptures from the drums and parapet of the earlier building. He also made accurate measurements and a plan of the Hellenistic temple. found many inscriptions and a few miscellaneous antiquities, and had begun to explore the Precinct, when the great expense and other considerations induced the trustees of the British Museum to suspend his operations in 1874. Wood made two subsequent attempts to resume work, but failed; and the site lay desolate till 1904, when the trustees, wishing to have further information about the earlier strata and the Precinct, sent D. G. Hogarth to re-examine the remains. As a result of six months' work, Wood's "earliest temple" was re-cleared and planned, remains of three earlier shrines were found beneath it, a rich deposit of offerings, &c., belonging to the earliest shrine was discovered, and tentative explorations were made in the Precinct. This deep digging, however, which reached the sand of the original marsh, released much ground water and resulted in the permanent flooding of the site.

The history of the Artemision, as far as it can be inferred from the remains, is as follows. (1) There was no temple on the plain previous to the Ionian occupation, the primeval seat of the nature-goddess having been in the southern hills, at Ortygia (near mod. *Arvalia*). Towards the end of the 8th century B.C. a small shrine came into existence on the plain. This was little more than a small platform of green schist with a sacred tree and an altar, and perhaps later a wooden icon (image), the whole enclosed in a *temenos*: but, as is proved by a great treasure of objects in precious and other metals, ivory, bone, crystal, paste, glass, terra-cotta and other materials, found in 1904–1905, partly within the platform on which the cult-statue stood and partly outside, in the lowest stratum of deposit, this early shrine was presently enriched by Greeks with many and splendid offerings of Hellenic workmanship. A large number of electron coins, found among these offerings, and in style the earliest of their class known, combine with other evidence to date the whole treasure to a period considerably anterior to the reign of Croesus. This treasure is now divided between the museums of Constantinople and London. (2) Within a short time, perhaps after the Cimmerian sack (? 650 B.C.), this shrine was restored, slightly enlarged, and raised in level, but not altered in character. (3) About the close of the century, for some reason not known, but possibly owing to collapse brought about by the marshy nature of the site, this was replaced by a temple of regular Hellenic form. The latter was built in relation to the earlier central statue-base but at a higher level than either of its predecessors, doubtless for dryness' sake. Very little but its foundations was spared by later builders, and there is now no certain evidence of its architectural character; but it is very probable that it was the early temple in which the Ionic order is said to have been first used, after the colonists had made use of Doric in their earlier constructions (*e.g.* in the *Panionion*); and that it was the work of the Cnossian Chersiphron and his son, Metagenes, always regarded afterwards as the first builders of a regular Artemision. Their temple is said by Strabo to have been made bigger by another architect. (4) The latter's work must have been the much larger temple, exposed by Wood, and usually known as the Archaic or Croesus temple. This overlies the remains of No. 3, at a level higher by about a metre, and the area of its *cella* alone contains the whole of the earlier shrines. Its central point, however, was still the primitive statue-base, now enlarged and heightened. About half its pavement, parts of the *cella* walls and of three columns of the peristyle, and the foundations of nearly all the platform, are still in position. The visible work was all of very fine white marble, quarried about 7 m. N.E., near the modern Kos Bunar. Fragments of relief-sculptures belonging to the parapet and columns, and of fluted drums and capitals, cornices and other architectural members have been recovered, showing that the workmanship and Ionic style were of the highest excellence, and that the building presented a variety of ornament, rare among Hellenic temples. The whole ground-plan covered about 80,000 sq. ft. The height of the temple is doubtful, the measurements of columns given us by later authority having reference probably to its successor, the height of which was considered abnormal and marvellous. Judged by the diameter of the drums, the columns of the Croesus temple were not two-thirds of the height of those of the Hellenistic temple. This fourth temple is, beyond question, that to which Croesus contributed, and it was, therefore, in process of building about 540 B.C. Our authorities seem to be referring to it when they tell us that the Artemision was raised by common contribution of the great cities of Asia, and took 120 years to complete. It was dedicated with great ceremony, probably between 430 and 420 B.C., and the famous Timotheus, son of Thersander, carried off the magnificent prize for a lyric ode against all comers. Its original architects were, probably, Paeonius of Ephesus, and Demetrius, a *ἱερὸς* of the shrine itself: but it has been suggested that the latter may have been rather the actual contracting builder than the architect. Of this temple Herodotus speaks as existing in his day; and unless weight be given to an isolated statement of Eusebius, that it was burned about 395 B.C., we must assume that it survived until the night when one Herostratus, desirous of acquiring eternal fame if only by a great crime, set it alight. This is said to have happened in 356 B.C. on the October night on which Alexander the Great came into the world, and, as Hegesias said, the goddess herself was absent, assisting at the birth; but the exactness of this portentous synchronism makes the date suspect. (5) It was succeeded by what is called the Hellenistic temple, begun almost immediately after the catastrophe, according to plans drawn by the famous Dinocrates the architect of Alexandria. The platform was once more raised to a higher level, some 7 ft. above that of the Archaic, by means of huge foundation blocks bedded upon the earlier structures; and this increase of elevation necessitated a slight expansion of the area all round, and ten steps in place of three. The new columns were of greater diameter than the old and over 60 ft. high; and from its great height the whole structure was regarded as a marvel, and accounted one of the wonders of the world. Since, however, other Greek temples had colonnades hardly less high, and were of equal or greater area, it has been suggested that the Ephesian temple had some distinct element of grandiosity, no longer known to us—perhaps a lofty sculptured parapet or some imposing form of *podium*. Bede, in his treatise *De sept. mir. mundi*, describes a stupendous erection of several storeys; but his other descriptions are so fantastic that no credence can



Ground plan of the 6th Century ("Croesus") Temple at Ephesus, conjecturally restored by A. E. Henderson.

be attached to this. The fifth temple was once more of Ionic order, but the finish and style of its details as attested by existing remains were inferior to those of its predecessor. The great sculptured drums and pedestals, now in the British Museum, belong to the lower part of certain of its columns: but nothing of its frieze or pediments (if it had any) has been recovered. Begun probably before 350 B.C., it was in building when Alexander came to Ephesus in 334 and offered to bear the cost of its completion. It was probably finished by the end of the century; for Pliny the Elder states that its cypress-wood doors had been in existence for 400 years up to his time. It stood intact, except for very partial restorations, till A.D. 262 when it was sacked and burned by the Goths: but it appears to have been to some extent restored afterwards, and its cult no doubt survived till the Edict of Theodosius closed the pagan temples. Its material was then quarried extensively for the construction of the great cathedral of St John Theológos on the neighbouring hill (Ayassoluk), and a large Byzantine building (a church?) came into existence on the central part of its denuded site, but did not last long. Before the Ottoman conquest its remains were already buried under several feet of silt.

The organization of the temple hierarchy, and its customs and privileges, retained throughout an Asiatic character. The priestesses of the goddess were παρθένοι (*i.e.* unwedded), and her priests were compelled to celibacy. The chief among the latter, who bore the Persian name of Megabyzus and the Greek title Neocorus, was doubtless a power in the state as well as a dignitary of religion. His official dress and spadonic appearance are probably revealed to us by a small ivory statuette found by D. G. Hogarth in 1905. Besides these there was a vast throng of dependents who lived by the temple and its services—*theologi*, who may have expounded sacred legends, *hymnodi*, who composed hymns in honour of the deity, and others, together with a great crowd of *hieroi* who performed more menial offices. The making of shrines and images of the goddess occupied many hands. To support this greedy mob offerings flowed in in a constant stream from votaries and from visitors, who contributed sometimes money, sometimes statues and works of art. These latter so accumulated that the temple became a rich museum, among the chief treasures of which were the figures of Amazons sculptured in competition by Pheidias, Polyclitus, Cresilas and Phradmon, and the painting by Apelles of Alexander holding a thunderbolt. The temple was also richly endowed with lands, and possessed the fishery of the Selinusian lakes, with other large revenues. But perhaps the most important of all the privileges possessed by the goddess and her priests was that of *asylum.* Fugitives from justice or vengeance who reached her precincts were perfectly safe from all pursuit and arrest. The boundaries of the space possessing such virtue were from time to time enlarged. Mithradates extended them to a bowshot from the temple in all directions, and Mark Antony imprudently allowed them to take in part of the city, which part thus became free of all law, and a haunt of thieves and villains. Augustus, while leaving the right of asylum untouched, diminished the space to which the privilege belonged, and built round it a wall, which still surrounds the ruins of the temple at the distance of about a quarter of a mile, bearing an inscription in Greek and Latin, which states that it was erected in the proconsulship of Asinius Gallus, out of the revenues of the temple. The right of asylum, however, had once more to be defended by a deputation sent to the emperor Tiberius. Besides being a place of worship, a museum and a sanctuary, the Ephesian temple was a great bank. Nowhere in Asia could money be more safely bestowed, and both kings and private persons placed their treasures under the guardianship of the goddess.

The City.—After Wood's superficial explorations, the city remained desolate till 1894, when the Austrian Archaeological Institute obtained a concession for excavation and began systematic work. This has continued regularly ever since, but has been carried down no farther than the Imperial stratum. The main areas of operation have been: (1) The *Great Theatre.* The stage buildings, orchestra and lower parts of the *cavea* have been cleared. In the process considerable additions were made to Wood's find of sculptures in marble and bronze, and of inscriptions, including missing parts of the Vibius Salutaris texts. This theatre has a peculiar interest as the scene of the tumult aroused by the mission of St Paul; but the existing remains represent a reconstruction carried out after his time. (2) The *Hellenistic Agora*, a huge square, surrounded by porticoes, lying S.W. of the theatre and having fine public halls on the S. It has yielded to the Austrians fine sculpture in marble and bronze and many inscriptions. (3) *The Roman Agora*, with its large halls, lying N.W. of the theatre. Here were found many inscriptions of Roman date and some statuary. (4) A street running from the S.E. angle of the Hellenic Agora towards the Magnesian gate. This was found to be lined with pedestals of honorific statues and to have on the west side a remarkable building, stated in an inscription to have been a library. The tomb of the founder, T. Julius Celsus, is hard by, and some fine Roman reliefs, which once decorated it, have been sent to Vienna. (5) A street running direct to the port from the theatre. This is of great breadth, and had a Horologion half-way down and fine porticoes and shops. It was known as the Arcadiane after having been restored at a higher level than formerly by the emperor Arcadius (A.D. 395). It leaves on the right the great *Thermae* of Constantine, of which the Austrians have cleared out the south-east part. This huge pile used to be taken for the Artemision by early visitors to Ephesus. Part of the quays and buildings round the port were exposed, after measures had been taken to drain the upper part of the marsh. (6) The Double Church of the Virgin " Deipara " in the N.W. of the city, wherein the council of 431 was held. Here interesting inscriptions and Byzantine architectural remains were found. Besides these excavated monuments, the Stadion; the *enceinte* of fortifications erected by Lysimachus, which runs from the tower called the " Prison of St Paul " and right along the crests of the Bulbul (Prion) and Panajir hills; the round monument miscalled the " Tomb of St Luke "; and the Opistholeprian gymnasium near the Magnesian gate, are worthy of attention.

The work done by the Austrians enables a good idea to be obtained of the appearance presented by a great Graeco-Roman city of Asia in the last days of its prosperity. It may be realized better there than anywhere how much architectural splendour was concentrated in the public quarters. But the restriction of the clearance to the upper stratum of deposit has prevented the acquisition of much further knowledge. Both the Hellenistic and, still more, the original Ionian cities remain for the most part unexplored. It should, however, be added that very valuable topographical exploration has been carried out in the environs of Ephesus by members of the Austrian expedition, and that the Ephesian district is now mapped more satisfactorily than any other district of ancient interest in Asia Minor.

The Turkish village of Ayassoluk (the modern representative of Ephesus), more than a mile N.E. of the ancient city, has revived somewhat of recent years owing to the development of its fig gardens by the Aidin railway, which passes through the upper part of the plain. It is noteworthy for a splendid ruined mosque built by the Seljuk, Isa Bey II., of Aidin, in 1375, which contains magnificent columns: for a castle, near which lie remains of the pendentives from the cupola of the great cathedral of St John, now deeply buried in its own ruins: and for an aqueduct, Turkish baths and mosque-tombs. There is a fair inn managed by the Aidin Railway Company.

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EPHESUS, COUNCIL OF. This Church council was convened in 431 for the purpose of taking authoritative action concerning the doctrine of the person of Christ. The councils of Nicaea and Constantinople had asserted the full divinity and real humanity of Christ, without, however, defining the manner of their union. The attempt to solve the apparent incongruity of a perfect union of two complete and distinct natures in one person produced first Apollinarianism, which substituted the divine Logos for the human νοῦς or πνεῦμα of Jesus, thereby detracting from the completeness of his humanity; and then Nestorianism, which destroyed the unity of Christ's person by affirming that the divine Logos dwelt in the man Jesus as in a temple, and that the union of the two was in respect of dignity, and furthermore that, inasmuch as the Logos could not have been born, to call Mary θεοτόκος, "Godbearer," was absurd and blasphemous. The Alexandrians, led by Cyril, stood for the doctrine of the perfect union of two complete natures in one person, and made θεοτόκος the shibboleth of orthodoxy. The theological controversy was intensified by the rivalry of the two patriarchates, Alexandria and Constantinople, for the primacy of the East. As bishop of Constantinople Nestorius naturally looked to the emperor for support, while Cyril turned to Rome. A Roman synod in 430 found Nestorius heretical and decreed his excommunication unless he should recant. Shortly afterwards an Alexandrian synod condemned his doctrines in twelve anathemas, which only provoked counter-anathemas. The emperor now intervened and summoned a council, which met at Ephesus on the 22nd of June 431. Nestorius was present with an armed escort, but refused to attend the council on the ground that the patriarch of Antioch (his friend) had not arrived. The council, nevertheless, proceeded to declare him excommunicate and deposed. When the Roman legates appeared they "examined and approved" the acts of the council, whether as if thereby giving them validity, or as if concurring with the council, is a question not easy to answer from the records. Cyril, the president, apparently regarded the subscription of the legates as the acknowledgment of "canonical agreement" with the synod.

The disturbances that followed the arrival of John, the patriarch of Antioch, are sufficiently described in the article NESTORIUS.

The emperor finally interposed to terminate that scandalous strife, banished Nestorius and dissolved the council. Ultimately he gave decision in favour of the orthodox. The council was generally received as ecumenical, even by the Antiochenes, and the differences between Cyril and John were adjusted (433) by a "Union Creed," which, however, did not prevent a recrudescence of theological controversy.

See Mansi iv. pp. 567-1482, v. pp. 1-1023; Hardouin i. pp. 1271-1722; Hefele (2nd ed.) ii. pp. 141-247 (Eng. trans. iii. pp. 1-114); Peltanus, *SS. Magni et Ecumen. Conc. Ephesini primi Acta omnia* . . . (Ingolstadt, 1576); Wilhelm Kraetz, *Koptische Akten zum Ephes. Konsil* . . . (Leipzig, 1904); also the articles NESTORIUS; CYRIL; THEODORE OF MOPSUESTIA.

The so-called "Robber Synod" of Ephesus (*Latrocinium Ephesinum*) of 449, although wholly irregular and promptly repudiated by the church, may, nevertheless, not improperly be treated here. The archimandrite Eutyches (*q.v.*) having been deposed by his bishop, Flavianus of Constantinople, on account of his heterodox doctrine of the person of Christ, had appealed to Dioscurus, the successor of Cyril in the see of Alexandria, who restored him and moved the emperor Theodosius II. to summon a council, which should "utterly destroy Nestorianism." Rome recognizing that she had more to fear from Alexandria, departed from her traditional policy and sided with Constantinople. The council of 130 bishops, which convened on the 8th of August 449, was completely dominated by Dioscurus. Eutyches was acquitted of heresy and reinstated, Flavianus and other bishops deposed, the Roman legates insulted, and all opposition was overborne by intimidation or actual violence. The death of Flavianus, which soon followed, was attributed to injuries received in this synod; but the proof of the charge leaves something to be desired.

The emperor confirmed the synod, but the Eastern Church was divided upon the question of accepting it, and Leo I. of Rome excommunicated Dioscurus, refused to recognize the successor of Flavianus and demanded a new and greater council. The death of Theodosius II. removed the main support of Dioscurus, and cleared the way for the council of Chalcedon (*q.v.*), which deposed the Alexandrian and condemned Eutychianism.

See Mansi vi. pp. 503 sqq., 606 sqq.: Hardouin ii. 71 sqq.: Hefele (2nd ed.) ii. pp. 349 sqq. (Eng. trans. iii. pp. 221 sqq.); S. G. F. Perry, *The Second Synod of Ephesus* (Dartford, 1881); l'Abbé Martin, *Actes du brigandage d'Éphèse* (Amiens, 1874) and *Le Pseudo-synode connu dans l'histoire sous le nom de brigandage d'Éphèse* (Paris, 1875). (T. F. C.)

EPHOD, a Hebrew word (*ēphōd*) of uncertain meaning, retained by the translators of the Old Testament. In the post-exilic priestly writings (5th century B.C. and later) the ephod forms part of the gorgeous ceremonial dress of the high-priest (see Ex. xxix. 5 sq. and especially Ecclus. xlv. 7-13). It was a very richly decorated object of coloured threads interwoven with gold, worn outside the luxurious mantle or robe; it was kept in place by a girdle, and by shoulder-pieces (?), to which were attached brooches of onyx (fastened to the robe) and golden rings from which hung the "breastplate" (or rather pouch) containing the sacred lots, Urim and Thummim. The somewhat involved description in Ex. xxviii. 6 sqq., xxxix. 2 sqq. (see V. Ryssel's ed. of Dillmann's commentary on Ex.-Lev.) leaves it uncertain whether it covered the back, encircling the body like a kind of waistcoat, or only the front; at all events it was not a garment in the ordinary sense, and its association with the sacred lots indicates that the ephod was used for divination (cf. Num. xxvii. 21), and had become the distinguishing feature of the leading priestly line (cf. 1 Sam. ii. 28).[1] But from other passages it seems that the ephod had been a familiar object whose use was by no means so restricted. Like the teraphim (*q.v.*) it was part of the common stock of Hebrew cult; it is borne (rather than worn) by persons acting in a priestly character (Samuel at Shiloh, priests of Nob, David), it is part of the worship of individuals (Gideon at Ophrah), and is found in a private shrine with a lay attendant (Micah; Judg. xvii. 5; see, however, vv. 10-13).[2] Nevertheless, while the prophetical teaching came to regard the ephod as contrary to the true worship of Yahweh, the priestly doctrine of the post-exilic age (when worship was withdrawn from the community at large to the recognized priesthood of Jerusalem) has retained it along with other remains of earlier usage, legalizing it, as it were, by confining it exclusively to the Aaronites.

An intricate historical problem is involved at the outset in the famous ephod, which the priest Abiathar brought in his hand when he fled to David after the massacre of the priests of Nob. It is evidently regarded as the one which had been in Nob (1 Sam. xxi. 9), and the presence of the priests at Nob is no less clearly regarded as the sequel of the fall of Shiloh. The ostensible intention is to narrate the transference of the sacred objects to David (cf. 2 Sam. i. 10), and henceforth he regularly inquires of Yahweh in his movements (1 Sam. xxiii. 9-12, xxx. 7 sq.; cf. xxiii. 2, 4; 2 Sam. ii. 1, v. 19-23). It is possible that the writer (or writers) desired to trace the earlier history of the ephod through the line of Eli and Abiathar to the time when the Zadokite priests gained the supremacy (see LEVITES); but elsewhere Abiathar is said to have borne the ark (1 Kings ii. 26; cf. 2 Sam. vii. 6), and this fluctuation is noteworthy by reason of the present confusion in the text of 1 Sam. xiv. 3, 18 (see commentaries).

On one view, the ark in Kirjath-jearim was in non-Israelite hands (1 Sam. vii. 1 sq.); on the other, Saul's position as king necessitates the presumption that his sway extended over Judah and Israel, including those cities which otherwise appear to have been in the hands of aliens (1 Sam. xiv. 47 sq.; cf. xvii. 54, &c.). There are some fundamental divergencies in the representations of the traditions of both David and Saul (*qq.v.*), and there is indirect and independent evidence which makes 1 Kings ii. 26 not entirely isolated. Here it must suffice to remark that the ark, too, was also an object for ascertaining the divine will (especially Judg. xx. 26-28; cf. 18, 23), and it is far from certain that the later records of the ark (which was too heavy to be borne by one), like those of the ephod, are valid for earlier times.

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[1] Cf. the phrase "ephod of prophecy" (*Testament of Levi*, viii. 2). The priestly apparatus of the post-exilic age retains several traces of old mythological symbolism and earlier cult, the meaning of which had not altogether been forgotten. With the dress one may perhaps compare the apparel of the gods Marduk and Adad, for which see A. Jeremias, *Das Alte Test. im Lichte des Alten Orients*, 2nd ed., figs. 33, 46, and pp. 162, 449.

[2] The ordinary interpretation "*linen* ephod" (1 Sam. ii. 18, xxii. 18; 2 Sam. vi. 14) is questioned by T. C. Foote in his useful monograph, *Journ. Bibl. Lit.* xxi., 1902, pp. 3, 47. This writer also aptly compares the infant Samuel with the child who drew the lots at the temple of Fortuna at Praeneste (Cicero, *De divin.* ii. 41, 86), and with the modern practice of employing innocent instruments of chance in lotteries (*op. cit.* pp. 22, 27).

For the form of the earlier ephod the classic passage is 2 Sam. vi. 14, where David girt in (or with) a linen ephod dances before the ark at its entry into Jerusalem and incurs the unqualified contempt of his wife Michal, the daughter of Saul. Relying upon the known custom of performing certain observances in a practically, or even entirely, nude condition, it seems plausible to infer that the ephod was a scanty wrapping, perhaps a loin-cloth, and this view has found weighty support. On the other hand, the idea of contempt at the exposure of the person, to whatever extent, may not have been so prominent, especially if the custom were not unfamiliar, and it is possible that the sequel refers more particularly to grosser practices attending outbursts of religious enthusiasm.[1]

The favourite view that the ephod was also an image rests partly upon 1 Sam. xxi. 9, where Goliath's sword is wrapped in a cloth in the sanctuary of Nob *behind the ephod*. But it is equally natural to suppose that it hung on a nail in the wall, and apart from the omission of the significant words in the original Septuagint, the possibility that the text read "ark" cannot be wholly ignored (see above; also G. F. Moore, *Ency. Bib.* col. 1307, n. 2). Again, in the story of Micah's shrine and the removal of the sacred objects and the Levite priest by the Danites, parallel narratives have been used: the graven and molten images of Judg. xvii. 2-4 corresponding to the ephod and teraphim of ver. 5. Throughout there is confusion in the use of these terms, and the finale refers only to the graven image of Dan (xviii. 30 sq., see 1 Kings xii. 28 sq.). But the combination of ephod and teraphim (as in Hos. iii. 4) is noteworthy, since the fact that the latter were images (1 Sam. xix. 13; Gen. xxxi. 34) could be urged against the view that the former were of a similar character. Finally, according to Judg. viii. 27, Gideon made an ephod of gold, about 70 ℔ in weight, and "put" it in Ophrah. It is regarded as a departure from the worship of Yahweh, although the writer of ver. 33 (cf. also ver 23) hardly shared this feeling; it was probably something once harmlessly associated with the cult of Yahweh (cf. Calf, Golden), and the term "ephod" may be due to a later hand under the influence of the prophetical teaching referred to above. The present passage is the only one which appears to prove that the ephod was an image, and several writers, including Lotz (*Realencyk. f. prot. Theol.* vol. v., *s.v.*), T. C. Foote (pp. 13-18) and A. Maecklenburg (*Zeit. f. wissens. Theol.*, 1906, pp. 433 sqq.) find this interpretation unnecessary.

Archaeological evidence for objects of divination (see, *e.g.*, the interesting details in Ohnefalsch-Richter, *Kypros, the Bible and Homer*, i. 447 sq.), and parallels from the Oriental area, can be readily cited in support of any of the explanations of the ephod which have been offered, but naturally cannot prove the form which it actually took in Palestine. Since images were clothed, it could be supposed that the diviner put on the god's apparel (cf. *Ency. Bib.* col. 1141); but they were also plated, and in either case the transference from a covering to the object covered is intelligible. If the ephod was a loin-cloth, its use as a receptacle and the known evolution of the article find useful analogies (Foote, p. 43 sq., and *Ency. Bib.* col. 1734 [1]). Finally, if there is no decisive evidence for the view that it was an image (Judg. viii. 27), or that as a wrapping it formed the sole covering of the officiating agent (2 Sam. vi.), all that can safely be said is that it was certainly used in divination and presumably did not differ radically from the ephod of the post-exilic age.

See further, in addition to the monographs already cited, the articles in Hastings's *Dict. Bible* (by S. R. Driver), *Ency. Bib.* (by G. F. Moore), and *Jew. Encyc.* (L. Ginsburg), and E. Sellin, in *Oriental. Studien: Theodor Nöldeke* (ed. Bezold, 1906), pp. 699 sqq. (S. A. C.)

EPHOR (Gr. ἔφορος), the title of the highest magistrates of the ancient Spartan state. It is uncertain when the office was created and what was its original character. That it owed its institution to Lycurgus (Herod. i. 65; cf. Xen. *Respub. Lacedaem.* viii. 3) is very improbable, and we may either regard it as an immemorial Dorian institution (with C. O. Müller, H. Gabriel, H. K. Stein, Ed. Meyer and others), or accept the tradition that it was founded during the first Messenian War, which necessitated a prolonged absence from Sparta on the part of both kings (Plato, *Laws*, iii. 692 A; Aristotle, *Politics*, v. 9. 1 = p. 1313 a 26; Plut. *Cleomenes*, 10; so G. Dum, G. Gilbert, A. H. J. Greenidge). There is no evidence for the theory that originally the ephors were market inspectors; they seem rather to have had from the outset judicial or police functions. Gradually they extended their powers, aided by the jealousy between the royal houses, which made it almost impossible for the two kings to co-operate heartily, and from the 5th to the 3rd century they exercised a growing despotism which Plato justly calls a *tyrannis* (*Laws*, 692). Cleomenes III. restored the royal power by murdering four of the ephors and abolishing the office, and though it was revived by Antigonus Doson after the battle of Sellasia, and existed at least down to Hadrian's reign (*Sparta Museum Catalogue*, Introd. p. 10), it never regained its former power.

In historical times the ephors were five in number, the first of them giving his name to the year, like the eponymous archon at Athens. Where opinions were divided the majority prevailed. The ephors were elected annually, originally no doubt by the kings, later by the people; their term of office began with the new moon after the autumnal equinox, and they had an official residence (ἐφορεῖον) in the Agora. Every full citizen was eligible and no property qualification was required.

The ephors summoned and presided over meetings of the Gerousia and Apella, and formed the executive committee responsible for carrying out decrees. In their dealings with the kings they represented the supremacy of the people. There was a monthly exchange of oaths, the kings swearing to rule according to the laws, the ephors undertaking on this condition to maintain the royal authority (Xen. *Resp. Laced.* 15. 7). They alone might remain seated in a king's presence, and had power to try and even to imprison a king, who must appear before them at the third summons. Two of them accompanied the army in the field, not interfering with the king's conduct of the campaign, but prepared, if need be, to bring him to trial on his return. The ephors, again, exercised a general guardianship of law and custom and superintended the training of the young. They shared the criminal jurisdiction of the Gerousia and decided civil suits. The administration of taxation, the distribution of booty, and the regulation of the calendar also devolved upon them. They could actually put *perioeci* to death without trial, if we may believe Isocrates (xii. 181), and were responsible for protecting the state against the helots, against whom they formally declared war on entering office, so as to be able to kill any whom they regarded as dangerous without violating religious scruples. Finally, the ephors were supreme in questions of foreign policy. They enforced, when necessary, the alien acts (ξενηλασία), negotiated with foreign ambassadors, instructed generals, sent out expeditions and were the guiding spirits of the Spartan confederacy.

See the constitutional histories of G. Gilbert (Eng. trans.), pp. 16, 52-59; G. Busolt, p. 84 ff., V. Thumser, p. 241 ff., G. F. Schömann (Eng. trans.), p. 236 ff., A. H. J. Greenidge, p. 102 ff.; Szanto's article "Ephoroi" in Pauly-Wissowa, *Realencyclopädie*, v. 2860 ff.; Ed. Meyer, *Forschungen zur alten Geschichte*, i. 244 ff.; C. O. Müller, *Dorians*, bk. iii. ch. vii.; G. Grote, *History of Greece*, pt. ii. ch. vi.; G. Busolt, *Griechische Geschichte*, i.^{2} 555 ff.; B. Niese, *Historische Zeitschrift*, lxii. 58 ff. Of the many monographs dealing with this subject the following are specially useful: G. Dum, *Entstehung und*

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[1] It is not stated that the linen ephod was David's sole covering, and it is difficult to account for the text in the parallel passage 1 Chron. xv. 27 (where he is clothed with a robe); "girt," too, is ambiguous, since the verb is even used of a sword. On the question of nudity (cf. 1 Sam. xix. 24) see Robertson Smith, *Rel. Sem*.^{2} pp. 161, 450 sq.; *Ency Bib.* s.vv. "girdle," "sackcloth"; and M. Jastrow, *Journ. Am. Or Soc* xx. 144, xxi. 23. The significant terms "uncover," "play" (2 Sam. vi. 20 sq.), have other meanings intelligible to those acquainted with the excesses practised in Oriental cults.

Entwicklung des spartan. Ephorats (Innsbruck, 1878); H. K. Stein, *Das spartan. Ephorat bis auf Chellon* (Paderborn, 1870); K. Kuchtner, *Entstehung und ursprüngliche Bedeutung des spartan. Ephorats* (Munich, 1897); C. Frick, *De ephoris Spartanis* (Göttingen, 1872); A. Schaefer, *De ephoris Lacedaemoniis* (Greifswald, 1863); E. von Stern, *Zur Entstehung und ursprünglichen Bedeutung des Ephorats in Sparta* (Berlin, 1894). (M. N. T.)

EPHORUS (*c.* 400–330 B.C.), of Cyme in Aeolis, in Asia Minor, Greek historian. Together with the historian Theopompus he was a pupil of Isocrates, in whose school he attended two courses of rhetoric. But he does not seem to have made much progress in the art, and it is said to have been at the suggestion of Isocrates himself that he took up literary composition and the study of history. The fruit of his labours was his Ἱστορίαι in 29 books, the first universal history, beginning with the return of the Heraclidae to Peloponnesus, as the first well-attested historical event. The whole work was edited by his son Demophilus, who added a 30th book, containing a summary description of the Social War and ending with the taking of Perinthus (340) by Philip of Macedon (cf. Diod. Sic. xvi. 14 with xvi. 76). Each book was complete in itself, and had a separate title and preface. It is clear that Ephorus made critical use of the best authorities, and his work, highly praised and much read, was freely drawn upon by Diodorus Siculus[1] and other compilers. Strabo (viii. p. 332) attaches much importance to his geographical investigations, and praises him for being the first to separate the historical from the merely geographical element. Polybius (xii. 25 g) while crediting him with a knowledge of the conditions of naval warfare, ridicules his description of the battles of Leuctra and Mantineia as showing ignorance of the nature of land operations. He was further to be commended for drawing (though not always) a sharp line of demarcation between the mythical and historical (Strabo ix. p. 423); he even recognized that a profusion of detail, though lending corroborative force to accounts of recent events, is ground for suspicion in reports of far-distant history. His style was high-flown and artificial, as was natural considering his early training, and he frequently sacrificed truth to rhetoric effect; but, according to Dionysius of Halicarnassus, he and Theopompus were the only historical writers whose language was accurate and finished. Other works attributed to him were:—*A Treatise on Discoveries*; *Respecting Good and Evil Things*; *On Remarkable Things in Various Countries* (it is doubtful whether these were separate works, or merely extracts from the *Histories*); *A Treatise on my Country*, on the history and antiquities of Cyme, and an essay *On Style*, his only rhetorical work, which is occasionally mentioned by the rhetorician Theon. Nothing is known of his life, except the statement in Plutarch that he declined to visit the court of Alexander the Great.

Fragments in C. W. Müller, *Fragmenta historicorum Graecorum*, i., with critical introduction on the life and writings of Ephorus; see J. A. Klügmann, *De Ephoro historico* (1860); C. A. Volquardsen, *Untersuchungen über die Quellen der griechischen und sicilischen Geschichten bei Diodor. xi.-xvi.* (1868); and specially J. B. Bury, *Ancient Greek Historians* (1909); E. Schwartz, in Pauly-Wissowa, *Realencyc.* s.v.; and article GREECE: *History*: Ancient Authorities.

EPHRAEM SYRUS (Ephraim the Syrian), a saint who lived in Mesopotamia during the first three quarters of the 4th century A.D. He is perhaps the most influential of all Syriac authors; and his fame as a poet, commentator, preacher and defender of orthodoxy has spread throughout all branches of the Christian Church. This reputation he owes partly to the vast fertility of his pen—according to the historian Sozomen he was credited with having written altogether 3,000,000 lines—partly to the elegance of his style and a certain measure of poetic inspiration, more perhaps to the strength and consistency of his personal character, and his ardour in defence of the creed formulated at Nicaea.

An anonymous life of Ephraim was written not long after his death in 373. The biography has come down to us in two recensions. But in neither form is it free from later interpolation; and its untrustworthiness is shown by its conflicting with data supplied by his own works, as well as by the manner in which it is overloaded with miraculous events. The following is a probable outline of the main facts of Ephraim's life. He was born in the reign of Constantine (perhaps in 306) at or near Nisibis. His father was a pagan, the priest of an idol called Abnil or Abizal.[2] During his boyhood Ephraim showed a repugnance towards heathen worship, and was eventually driven by his father from the home. He became a ward and disciple of the famous Jacob—the same who attended the Council of Nicaea as bishop of Nisibis, and died in 338. At his hands Ephraim seems to have received baptism at the age of 18 or of 28 (the two recensions differ on this point), and remained at Nisibis till its surrender to the Persians by Jovian in 363. Probably in the course of these years he was ordained a deacon, but from his humble estimate of his own worth refused advancement to any higher degree in the church. He seems to have played an important part in guiding the fortunes of the city during the war begun by Shapur II. in 337, in the course of which Nisibis was thrice unsuccessfully besieged by the Persians (in 338, 346 and 350). The statements of his biographer to this effect accord with the impression we derive from his own poems (*Carmina Nisibena*, 1-21). His intimate relations with Bishop Jacob were continued with the three succeeding bishops—Babu (338–?349), Vologaeses (?349–361), and Abraham—on all of whom he wrote encomia. The surrender of the city in 363 to the Persians resulted in a general exodus of the Christians, and Ephraim left with the rest. After visiting Amid (Diarbekr) he proceeded to Edessa, and there settled and spent the last ten years of his life. He seems to have lived mainly as a hermit outside the city: his time was devoted to study, writing, teaching and the refutation of heresies. It is possible that during these years he paid a visit to Basil at Caesarea. Near the end of his life he rendered great public service by distributing provisions in the city during a famine. The best attested date for his death is the 9th of June 373. It is clear that this chronology leaves no room for the visit to Egypt, and the eight years spent there in refuting Arianism, which are alleged by his biographer. Perhaps, as has been surmised, there may be confusion with another Ephraim. Nor can he have written the funeral panegyric on Basil who survived him by three months. But with all necessary deductions the biography is valuable as witnessing to the immense reputation for sanctity and for theological acumen which Ephraim had gained in his lifetime, or at least soon after he died. His biographer's statement as to his habits and appearance is worth quoting, and is probably true:—"From the time he became a monk to the end of his life his only food was barley bread and sometimes pulse and vegetables: his drink was water. And his flesh was dried upon his bones, like a potter's sherd. His clothes were of many pieces patched together, the colour of dirt. In stature he was little; his countenance was always sad, and he never condescended to laughter. And he was bald and beardless."

The statement in his Life that Ephraim miraculously learned Coptic falls to the ground with the narrative of his Egyptian visit: and the story of his suddenly learning to speak Greek through the prayer of St Basil is equally unworthy of credence. He probably wrote only in Syriac, though he may have possessed some knowledge of Greek and possibly of Hebrew. But many of his works must have been early translated into other languages; and we possess in MSS. versions into Greek, Armenian, Coptic, Arabic and Ethiopic. The Greek versions occupy three entire volumes of the Roman folio edition, and the extant Armenian versions (mainly of N.T. commentaries) were published at Venice in four volumes in 1836.

It was primarily as a sacred poet that Ephraim impressed himself on his fellow-countrymen. With the exception of his commentaries on scripture, nearly all his extant Syriac works are composed in metre. In many cases the metrical structure is of the simplest, consisting only in the arrangement of the discourse in lines of uniform length—usually heptasyllabic (Ephraim's favourite metre) or pentasyllabic. A more complicated arrangement is found in other poems, such as the *Carmina Nisibena*: these are made up of strophes, each consisting of lines of different lengths according to a settled scheme, with a recurring refrain. T. J. Lamy has estimated that, in this class of poems, there are as many as 66 different varieties of metres to be found in the works of Ephraim. These strophic poems were set to music, and sung by alternating choirs of girls. According to Ephraim's biographer, his main motive for providing these hymns set to music was his desire to counteract the baneful effects produced by the heretical hymns of Bardaiṣan and his son Harmonius. which had enjoyed popularity and been sung among the Edessenes for a century and a half.

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[1] It is now generally recognized, thanks to Volquardsen and others, that Ephorus is the principal authority followed by Diodorus, except in the chapters relating to Sicilian history.

[2] It is true that in the *Confession* attributed to him and printed among his Greek works in the first volume of the Roman edition he speaks (p. 129) of his parents as having become martyrs for the Christian faith. But this document is of very doubtful authenticity.

The subject-matter of Ephraim's poems covers all departments of theology. Thus the Roman edition contains (of metrical works) exegetical discourses, hymns on the Nativity of Christ, 65 hymns against heretics, 85 on the Faith against sceptics, a discourse against the Jews, 85 funeral hymns, 4 on free-will, 76 exhortations to repentance, 12 hymns on paradise, and 12 on miscellaneous subjects. The edition of Lamy has added many other poems, largely connected with church festivals. It must be confessed that, judged by Western standards, the poems of Ephraim are prolix and wearisome in the extreme, and are distinguished by few striking poetic beauties. And so far as they are made the vehicle of reasoning, their efficiency is seriously hampered by their poetic form. On the other hand, it is fair to remember that the taste of Ephraim's countrymen in poetry was very different from ours. As Duval remarks: "quant à la prolixité de saint Éphrem que nous trouvons parfois fastidieuse, on ne peut la condamner sans tenir compte du goût des Syriens qui aimaient les répétitions et les développements de la même pensée, et voyaient des qualités là où nous trouvons des défauts" (*Littér. syriaque*, p. 19). He is no worse in these respects than the best of the Syriac writers who succeeded him. And he surpasses almost all of them in the richness of his diction, and his skill in the use of metaphors and illustrations.

Of Ephraim as a commentator on Scripture we have only imperfect means of judging. His commentaries on the O.T. are at present accessible to us only in the form they had assumed in the *Catena Patrum* of Severus (compiled in 861), and to some extent in quotations by later Syriac commentators. His commentary on the Gospels is of great importance in connexion with the textual history of the N.T., for the text on which he composed it was that of the Diatessaron. The Syriac original is lost: but the ancient Armenian version survives, and was published at Venice in 1836 along with Ephraim's commentary on the Pauline epistles (also only extant in Armenian) and some other works. A Latin version of the Armenian Diatessaron commentary has been made by Aucher and Mösinger (Venice, 1876). Using this version as a clue, J. R. Harris[1] has been able to identify a number of Syriac quotations from or references to this commentary in the works of Isho'dadh, Bar-Kepha (Severus), Bar-ṣalibi and Barhebraeus. Although, as Harris points out, it is unlikely that the original text of the Diatessaron had come down unchanged through the two centuries to Ephraim's day, the text on which he comments was in the main unaffected by the revision which produced the Peshitta. Side by side with this conclusion may be placed the result of F. C. Burkitt's[2] careful examination of the quotations from the Gospels in the other works of Ephraim; he shows conclusively that in all the undoubtedly genuine works the quotations are from a pre-Peshitta text.

As a theologian, Ephraim shows himself a stout defender of Nicaean orthodoxy, with no leanings in the direction of either the Nestorian or the Monophysite heresies which arose after his time. He regarded it as his special task to combat the views of Marcion, of Bardaisan and of Mani.

To the modern historian Ephraim's main contribution is in the material supplied by the 72 hymns[3] known as *Carmina Nisibena* and published by G. Bickell in 1866. The first 20 poems were written at Nisibis between 350 and 363 during the Persian invasions; the remaining 52 at Edessa between 363 and 373. The former tell us much of the incidents of the frontier war, and particularly enable us to reconstruct in detail the history of the third siege of Nisibis in 350.

Of the many editions of Ephraim's works a full list is given by Nestle in *Realenk. f. protest. Theol. und Kirche* (3rd ed.). For modern students the most important are: (1) the great folio edition in 6 volumes (3 of works in Greek and 3 in Syriac), in which the text is throughout accompanied by a Latin version (Rome, 1732–1746); on the unsatisfactory character of this edition (which includes many works that are not Ephraim's) and especially of the Latin version, see Burkitt, *Ephraim's Quotations*, pp. 4 sqq.; (2) *Carmina Nisibena*, edited with a Latin translation by G. Bickell (Leipzig, 1866); (3) *Hymni et sermones*, edited with a Latin translation by T. J. Lamy (4 vols., Malines, 1882–1902). Many selected homilies have been edited or translated by Overbeck, Zingerle and others (cf. Wright, *Short History*, pp. 35 sqq.); a selection of the *Hymns* was translated by H. Burgess, *Select Metrical Hymns of Ephrem Syrus* (1853). Of the two recensions of Ephraim's biography, one was edited in part by J. S. Assemani (B.O. i. 26 sqq.) and in full by S. E. Assemani in the Roman edition (iii. pp. xxiii.-lxiii.); the other by Lamy (ii. 5-90) and Bedjan (*Acta mart. et sanct.* iii. 621-665). The long poem on the history of Joseph, twice edited by Bedjan (Paris, 1887 and 1891) and by him attributed to Ephraim, is more probably the work of Balai. (N. M.)

EPHRAIM, a tribe of Israel, called after the younger son of Joseph, who in his benediction exalted Ephraim over the elder brother Manasseh (Gen. xlviii.). These two divisions were often known as the "house of Joseph" (Josh. xvii. 14 sqq.; Judg. i. 22; 2 Sam. xix. 20; 1 Kings xi. 28). The relations between them are obscure; conflicts are referred to in Is. ix. 21,[4] and Ephraim's proud and ambitious character is indicated in its demands as narrated in Josh. xvii. 14; Judg. viii. 1-3, xii. 1-6. Thoughout, Ephraim played a distinctive and prominent part; it probably excelled Manasseh in numerical strength, and the name became a synonym for the northern kingdom of Israel. Originally the name may have been a geographical term for the central portion of Palestine. Regarded as a tribe, it lay to the north of Benjamin, which traditionally belongs to it; but whether the young "brother" (see BENJAMIN) sprang from it, or grew up separately, is uncertain. Northwards, Ephraim lost itself in Manasseh, even if it did not actually include it (Judg. i. 27; 1 Chron. vii. 29); the boundaries between them can hardly be recovered. Ephraim's strength lay in the possession of famous sites: Shechem, with the tomb of the tribal ancestor, also one of the capitals; Shiloh, at one period the home of the ark; Timnath-Serah (or Heres), the burial-place of Joshua; and Samaria, whose name was afterwards extended to the whole district (see SAMARIA).

Shechem itself was visited by Abraham and Jacob, and the latter bought from the sons of Hamor a burial-place (Gen. xxxiii. 19). The story of Dinah may imply some early settlement of tribes in its vicinity (but see SIMEON), and the reference in Gen. xlviii. 22 (see R. V. marg.) alludes to its having been forcibly captured. But how this part of Palestine came into the hands of the Israelites is not definitely related in the story of the invasion (see JOSHUA).

A careful discussion of the Biblical data referring to Ephraim is given by H. W. Hogg, *Ency. Bib.*, s.v. On the characteristic narratives which appear to have originated in Ephraim (viz. the Ephraimite or Elohist source, E), see GENESIS and BIBLE: *Old Testament Criticism*. See further ABIMELECH; GIDEON; MANASSEH; and JEWS: *History*.

EPHTHALITES, or WHITE HUNS. This many-named and enigmatical tribe was of considerable importance in the history of India and Persia in the 5th and 6th centuries, and was known to the Byzantine writers, who call them Ἐφθαλῖται, Εὐθαγῖται, Νεφθαλῖται or Ἀβδελοί. The last of these is an independent attempt to render the original name, which was probably something like Aptal or Haptal, but the initial N of the third is believed to be a clerical error. They were also called *Λευκοὶ Οὖννοι* or *Χοῦνοι*, White (that is fair-skinned) Huns. In Arabic and Persian they are known as Haital and in Armenian as Haithal, Idal or Hepthal. The Chinese name Yetha seems an attempt to represent the same sound. In India they were called Hūnas. Ephthalite is the usual orthography, but Hephthalite is perhaps more correct.

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[1] *Fragments of the Commentary of Ephrem Syrus upon the Diatessaron* (London, 1895).

[2] "Ephraim's Quotations from the Gospel," in *Texts and Studies*, vol. vii. (Cambridge, 1901).

[3] There were originally 77, but 5 have perished.

[4] Inter-tribal feuds during the period of the monarchy may underlie the events mentioned in 1 Kings xvi. 9 sq., 21 sq.; 2 Kings xv. 10, 14.

Our earliest information about the Ephthalites comes from the Chinese chronicles, in which it is stated that they were originally a tribe of the great Yue-Chi (*q.v.*), living to the north of the Great Wall, and in subjection to the Jwen-Jwen, as were also the Turks at one time. Their original name was Hoa or Hoa-tun, subsequently they styled themselves Ye-tha-i-li-to after the name of their royal family, or more briefly Ye-tha. Before the 5th century A.D. they began to move westwards, for about 420 we find them in Transoxiana, and for the next 130 years they were a menace to Persia, which they continually and successfully invaded, though they never held it as a conquest. The Sassanid king, Bahram V., fought several campaigns with them and succeeded in keeping them at bay, but they defeated and killed Peroz (Firūz), A.D. 484. His son Kavadh I. (Kobad), being driven out of Persia, took refuge with the Ephthalites, and recovered his throne with the assistance of their khan, whose daughter he had married, but subsequently he engaged in prolonged hostilities with them. The Persians were not quit of the Ephthalites until 557 when Chosroes Anushirwan destroyed their power with the assistance of the Turks, who now make their first appearance in western Asia.

The Huns who invaded India appear to have belonged to the same stock as those who molested Persia. The headquarters of the horde were at Bamian and at Balkh, and from these points they raided south-east and south-west. Skandagupta repelled an invasion in 455, but the defeat of the Persians in 484 probably stimulated their activity, and at the end of the 5th century their chief Toromana penetrated to Malwa in central India and succeeded in holding it for some time. His son Mihiragula (*c.* 510–540) made Sakāla in the Punjab his Indian capital, but the cruelty of his rule provoked the Indian princes to form a confederation and revolt against him about 528. He was not, however, killed, but took refuge in Kashmir, where after a few years he seized the throne and then attacked the neighbouring kingdom of Gandhara, perpetrating terrible massacres. About a year after this he died (*c.* 540), and shortly afterwards the Ephthalites collapsed under the attacks of the Turks. They do not appear to have moved on to another sphere, as these nomadic tribes often did when defeated, and were probably gradually absorbed in the surrounding populations. Their political power perhaps continued in the Gurjara empire, which at one time extended to Bengal in the east and the Nerbudda in the south, and continued in a diminished form until A.D. 1040. These Gurjaras appear to have entered India in connexion with the Hunnish invasions.

Our knowledge of the Indian Hūnas is chiefly derived from coins, from a few inscriptions distributed from the Punjab to central India, and from the account of the Chinese pilgrim Hsüan Tsang, who visited the country just a century after the death of Mihiragula. The Greek monk Cosmas Indicopleustes, who visited India about 530, describes the ruler of the country, whom he calls Gollas, as a White Hun king, who exacted an oppressive tribute with the help of a large army of cavalry and war elephants. Gollas no doubt represents the last part of the name Mihiragula or Mihirakula.

The accounts of the Ephthalites, especially those of the Indian Hūnas, dwell on their ferocity and cruelty. They are represented as delighting in massacres and torture, and it is said that popular tradition in India still retains the story that Mihiragula used to amuse himself by rolling elephants down a precipice and watching their agonies. Their invasions shook Indian society and institutions to the foundations, but, unlike the earlier Kushans, they do not seem to have introduced new ideas into India or have acted as other than a destructive force, although they may perhaps have kept up some communication between India and Persia. The first part of Mihiragula seems to be the name of the Persian deity Mithra, but his patron deity was Siva, and he left behind him the reputation of a ferocious persecutor of Buddhism. Many of his coins bear the Nandi bull (Śiva's emblem), and the king's name is preceded by the title *šahi* (shah), which had previously been used by the Kushan dynasty. Toramana's coins are found plentifully in Kashmir, which, therefore, probably formed part of the Huna dominions before Mihiragula's time, so that when he fled there after his defeat he was taking refuge, if not with his own subjects, at least with a kindred clan.

Greek writers give a more flattering account of the Ephthalites, which may perhaps be due to the fact that they were useful to the East Roman empire as enemies of Persia and also not dangerously near. Procopius says that they were far more civilized than the Huns of Attila, and the Turkish ambassador who was received by Justin is said to have described them as *ἀστικοί*, which may merely mean that they lived in the cities which they conquered. The Chinese writers say that their customs were like those of the Turks; that they had no cities, lived in felt tents, were ignorant of writing and practised polyandry. Nothing whatever is known of their language, but some scholars explain the names Toramana and Jauvla as Turkish.

For the possible connexion between the Ephthalites and the European Huns see HUNS. The Chinese statement that the Hoa or Ye-tha were a section of the great Yue-Chi, and that their customs resembled those of the Turks (Tu-Kiue), is probably correct, but does not amount to much, for the relationship did not prevent them from fighting with the Yue-Chi and Turks, and means little more than that they belonged to the warlike and energetic section of central Asian nomads, which is in any case certain. They appear to have been more ferocious and less assimilative than the other conquering tribes. This may, however, be due to the fact that their contact with civilization was so short; the Yue-Chi and Turks had had some commerce with more advanced races before they played any part in political history, but the Ephthalites appear as raw barbarians, and were annihilated as a nation in little more than a hundred years. Like the Yue-Chi they have probably contributed to form some of the physical types of the Indian population, and it is noticeable that polyandry is a recognized institution among many Himalayan tribes, and is also said to be practised secretly by the Jats and other races of the plains.

Among original authorities may be consulted Procopius, Menander Protector, Cosmas Indicopleustes (trans. McCrindle, Hakluyt Society, 1897), the Kashmir chronicle *Rajataranginī* (trans. Stein, 1900, and Yüan Chwang). See also A. Stein, *White Huns and Kindred Tribes* (1905); O. Franke, *Beiträge aus chinesischen Quellen zur Kenntnis der Turkvölker und Skythen* (1904); Ujfalvy, *Mémoire sur les Huns Blancs* (1898); Drouin, *Mémoire sur les Huns Ephthalites* (1895); and various articles by Vincent Smith, Specht, Drouin, and E. H. Parker in the *Journal of the Royal Asiatic Society*, *Journal asiatique*, *Revue numismatique*, *Asiatic Quarterly*, &c. (C. El.)

ÉPI, the French architectural term for a light finial, generally of metal, but sometimes of terra-cotta, forming the termination of a spire or the angle of a roof.

EPICENE (from the Gr. *ἐπίκοινος*, common), a term in Greek and Latin grammar denoting nouns which, possessing but one gender, are used to describe animals of either sex. In English grammar there are no true epicene nouns, but the term is sometimes used instead of *common gender*. In figurative and literary language, epicene is an adjective applied to persons having the characteristics of both sexes, and hence is occasionally used as a synonym of "effeminate."

EPICHARMUS (*c.* 540–450 B.C.), Greek comic poet, was born in the island of Cos. Early in life he went to Megara in Sicily, and after its destruction by Gelo (484) removed to Syracuse, where he spent the rest of his life at the court of Hiero, and died at the age of ninety or (according to a statement in Lucian, *Macrobii*, 25) ninety-seven. A brazen statue was set up in his honour by the inhabitants, for which Theocritus composed an inscription (*Epigr.* 17). Epicharmus was the chief representative of the Sicilian or Dorian comedy. Of his works 35 titles and a few fragments have survived. In the city of tyrants it would have been dangerous to present comedies like those of the Athenian stage, in which attacks were made upon the authorities. Accordingly, the comedies of Epicharmus are of two kinds, neither of them calculated to give offence to the ruler. They are either mythological travesties (resembling the satyric drama of Athens) or character comedies. To the first class belong the *Busiris*, in which Heracles is represented as a voracious glutton; the *Marriage of Hebe*, remarkable for a lengthy list of dainties. The second class dealt with different classes of the population (the sailor, the prophet, the boor, the parasite). Some of the plays seem to have bordered on the political, as *The Plunderings*, describing the devastation of Sicily in the time of the poet. A short fragment has been discovered (in the Rainer papyri) from the *Ὀδυσσεὺς αὐτόμολος*, which told how Odysseus got inside Troy in the disguise of a beggar and obtained valuable information. Another feature of his works was the large number of excellent sentiments expressed in a brief proverbial form; the Pythagoreans claimed him as a member of their school, who had forsaken the study of philosophy for the writing of comedy. Plato (*Theaetetus*, 152 E) puts him at the head of the masters of comedy, coupling his name with Homer and, according to a remark in Diogenes Laërtius, Plato was indebted to Epicharmus for much of his philosophy. Ennius called his didactic poem on natural philosophy *Epicharmus* after the comic poet. The metres employed by Epicharmus were iambic trimeter, and especially trochaic and anapaestic tetrameter. The plot of the plays was simple, the action lively and rapid; hence they were classed among the *fabulae motoriae* (stirring, bustling), as indicated in the well-known line of Horace (*Epistles*, ii. 1. 58):

> "Plautus ad exemplar Siculi properare Epicharmi."

Epicharmus is the subject of articles in Suidas and Diogenes Laërtius (viii. 3). See A. O. Lorenz, *Leben und Schriften des Koers E.* (with account of the Doric drama and fragments, 1864); J. Girard, *Études sur la poésie grecque* (1884); Kaibel in Pauly-Wissowa's *Realencyclopädie*, according to whom Epicharmus was a Siceliot; for the papyrus fragment, Blass in *Jahrbücher für Philologie*, cxxxix., 1889.

EPIC POETRY, or EPOS (from the Gr. ἔπος, a story, and ἐπικός, pertaining to a story), the names given to the most dignified and elaborate forms of narrative poetry. The word *epopee* is also, but more rarely, employed to designate the same thing, ἐποποιός in Greek being a maker of epic poetry, and ἐποποιΐα what he makes.

It is to Greece, where the earliest literary monuments which we possess are of an epical character, that we turn for a definition of these vast heroic compositions, and we gather that their subject-matter was not confined, as Voltaire and the critics of the 18th century supposed, to "narratives in verse of warlike adventures." When we first discover the epos, hexameter verse has already been selected for its vehicle. In this form epic poems were composed not merely dealing with war and personal romance, but carrying out a didactic purpose, or celebrating the mysteries of religion. These three divisions, to which are severally attached the more or less mythical names of Homer, Hesiod and Orpheus seem to have marked the earliest literary movement of the Greeks. But, even here, we must be warned that what we possess is not primitive; there had been unwritten epics, probably in hexameters, long before the composition of any now-surviving fragment. The saga of the Greek nation, the catalogue of its arts and possessions, the rites and beliefs of its priesthood, must have been circulated, by word of mouth, long before any historical poet was born. We look upon Homer and Hesiod as records of primitive thought, but Professor Gilbert Murray reminds us that "our *Iliad*, *Odyssey*, *Erga* and *Theogony* are not the first, nor the second, nor the twelfth of such embodiments." The early epic poets, Lesches, Linus, Orpheus, Arctinus, Eugammon are the veriest shadows, whose names often betray their symbolic and fabulous character. It is now believed that there was a class of minstrels, the Rhapsodists or Homeridae, whose business it was to recite poetry at feasts and other solemn occasions. "The real bards of early Greece were all nameless and impersonal." When our tradition begins to be preserved, we find everything of a saga-character attributed to Homer, a blind man and an inhabitant of Chios. This gradually crystallized until we find Aristotle definitely treating Homer as a person, and attributing to him the composition of three great poems, the *Iliad*, the *Odyssey* and the *Margites*, now lost (see HOMER). The first two of these have been preserved and form for us the type of the ancient epic; when we speak of epic poetry, we unconsciously measure it by the example of the *Iliad* and the *Odyssey*. It is quite certain, however, that these poems had not merely been preceded by a vast number of revisions of the mythical history of the country, but were accompanied by innumerable poems of a similar character, now entirely lost. That antiquity did not regard these other epics as equal in beauty to the *Iliad* seems to be certain; but such poems as *Cypria*, *Iliou Persis* (Sack of Ilion) and *Aethiopis* can hardly but have exhibited other sides of the epic tradition. Did we possess them, it is almost certain that we could speak with more assurance as to the scope of epic poetry in the days of oral tradition, and could understand more clearly what sort of ballads in hexameter it was which rhapsodes took round from court to court. In the 4th century B.C. it seems that people began to write down what was not yet forgotten of all this oral poetry. Unfortunately, the earliest critic who describes this process is Proclus, a Byzantine neo-Platonist, who did not write until some 800 years later, when the whole tradition had become hopelessly corrupted. When we pass from Homer and Hesiod, about whose actual existence critics will be eternally divided, we reach in the 7th century a poet, Peisander of Rhodes, who wrote an epic poem, the *Heracleia*, of which fragments remain. Other epic writers, who appear to be undoubtedly historic, are Antimachus of Colophon, who wrote a *Thebais*; Panyasis, who, like Peisander, celebrated the feats of Heracles; Choerilus of Samos; and Anyte, of whom we only know that she was an epic poetess, and was called "The female Homer." In the 6th and 5th centuries B.C. there was a distinct school of philosophical epic, and we distinguish the names of Xenophanes, Parmenides and Empedocles as the leaders of it.

From the dawn of Latin literature epic poetry seems to have been cultivated in Italy. A Greek exile, named Livius Andronicus, translated the *Odyssey* into Latin during the first Punic War, but the earliest original epic of Rome was the lost *Bellum Punicum* of Naevius, a work to which Virgil was indebted. A little later, Ennius composed, about 172 B.C., in 18 books, an historical epic of the *Annales*, dealing with the whole chronicle of Rome. This was the foremost Latin poem, until the appearance of the *Aeneid*; it was not imitated, remaining, for a hundred years, as Mr Mackail has said, "not only the unique, but the satisfying achievement in this kind of poetry." Virgil began the most famous of Roman epics in the year 30 B.C., and when he died, nine years later, he desired that the MS. of the *Aeneid* should be burned, as it required three years' work to complete it. Nevertheless, it seems to us, and seemed to the ancient world, almost perfect, and a priceless monument of art; it is written, like the great Greek poems on which it is patently modelled, in hexameters. In the next generation, the *Pharsalia* of Lucan, of which Cato, as the type of the republican spirit, is the hero, was the principal example of Latin epic. Statius, under the Flavian emperors, wrote several epic poems, of which the *Thebaid* survives. In the 1st century A.D. Valerius Flaccus wrote the *Argonautica* in 8 books, and Silius Italicus the *Punic War*, in 17 books; these authors show a great decline in taste and merit, even in comparison with Statius, and Silius Italicus, in particular, is as purely imitative as the worst of the epic writers of modern Europe. At the close of the 4th century the style revived with Claudian, who produced five or six elaborate historical and mythological epics of which the *Rape of Proserpine* was probably the most remarkable; in his interesting poetry we have a valuable link between the Silver Age in Rome and the Italian Renaissance. With Claudian the history of epic poetry among the ancients closes.

In medieval times there existed a large body of narrative poetry to which the general title of Epic has usually been given. Three principal schools are recognized, the French, the Teutonic and the Icelandic. Teutonic epic poetry deals, as a rule, with legends founded on the history of Germany in the 4th, 5th and 6th centuries, and in particular with such heroes as Ermanaric, Attila and Theodoric. But there is also an important group in it which deals with English themes, and among these *Beowulf*, *Waldere*, *The Lay of Maldon* and *Finnesburh* are pre-eminent. To this group is allied the purely German poem of *Hildebrand*, attributed to *c.* 800. Among these *Beowulf* is the only one which exists in anything like complete form, and it is of all examples of Teutonic epic the most important. With all its trivialities and incongruities, which belong to a barbarous age, *Beowulf* is yet a solid and comprehensive example of native epic poetry. It is written, like all old Teutonic work of the kind, in alliterative unrhymed rhythm. In Iceland, a new heroic literature was invented in the middle ages, and to this we owe the Sagas, which are, in fact, a reduction to prose of the epics of the warlike history of the North. These Sagas took the place of a group of archaic Icelandic epics, the series of which seems to have closed with the noble poem of *Atlamál*, the principal surviving specimen of epic poetry as it was cultivated in the primitive literature of Iceland. The surviving epical fragments of Icelandic composition are found thrown together in the *Codex Regius*, under the title of *The Elder Edda*, a most precious MS. discovered in the 17th century. The Icelandic epics seem to have been shorter and more episodical in character than the lost Teutonic specimens; both kinds were written in alliterative verse. It is not probable that either possessed the organic unity and vitality of spirit which make the Sagas so delightful. The French medieval epics (see CHANSONS DE GESTE) are late in comparison with those of England, Germany and Iceland. They form a curious transitional link between primitive and modern poetry; the literature of civilized Europe may be said to begin with them. There is a great increase of simplicity, a great broadening of the scene of action. The Teutonic epics were obscure and intense, the French *chansons de geste* are lucid and easy. The existing masterpiece of this kind, the magnificent *Roland*, is doubtless the most interesting and pleasing of all the epics of medieval Europe. Professor Ker's analysis of its merits may be taken as typical of all that is best in the vast body of epic which comes between the antique models, which were unknown to the medieval poets, and the artificial epics of a later time which were founded on vast ideal themes, in imitation of the ancients. "There is something lyrical in *Roland*, but the poem is not governed by lyrical principles; it requires the deliberation and the freedom of epic; it must have room to move in before it can come up to the height of its argument. The abruptness of its periods is not really an interruption of its even flight; it is an abruptness of detail, like a broken sea with a larger wave moving under it; it does not impair or disguise the grandeur of the movement as a whole." Of the progress and decline of the *chansons de geste* (*q.v.*) from the ideals of *Roland* a fuller account is given elsewhere. To the *Nibelungenlied* (*q.v.*) also, detailed attention is given in a separate article.

What may be called the artificial or secondary epics of modern Europe, founded upon an imitation of the *Iliad* and the *Aeneid*, are more numerous than the ordinary reader supposes, although but few of them have preserved much vitality. In Italy the *Chanson de Roland* inspired romantic epics by Luigi Pulci (1432–1487), whose *Morgante Maggiore* appeared in 1481, and is a masterpiece of burlesque; by M. M. Boiardo (1434–1494), whose *Orlando Innamorato* was finished in 1486; by Francesco Bello (1440?–1495), whose *Mambriano* was published in 1497; by Lodovico Ariosto (*q.v.*), whose *Orlando Furioso*, by far the greatest of its class, was published in 1516, and by Luigi Dolce (1508–1568), as well as by a great number of less illustrious poets. G.G. Trissino (1478–1549) wrote a *Deliverance of Italy from the Goths* in 1547, and Bernardo Tasso (1493–1569) an *Amadigi* in 1559; Berni remodelled the epic of Boiardo in 1541, and Teofilo Folango (1491–1544), ridiculed the whole school in an *Orlandino* of 1526. An extraordinary feat of mock-heroic epic was *The Bucket* (1622) of Alessandro Tassoni (1565–1638). The most splendid of all the epics of Italy, however, was, and remains, the *Jerusalem Delivered* of Torquato Tasso (*q.v.*), published originally in 1580, and afterwards rewritten as *The Conquest of Jerusalem*, 1593. The fantastic *Adone* (1623) of G. B. Marini (1569–1625) and the long poems of Chiabrera, close the list of Italian epics. Early Portuguese literature is rich in epic poetry. Luis Pereira Brandão wrote an *Elegiada* in 18 books, published in 1588; Jeronymo Corte-Real (d. 1588) a *Shipwreck of Sepulveda* and two other epics; V. M. Quevedo, in 1601, an *Alphonso of Africa*, in 12 books; Sá de Menezes (d. 1664) a *Conquest of Malacca*, 1634; but all these, and many more, are obscured by the glory of Camoens (*q.v.*), whose magnificent *Lusiads* had been printed in 1572, and forms the summit of Portuguese literature. In Spanish poetry, the *Poem of the Cid* takes the first place, as the great national epic of the middle ages; it is supposed to have been written between 1135 and 1175. It was followed by the *Rodrigo*, and the medieval school closes with the *Alphonso XI.* of Rodrigo Yañez, probably written at the close of the 12th century. The success of the Italian imitative epics of the 15th century led to some imitation of their form in Spain. Juan de la Cueva (1550?–1606) published a *Conquest of Bética* in 1603; Cristóbal de Virues (1550–1610) a *Monserrate*, in 1588; Luis Barahona de Soto continued Ariosto in a *Tears of Angélica*; Gutiérrez wrote an *Austriada* in 1584; but perhaps the finest modern epic in Spanish verse is the *Araucana* (1569–1590) of Alonso de Ercilla y Zúñiga (1533–1595), "the first literary work of merit," as Mr Fitzmaurice-Kelly remarks, "composed in either American continent." In France, the epic never flourished in modern times, and no real success attended the *Franciade* of Ronsard, the *Alaric* of Scudéry, the *Pucelle* of Chapelain, the *Divine Epopée* of Soumet, or even the *Henriade* of Voltaire. In English literature *The Faery Queen* of Spenser has the same claim as the Italian poems mentioned above to bear the name of epic, and Milton, who stands entirely apart, may be said, by his isolated *Paradise Lost*, to take rank with Homer and Virgil, as one of the three types of the mastery of epical composition.

See Bossu, *Traité du poeme épique* (1675); Voltaire, *Sur la poésie épique*; Fauviel, *L'Origine de l'épopée chevaleresque* (1832); W. P. Ker, *Epic and Romance* (1897), and *Essays in Medieval Literature* (1905); Gilbert Murray, *History of Ancient Greek Literature* (1897); W von Christ, *Geschichte der griechischen Litteratur* (1879); Gaston Paris, *La Littérature française au moyen âge* (1890); Léon Gautier, *Les Épopées françaises* (1865–1868). For works on the Greek epics see also GREEK LITERATURE and CYCLE. (E. G.)

EPICTETUS (born *c.* A.D. 60), Greek philosopher, was probably a native of Hierapolis in south-west Phrygia. The name Epictetus is merely the Greek for "acquired" (from *ἐπικτᾶσθαι*); his original name is not known. As a boy he was a slave in the house of Epaphroditus, a freedman and courtier of the emperor Nero. He managed, however, to attend the lectures of the Stoic Musonius Rufus, and subsequently became a freedman. He was lame and of weakly health. In 90 he was expelled with the other philosophers by Domitian, who was irritated by the support and encouragement which the opposition to his tyranny found amongst the adherents of Stoicism. For the rest of his life he settled at Nicopolis, in southern Epirus, not far from the scene of the battle of Actium. There for several years he lived, and taught by close earnest personal address and conversation. According to some authorities he lived into the time of Hadrian; he himself mentions the coinage of the emperor Trajan. His contemporaries and the next generation held his character and teaching in high honour. According to Lucian, the earthenware lamp which had belonged to the sage was bought by an antiquarian for 3000 drachmas. He was never married. He wrote nothing; but much of his teaching was taken down with affectionate care by his pupil Flavius Arrianus, the historian of Alexander the Great, and is preserved in two treatises, of the larger of which, called the *Discourses of Epictetus* (*Ἐπικτήτου Διατριβαί*), four books are still extant. The other treatise is a shorter and more popular work, the *Encheiridion* ("Handbook"). It contains in an aphoristic form the main doctrines of the longer work.

The philosophy of Epictetus is intensely practical, and exhibits a high idealistic type of morality. He is an earnest, sometimes stern and sometimes pathetic, preacher of righteousness, who despises the mere graces of style and the subtleties of an abstruse logic. He has no patience with mere antiquarian study of the Stoical writers. The problem of how life is to be carried out well is the one question which throws all other inquiries into the shade. True education lies in learning to wish things to be as they actually are; it lies in learning to distinguish what is our own from what does not belong to us. But there is only one thing which is fully our own,—that is, our will or purpose. God, acting as a good king and a true father, has given us a will which cannot be restrained, compelled or thwarted. Nothing external, neither death nor exile nor pain nor any such thing, can ever force us to act against our will; if we are conquered, it is because we have willed to be conquered. And thus, although we are not responsible for the ideas that present themselves to our consciousness, we are absolutely and without any modification responsible for the way in which we use them. Nothing is ours besides our will. The divine law which bids us keep fast what is our own forbids us to make any claim to what is not ours; and while enjoining us to make use of whatever is given to us, it bids us not long after what has not been given. "Two maxims," he says, "we must ever bear in mind—that apart from the will there is nothing either good or bad, and that we must not try to anticipate or direct events, but merely accept them with intelligence." We must, in short, resign ourselves to whatever fate and fortune bring to us, believing, as the first article of our creed, that there is a god, whose thought directs the universe, and that not merely in our acts, but even in our thoughts and plans, we cannot escape his eye. In the world the true position of man is that of member of a great system, which comprehends God and men. Each human being is in the first instance a citizen of his own nation or commonwealth; but he is also a member of the great city of gods and men, whereof the city political is only a copy in miniature. All men are the sons of God, and kindred in nature with the divinity. For man, though a member in the system of the world, has also within him a principle which can guide and understand the movement of all the members; he can enter into the method of divine administration, and thus can learn—and it is the acme of his learning—the will of God, which is the will of nature. Man, said the Stoic, is a rational animal; and in virtue of that rationality he is neither less nor worse than the gods, for the magnitude of reason is estimated not by length nor by height but by its judgments. Each man has within him a guardian spirit, a god within him, who never sleeps; so that even in darkness and solitude we are never alone, because God is within, our guardian spirit. The body which accompanies us is not strictly speaking ours; it is a poor dead thing, which belongs to the things outside us. But by reason we are the masters of those ideas and appearances which present themselves from without; we can combine them, and systematize, and can set up in ourselves an order of ideas corresponding with the order of nature.

The natural instinct of animated life, to which man also is originally subject, is self-preservation and self-interest. But men are so ordered and constituted that the individual cannot secure his own interests unless he contribute to the common welfare. We are bound up by the law of nature with the whole fabric of the world. The aim of the philosopher therefore is to reach the position of a mind which embraces the whole world in its view,—to grow into the mind of God and to make the will of nature our own. Such a sage agrees in his thought with God; he no longer blames either God or man; he fails of nothing which he purposes and falls in with no misfortune unprepared; he indulges in neither anger nor envy nor jealousy; he is leaving manhood for godhead, and in his dead body his thoughts are concerned about his fellowship with God.

The historical models to which Epictetus reverts are Diogenes and Socrates. But he frequently describes an ideal character of a missionary sage, the perfect Stoic—or, as he calls him, the Cynic. This missionary has neither country nor home nor land nor slave; his bed is the ground; he is without wife or child; his only mansion is the earth and sky and a shabby cloak. He must suffer stripes, and must love those who beat him as if he were a father or a brother. He must be perfectly unembarrassed in the service of God, not bound by the common ties of life, nor entangled by relationships, which if he transgresses he will lose the character of a man of honour, while if he upholds them he will cease to be the messenger, watchman and herald of the gods. The perfect man thus described will not be angry with the wrong-doer; he will only pity his erring brother; for anger in such a case would only betray that he too thought the wrong-doer gained a substantial blessing by his wrongful act, instead of being, as he is, utterly ruined.

The best editions of the works of Epictetus are by J. Schweighäuser (6 vols., Leipzig, 1799–1800) and H. Schenkl (Leipzig, 1894, 1898). English translations by Elizabeth Carter (London, 1758); G. Long (London, 1848, ed. 1877, 1892, 1897); T. W. Higginson (Boston, 1865, new ed. 1890); of the *Encheiridion* alone by H. Talbot (London, 1881); T. W. H. Rolleston (London, 1881). See A. Bonhöffer, *Epiktet und die Stoa* (Stuttgart, 1890) and *Die Ethik des Stoikers Epiktet* (1894); E. M. Schranka, *Der Stoiker Epiktet und seine Philosophie* (Frankfort, 1885); T. Zahn, *Der Stoiker Epiktet und sein Verhältnis zum Christentum* (2nd ed. Erlangen, 1895). See also STOICS and works quoted. (W. W.; X.)

EPICURUS (342–270 B.C.), Greek philosopher, was born in Samos in the end of 342 or the beginning of 341 B.C., seven years after the death of Plato. His father Neocles, a native of Gargettos, a small village of Attica, had settled in Samos, not later than 352, as one of the cleruchs sent out after the victory of Timotheus in 366–365. At the age of eighteen he went to Athens, where the Platonic school was flourishing under the lead of Xenocrates. A year later, however, Antipater banished some 12,000 of the poorer citizens, and Epicurus joined his father, who was now living at Colophon. It seems possible that he had listened to the lectures of Nausiphanes, a Democritean philosopher, and Pamphilus the Platonist, but he was probably, like his father, merely an ordinary teacher. Stimulated, however, by the perusal of some writings of Democritus, he began to formulate a doctrine of his own; and at Mitylene, Colophon and Lampsacus, he gradually gathered round him several enthusiastic disciples. In 307 he returned to Athens, which had just been restored to a nominal independence by Demetrius Poliorcetes, and there he lived for the rest of his life. The scene of his teaching was a garden which he bought for about £300 (80 *minae*). There he passed his days as the loved and venerated head of a remarkable, and up to that time unique, society of men and women. Amongst the number were Metrodorus (d. 277), his brother Timocrates, and his wife Leontion (formerly a hetaera), Polyaenus, Hermarchus, who succeeded Epicurus as chief of the school, Leonteus and his wife Themista, and Idomeneus, whose wife was a sister of Metrodorus. It is possible that the relations between the sexes—in this prototype of Rabelais's Abbey of Thélème—were not entirely what is termed Platonic. But there is on the other hand scarcely a doubt that the tales of licentiousness circulated by opponents are groundless. The stories of the Stoics, who sought to refute the views of Epicurus by an appeal to his alleged antecedents and habits, were no doubt in the main, as Diogenes Laertius says, the stories of maniacs. The general charges, which they endeavoured to substantiate by forged letters, need not count for much, and in many cases they only exaggerated what, if true, was not so heinous as they suggested. Against them trustworthy authorities testified to his general and remarkable considerateness, pointing to the statues which the city had raised in his honour, and to the numbers of his friends, who were many enough to fill whole cities.

The mode of life in his community was plain. The general drink was water and the food barley bread; half a pint of wine was held an ample allowance. "Send me," says Epicurus to a correspondent, "send me some Cythnian cheese, so that, should I choose, I may fare sumptuously." There was no community of property, which, as Epicurus said, would imply distrust of their own and others' good resolutions. The company was held in unity by the charms of his personality, and by the free intercourse which he inculcated and exemplified. Though he seems to have had a warm affection for his countrymen, it was as human beings brought into contact with him, and not as members of a political body, that he preferred to regard them. He never entered public life. His kindliness extended even to his slaves, one of whom, named Mouse, was a brother in philosophy

Epicurus died of stone in 270 B.C. He left his property, consisting of the garden (Κῆποι Ἐπικούρου), a house in Melite (the south-west quarter of Athens), and apparently some funds besides, to two trustees on behalf of his society, and for the special interest of some youthful members. The garden was set apart for the use of the school; the house became the house of Hermarchus and his fellow-philosophers during his lifetime The surplus proceeds of the property were further to be applied to maintain a yearly offering in commemoration of his departed father, mother and brothers, to pay the expenses incurred in celebrating his own birthday every year on the 7th of the month Gamelion, and for a social gathering of the sect on the 20th of every month in honour of himself and Metrodorus. Besides similar tributes in honour of his brothers and Polyaenus, he directed the trustees to be guardians of the son of Polyaenus and the son of Metrodorus, whilst the daughter of the last mentioned was to be married by the guardians to some member of the society who should be approved of by Hermarchus. His four slaves, three men and one woman, were left their freedom. His books passed to Hermarchus.

Philosophy.—The Epicurean philosophy is traditionally divided into the three branches of logic, physics and ethics. It is, however, only as a basis of facts and principles for his theory of life that logical and physical inquiries find a place at all. Epicurus himself had not apparently shared in any large or liberal culture, and his influence was certainly thrown on the side of those who depreciated purely scientific pursuits as one-sided and misleading. "Steer clear of all culture" was his advice to a young disciple. In this aversion to a purely or mainly intellectual training may be traced a recoil from the systematic metaphysics of Plato and Aristotle, whose tendency was to subordinate the practical man to the philosopher. Ethics had been based upon logic and metaphysics. But experience showed that systematic knowledge of truth is not synonymous with right action. Hence, in the second place, Plato and Aristotle had assumed a perfect state with laws to guide the individual aright. It was thus comparatively easy to show how the individual could learn to apprehend and embody the moral law in his own conduct. But experience had in the time of Epicurus shown the temporary and artificial character of the civic form of social life. It was necessary, therefore, for Epicurus to go back to nature to find a more enduring and a wider foundation for ethical doctrine, to go back from words to realities, to give up reasonings and get at feelings, to test conceptions and arguments by a final reference to the only touchstone of truth—to sensation. There, and there only, one seems to find a common and a satisfactory ground, supposing always that all men's feelings give the same answer. Logic must go, but so also must the state, as a specially-privileged and eternal order of things, as anything more than a contrivance serving certain purposes of general utility.

To the Epicureans the elaborate logic of the Stoics was a superfluity. In place of logic we find canonic, the theory of the three tests of truth and reality. (1) The only ultimate canon of reality is sensation; whatever we feel, whatever we perceive by any sense, that we know on the most certain evidence we can have to be real, and in proportion as our feeling is clear, distinct and vivid, in that proportion are we sure of the reality of its object. But in what that vividness (ἐνάργεια) consists is a question which Epicurus does not raise, and which he would no doubt have deemed superfluous quibbling over a matter sufficiently settled by common sense. (2) Besides our sensations, we learn truth and reality by our preconceptions or ideas (προλήψεις). These are the fainter images produced by repeated sensations, the "ideas" resulting from previous "impressions"—sensations at second-hand as it were, which are stored up in memory, and which a general name serves to recall. These bear witness to reality, not because we feel anything now, but because we felt it once; they are sensations registered in language, and again, if need be, translatable into immediate sensations or groups of sensation. (3) Lastly, reality is vouched for by the imaginative apprehensions of the mind (φανταστικαὶ ἐπιβολαί), immediate feelings of which the mind is conscious as produced by some action of its own. This last canon, however, was of dubious validity. Epicureanism generally was content to affirm that whatever we effectively feel in consciousness is real; in which sense they allow reality to the fancies of the insane, the dreams of a sleeper, and those feelings by which we imagine the existence of beings of perfect blessedness and endless life. Similarly, just because fear, hope and remembrance add to the intensity of consciousness, the Epicurean can hold that bodily pain and pleasure is a less durable and important thing than pain and pleasure of mind. Whatever we feel to affect us does affect us, and is therefore real. Error can arise only because we mix up our opinions and suppositions with what we actually feel. The Epicurean canon is a rejection of logic, it sticks fast to the one point that "sensation is sensation," and there is no more to be made of it. Sensation, it says, is unreasoning (ἄλογος); it must be accepted, and not criticized. Reasoning can come in only to put sensations together, and to point out how they severally contribute to human welfare; it does not make them, and cannot alter them.

Physics.—In the Epicurean physics there are two parts—a general metaphysic and psychology, and a special explanation of particular phenomena of nature. The method of Epicurus is the argument of analogy. It is an attempt to make the phenomena of nature intelligible to us by regarding them as instances on a grand scale of that with which we are already familiar on a small scale. This is what Epicurus calls explaining what we do not see by what we do see.

In physics Epicurus founded upon Democritus, and his chief object was to abolish the dualism between mind and matter which is so essential a point in the systems of Plato and Aristotle. All that exists, says Epicurus, is corporeal (τὸ πᾶν ἐστι σῶμα); the intangible is non-existent, or empty space. If a thing exists it must be felt, and to be felt it must exert resistance. But not all things are intangible which our senses are not subtle enough to detect. We must indeed accept our feelings; but we must also believe much which is not directly testified by sensation, if only it serves to explain phenomena and does not contravene our sensations. The fundamental postulates of Epicureanism are atoms and the void (ἄτομα καὶ κενόν). Space is infinite, and there is an illimitable multitude of indestructible, indivisible and absolutely compact atoms in perpetual motion in this illimitable space. These atoms, differing only in size, figure and weight, are perpetually moving with equal velocities, but at a rate far surpassing our conceptions; as they move, they are for ever giving rise to new worlds; and these worlds are perpetually tending towards dissolution, and towards a fresh series of creations. This universe of ours is only one section out of the innumerable worlds in infinite space; other worlds may present systems very different from that of our own. The soul of man is only a finer species of body, spread throughout the whole aggregation which we term his bodily frame. Like a warm breath, it pervades the human structure and works with it; nor could it act as it does in perception unless it were corporeal. The various processes of sense, notably vision, are explained on the principles of materialism. From the surfaces of all objects there are continually flowing thin filmy images exactly copying the solid body whence they originate; and these images by direct impact on the organism produce (we need not care to ask how) the phenomena of vision. Epicurus in this way explains vision by substituting for the apparent action of a body at a distance a direct contact of image and organ. But without following the explanation into the details in which it revels, it may be enough to say that the whole hypothesis is but an attempt to exclude the occult conception of action at a distance, and substitute a familiar phenomenon.

The Gods.—This aspect of the Epicurean physics becomes clearer when we look at his mode of rendering particular phenomena intelligible. His purpose is to eliminate the common idea of divine interference. That there are gods Epicurus never dreams of denying. But these gods have not on their shoulders the burden of upholding and governing the world. They are themselves the products of the order of nature—a higher species than humanity, but not the rulers of man, neither the makers nor the upholders of the world. Man should worship them, but his worship is the reverence due to the ideals of perfect blessedness; it ought not to be inspired either by hope or by fear. To prevent all reference of the more potent phenomena of nature to divine action Epicurus rationalizes the processes of the cosmos. He imagines all possible plans or hypotheses, not actually contradicted by our experience of familiar events, which will represent in an intelligible way the processes of astronomy and meteorology. When two or more modes of accounting for a phenomena are equally admissible as not directly contradicted by known phenomena, it seems to Epicurus almost a return to the old mythological habit of mind when a savant asserts that the real cause is one and only one. "Thunder," he says, "may be explained in many other ways; only let us have no myths of divine action. To assign only a single cause for these phenomena, when the facts familiar to us suggest several, is insane, and is just the absurd conduct to be expected from people who dabble in the vanities of astronomy." We need not be too curious to inquire how these celestial phenomena actually do come about; we can learn how they might have been produced, and to go further is to trench on ground beyond the limits of human knowledge.

Thus, if Epicurus objects to the doctrine of mythology, he objects no less to the doctrine of an inevitable fate, a necessary order of things unchangeable and supreme over the human will. The Stoic doctrine of Fatalism seemed to Epicurus no less deadly a foe of man's true welfare than popular superstition. Even in the movement of the atoms he introduces a sudden change of direction, which is supposed to render their aggregation easier, and to break the even law of destiny. So, in the sphere of human action, Epicurus would allow of no absolutely controlling necessity. In fact, it is only when we assume for man this independence of the gods and of fatality that the Epicurean theory of life becomes possible. It assumes that man can, like the gods, withdraw himself out of reach of all external influences, and thus, as a sage, "live like a god among men, seeing that the man is in no wise like a mortal creature who lives in undying blessedness." And this present life is the only one. With one consent Epicureanism preaches that the death of the body is the end of everything for man, and hence the other world has lost all its terrors as well as all its hopes.

The attitude of Epicurus in this whole matter is antagonistic to science. The idea of a systematic enchainment of phenomena, in which each is conditioned by every other, and none can be taken in isolation and explained apart from the rest, was foreign to his mind. So little was the scientific conception of the solar system familiar to Epicurus that he could reproach the astronomers, because their account of an eclipse represented things otherwise than as they appear to the senses, and could declare that the sun and stars were just as large as they seemed to us.

Ethics.—The moral philosophy of Epicurus is a qualified hedonism, the heir of the Cyrenaic doctrine that pleasure is the good thing in life. Neither sect, it may be added, advocated sensuality pure and unfeigned—the Epicurean least of all. By pleasure Epicurus meant both more and less than the Cyrenaics. To the Cyrenaics pleasure was of moments; to Epicurus it extended as a habit of mind through life. To the Cyrenaics pleasure was something active and positive; to Epicurus it was rather negative—tranquillity more than vigorous enjoyment. The test of true pleasure, according to Epicurus, is the removal and absorption of all that gives pain; it implies freedom from pain of body and from trouble of mind. The happiness of the Epicurean was, it might almost seem, a grave and solemn pleasure—a quiet unobtrusive ease of heart, but not exuberance and excitement. The sage of Epicureanism is a rational and reflective seeker for happiness, who balances the claims of each pleasure against the evils that may possibly ensue, and treads the path of enjoyment cautiously. Prudence is, therefore, the only real guide to happiness; it is thus the chief excellence, and the foundation of all the virtues. It is, in fact, says Epicurus—in language which contrasts strongly with that of Aristotle on the same topic—"a more precious power than philosophy." The reason or intellect is introduced to balance possible pleasures and pains, and to construct a scheme in which pleasures are the materials of a happy life. Feeling, which Epicurus declared to be the means of determining what is good, is subordinated to a reason which adjudicates between competing pleasures with the view of securing tranquillity of mind and body. "We cannot live pleasantly without living wisely and nobly and righteously." Virtue is at least a means of happiness, though apart from that it is no good in itself, any more than mere sensual enjoyments, which are good only because they may sometimes serve to secure health of body and tranquillity of mind. (See further Ethics.)

The Epicurean School.—Even in the lifetime of Epicurus we hear of the vast numbers of his friends, not merely in Greece, but in Asia and Egypt. The crowds of Epicureans were a standing enigma to the adherents of less popular sects. Cicero pondered over the fact; Arcesilaus explained the secession to the Epicurean camp, compared with the fact that no Epicurean was ever known to have abandoned his school, by saying that, though it was possible for a man to be turned into a eunuch, no eunuch could ever become a man. But the phenomenon was not obscure. The doctrine has many truths, and is attractive to many in virtue of its simplicity and its immediate relation to life. The dogmas of Epicurus became to his followers a creed embodying the truths on which salvation depended; and they passed on from one generation to another with scarcely a change or addition. The immediate disciples of Epicurus have been already mentioned, with the exception of Colotes of Lampsacus, a great favourite of Epicurus, who wrote a work arguing "that it was impossible even to live according to the doctrines of the other philosophers." In the 2nd and 1st centuries B.C. Apollodorus, nicknamed *κηποτύραννος* ("Lord of the Garden"), and Zeno of Sidon (who describes Socrates as "the Attic buffoon": Cic. *De nat. deor.* i. 21, 33, 34) taught at Athens. About 150 B.C. Epicureanism established itself at Rome. Beginning with C. Amafinius or Amafanius (Cic. *Acad.* i. 2, *Tusc.* iv. 3), we find the names of Phaedrus (who became scholarch at Athens *c.* 70 B.C.) and Philodemus (originally of Gadara in Palestine) as distinguished Epicureans in the time of Cicero. But the greatest of its Roman names was Lucretius, whose *De rerum natura* embodies the main teaching of Epicurus with great exactness, and with a beauty which the subject seemed scarcely to allow. Lucretius is a proof, if any were needed, that Epicureanism is compatible with nobility of soul. In the 1st century of the Christian era, the nature of the time, with its active political struggles, naturally called Stoicism more into the foreground, yet Seneca, though nominally a Stoic, draws nearly all his suavity and much of his paternal wisdom from the writings of Epicurus. The position of Epicureanism as a recognized school in the 2nd century is best seen in the fact that it was one of the four schools (the others were the Stoic, Platonist, and Peripatetic) which were placed on a footing of equal endowment when Marcus Aurelius founded chairs of philosophy at Athens. The evidence of Diogenes proves that it still subsisted as a school a century later, but its spirit lasted longer than its formal organization as a school. A great deal of the best of the Renaissance was founded on Epicureanism, and in more recent times a great number of prominent thinkers have been Epicureans in a greater or less degree. Among these may be mentioned Pierre Gassendi, who revived and codified the doctrine in the 17th century; Molière, the comte de Gramont, Rousseau, Fontenelle and Voltaire. All those whose ethical theory is in any degree hedonistic are to some extent the intellectual descendants of Epicurus (see Hedonism).

Works.—Epicurus was a voluminous writer (*πολυγραφώτατος*, Diog. Laërt. x. 26)—the author, it is said, of about 300 works. He had a style and vocabulary of his own. His chief aim in writing was plainness and intelligibility, but his want of order and logical precision thwarted his purpose. He pretended to have read little, and to be the original architect of his own system, and the claim was no doubt on the whole true. But he had read Democritus, and, it is said, Anaxagoras and Archelaus. His works, we learn, were full of repetition, and critics speak of vulgarities of language and faults of style. None the less his writings were committed to memory and remained the text-books of Epicureanism to the last. His chief work was a treatise on nature (Περὶ φύσεως), in thirty-seven books, of which fragments from about nine books have been found in the rolls discovered at Herculaneum, along with considerable treatises by several of his followers, and most notably Philodemus. An epitome of his doctrine is contained in three letters preserved by Diogenes.

AUTHORITIES.—The chief ancient accounts of Epicurus are in the tenth book of Diogenes Laërtius, in Lucretius, and in several treatises of Cicero and Plutarch. Gassendi, in his *De vita, moribus, et doctrina Epicuri* (Lyons, 1647), and his *Syntagma philosophiae Epicuri*, systematized the doctrine. The *Volumina Herculanensia* (1st and 2nd series) contain fragments of treatises by Epicurus and members of his school. See also H. Usener, *Epicurea* (Leipzig, 1887) and *Epicuri recogniti specimen* (Bonn, 1880); *Epicuri physica et meteorologica* (ed. J. G. Schneider, Leipzig, 1813); Th. Gomperz in his *Herkulanische Studien*, and in contributions to the Vienna Academy (*Monatsberichte*), has tried to evolve from the fragments more approximation to modern empiricism than they seem to contain. For criticism see W. Wallace, *Epicureanism* (London, 1880), and *Epicurus; A Lecture* (London, 1896); G. Trezza, *Epicuro e l' Epicureismo* (Florence, 1877; ed. Milan, 1885); E. Zeller, *Philosophy of the Stoics, Epicureans and Sceptics* (Eng. trans. O. J. Reichel, 1870; ed. 1880); Sir James Mackintosh, *On the Progress of Ethical Philosophy* (4th ed.); J. Watson, *Hedonistic Theories* (Glasgow, 1895); J. Kreibig, *Epicurus* (Vienna, 1886); A. Goedeckemeyer, *Epikurs Verhältnis zu Demokrit in der Naturphil.* (Strassburg, 1897); Paul von Gizycki, *Über das Leben und die Moralphilos. des Epikur* (Halle, 1879), and *Einleitende Bemerkungen zu einer Untersuchung über den Werth der Naturphilos. des Epikur* (Berlin, 1884); P. Cassel, *Epikur der Philosoph* (Berlin, 1892); M. Guyau, *La Morale d'Épicure et ses rapports avec les doctrines contemporaines* (Paris, 1878; revised and enlarged, 1881); F. Picavet, *De Epicuro novae religionis sectatore* (Paris, 1889); H. Sidgwick, *History of Ethics* (5th ed., 1902). (W. W.; X.)

EPICYCLE (Gr. ἐπί, upon, and κύκλος, circle), in ancient astronomy, a small circle the centre of which describes a larger one. It was especially used to represent geometrically the periodic apparent retrograde motion of the outer planets, Mars, Jupiter and Saturn, which we now know to be due to the annual revolution of the earth around the sun, but which in the Ptolemaic astronomy were taken to be real.

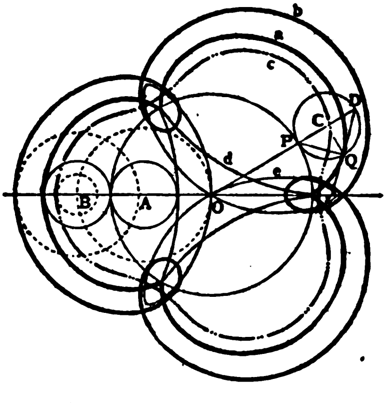
EPICYCLOID, the curve traced out by a point on the circumference of a circle rolling externally on another circle. If the moving circle rolls internally on the fixed circle, a point on the circumference describes a "hypocycloid" (from ὑπό, under). The locus of any other carried point is an "epitrochoid" when the circle rolls externally, and a "hypotrochoid" when the circle rolls internally. The epicycloid was so named by Ole Römer in 1674, who also demonstrated that cog-wheels having epicycloidal teeth revolved with minimum friction (see MECHANICS: *Applied*); this was also proved by Girard Desargues, Philippe de la Hire and Charles Stephen Louis Camus. Epicycloids also received attention at the hands of Edmund Halley, Sir Isaac Newton and others; spherical epicycloids, in which the moving circle is inclined at a constant angle to the plane of the fixed circle, were studied by the Bernoullis, Pierre Louis M. de Maupertuis, François Nicole, Alexis Claude Clairault and others.

In the annexed figure, there are shown various examples of the curves named above, when the radii of the rolling and fixed circles are in the ratio of 1 to 3. Since the circumference of a circle is proportional to its radius, it follows that if the ratio of the radii be commensurable, the curve will consist of a finite number of cusps, and ultimately return into itself. In the particular case when the radii are in the ratio of 1 to 3 the epicycloid (curve *a*) will consist of three cusps external to the circle and placed at equal distances along its circumference. Similarly, the corresponding epitrochoids will exhibit three loops or nodes (curve *b*), or assume the form shown in the curve *c*. It is interesting to compare the forms of these curves with the three forms of the cycloid (*q.v.*). The hypocycloid derived from the same circles is shown as curve *d*, and is seen to consist of three cusps arranged internally to the fixed circle; the corresponding hypotrochoid consists of a three-foil and is shown in curve *e*. The epicycloid shown is termed the "three-cusped epicycloid" or the "epicycloid of Cremona."

The cartesian equation to the epicycloid assumes the form

$$x=(a+b)\cos\theta-b\cos(\overline{a+b}/b)\theta,\ y=(a+b)\sin\theta-b\sin(\overline{a+b}/b)\theta,$$

when the centre of the fixed circle is the origin, and the axis of x passes through the initial point of the curve (*i.e.* the original position



of the moving point on the fixed circle), a and b being the radii of the fixed and rolling circles, and θ the angle through which the line joining the centres of the two circles has passed. It may be shown that if the distance of the carried point from the centre of the rolling circle be mb, the equation to the epitrochoid is

$$x=(a+b)\cos\theta-mb\cos(\overline{a+b}/b)\theta,\ y=(a+b)\sin\theta-mb\sin(\overline{a+b}/b)\theta.$$

The equations to the hypocycloid and its corresponding trochoidal curves are derived from the two preceding equations by changing the sign of b. Leonhard Euler (*Acta Petrop.* 1784) showed that the same hypocycloid can be generated by circles having radii of $\frac{1}{2}(a\pm b)$ rolling on a circle of radius a; and also that the hypocycloid formed when the radius of the rolling circle is greater than that of the fixed circle is the same as the epicycloid formed by the rolling of a circle whose radius is the difference of the original radii. These propositions may be derived from the formulae given above, or proved directly by purely geometrical methods.

The tangential polar equation to the epicycloid, as given above, is $p=(a+2b)\sin(a/\overline{a+2b})\psi$, while the intrinsic equation is $s=4(b/a)(a+b)\cos(a/\overline{a+2b})\psi$ and the pedal equation is $r^2=a^2+(4b.\overline{a+b})p^2/(a+2b)^2$. Therefore any epicycloid or hypocycloid may be represented by the equations $p=A\sin B\psi$ or $p=A\cos B\psi$, $s=A\sin B\psi$ or $s=A\cos B\psi$, or $r^2=A+Bp^2$, the constants A and B being readily determined by the above considerations.

If the radius of the rolling circle be one-half of the fixed circle, the hypocycloid becomes a diameter of this circle; this may be confirmed from the equation to the hypocycloid. If the ratio of the radii be as 1 to 4, we obtain the four-cusped hypocycloid, which has the simple cartesian equation $x^{2/3}+y^{2/3}=a^{2/3}$. This curve is the envelope of a line of constant length, which moves so that its extremities are always on two fixed lines at right angles to each other, *i.e.* of the line $x/\alpha+y/\beta=1$, with the condition $\alpha^2+\beta^2=1/a$, a constant. The epicycloid when the radii of the circles are equal is the cardioid (*q.v.*), and the corresponding trochoidal curves are limaçons (*q.v.*). Epicycloids are also examples of certain caustics (*q.v.*).

For the methods of determining the formulae and results stated above see J. Edwards, *Differential Calculus*, and for geometrical constructions see T. H. Eagles, *Plane Curves*.

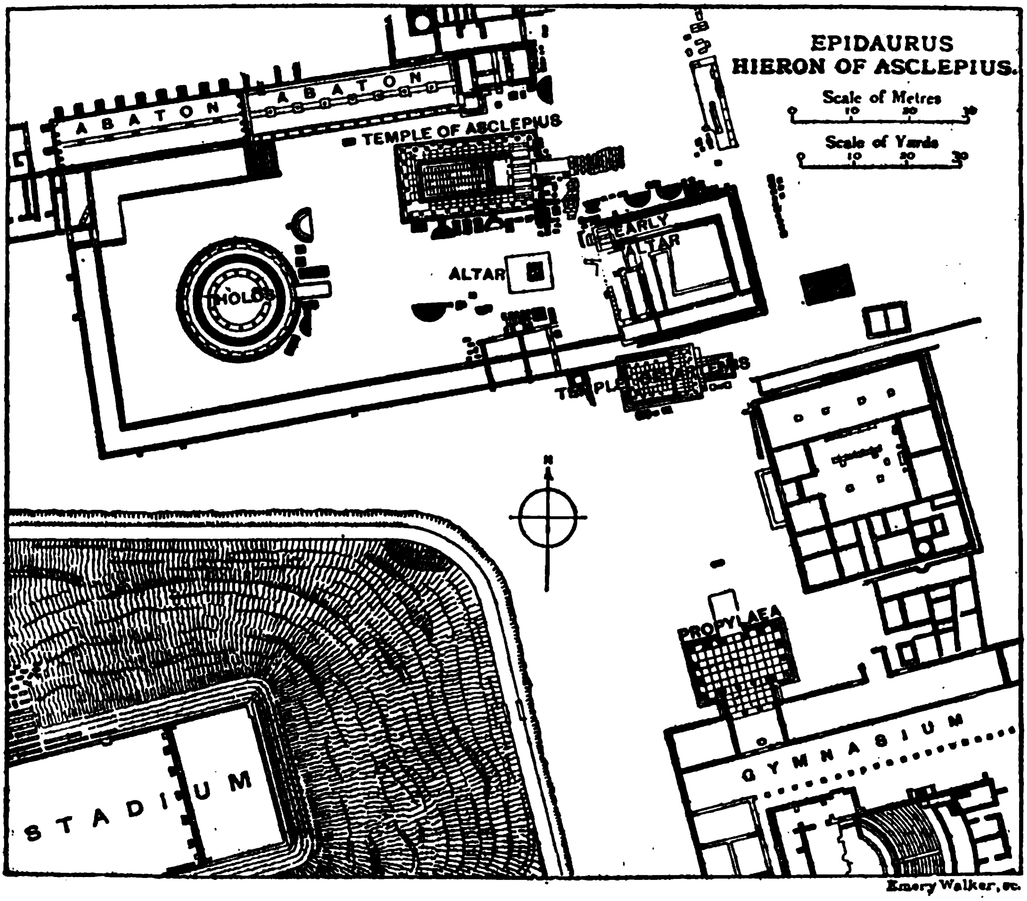
EPIDAURUS, the name of two ancient cities of southern Greece.

1. A maritime city situated on the eastern coast of Argolis, sometimes distinguished as ἡ ἱερὰ Ἐπίδαυρος, or Epidaurus the Holy. It stood on a small rocky peninsula with a natural harbour on the northern side and an open but serviceable bay on the southern; and from this position acquired the epithet of δίστομος, or the two-mouthed. Its narrow but fertile territory consisted of a plain shut in on all sides except towards the sea by considerable elevations, among which the most remarkable were Mount Arachnaeon and Titthion. The conterminous states were Corinth, Argos, Troezen and Hermione. Its proximity to Athens and the islands of the Saronic gulf, the commercial advantages of its position, and the fame of its temple

of Asclepius combined to make Epidaurus a place of no small importance. Its origin was ascribed to a Carian colony, whose memory was possibly preserved in Epicarus, the earlier name of the city; it was afterwards occupied by Ionians, and appears to have incorporated a body of Phlegyans from Thessaly. The Ionians in turn succumbed to the Dorians of Argos, who, according to the legend, were led by Deiphontes; and from that time the city continued to preserve its Dorian character. It not only colonized the neighbouring islands, and founded the city of Aegina, by which it was ultimately outstripped in wealth and power, but also took part with the people of Argos and Troezen in their settlements in the south of Asia Minor. The monarchical government introduced by Deiphontes gave way to an oligarchy, and the oligarchy degenerated into a despotism. When Procles the tyrant was carried captive by Periander of Corinth, the oligarchy was restored, and the people of Epidaurus continued ever afterwards close allies of the Spartan power. The governing body consisted of 180 members, chosen from certain influential families, and the executive was entrusted to a select committee of *artynae* (from ἀρτύνειν, to manage). The rural population, who had no share in the affairs of the city, were called *κονίποδες* ("dusty-feet"). Among the objects of interest described by Pausanias as extant in Epidaurus are the image of Athena Cissaea in the Acropolis, the temple of Dionysus and Artemis, a shrine of Aphrodite, statues of Asclepius and his wife Epione, and a temple of Hera. The site of the last is identified with the chapel of St Nicolas; a few portions of the outer walls of the city can be traced; and the name Epidaurus is still preserved by the little village of Nea-Epidavros, or Pidhavro.

The *Hieron* (sacred precinct) of Asclepius, which lies inland about 8 m. from the town of Epidaurus, has been thoroughly excavated by the Greek Archaeological Society since the year 1881, under the direction of M. Kavvadias. In addition to the sacred precinct, with its temples and other buildings, the theatre and stadium have been cleared; and several other extensive buildings, including baths, gymnasia, and a hospital for invalids, have also been found. The sacred road from Epidaurus, which is flanked by tombs, approaches the precinct through a gateway or propylaea. The chief buildings are grouped together, and include temples of Asclepius and Artemis, the Tholos, and the Abaton, or portico where the patients slept. In addition to remains of architecture and sculpture, some of them of high merit, there have been found many inscriptions, throwing light on the cures attributed to the god. The chief buildings outside the sacred precinct are the theatre and the stadium.

The temple of Asclepius, which contained the gold and ivory statue by Thrasymedes of Paros, had six columns at the ends and eleven at the sides; it was raised on stages and approached by a ramp at the eastern front. An inscription has been found recording the contracts for building this temple; it dates from



Emery Walker, sc.

about 460 B.C. The sculptor Timotheus—one of those who collaborated in the Mausoleum—is mentioned as undertaking to make the acroteria that stood on the ends of the pediments, and also models for the sculpture that filled one of them. Some of this sculpture has been found; the acroteria are Nereids mounted on sea-horses, and one pediment contained a battle of Greeks and Amazons. The great altar lay to the south of the temple, and a little to the east of it are what appear to be the remains of an earlier altar, built into the corner of a large square edifice of Roman date, perhaps a house of the priests. Just to the south of this are the foundations of a small temple of Artemis. The Tholos lay to the south-west of the temple of Asclepius; it must, when perfect, have been one of the most beautiful buildings in Greece; the exquisite carving of its mouldings is only equalled by that of the Erechtheum at Athens. It consisted of a circular chamber, surrounded on the outside by a Doric colonnade, and on the inside by a Corinthian one. The architect was Polyclitus, probably to be identified with the younger sculptor of that name. In the inscription recording the contracts for its building it is called the Thymele; and this name may give the clue to its purpose; it was probably the idealized architectural representative of a primitive pit of sacrifice, such as may still be seen in the Asclepianum at Athens. The foundations now visible present a very curious appearance, consisting of a series of concentric walls. Those in the middle are thin, having only the pavement of the cella to support, and are provided with doors and partitions that make a sort of subterranean labyrinth. There is no evidence for the statement sometimes made that there was a well or spring below the Tholos. North of the Tholos is the long portico described in inscriptions as the Abaton; it is on two different levels, and the lower or western portion of it had two storeys, of which the upper one was on a level with the ground in the eastern portion. Here the invalids used to sleep when consulting the god, and the inscriptions found here record not only the method of consulting the god, but the manner of his cures. Some of the inscriptions are contemporary dedications; but those which give us most information are long lists of cases, evidently compiled by the priests from the dedications in the sanctuary, or from tradition. There is no reason to doubt that most of the records have at least a basis of fact, for the cases are in accord with well-attested phenomena of a similar nature at the present day; but there are others, such as the miraculous mending of a broken vase, which suggest either invention or trickery.

In early times, though there is considerable variety in the cases treated and the methods of cure, there are certain characteristics common to the majority of the cases. The patient consulting the god sleeps in the Abaton, sees certain visions, and, as a result, comes forth cured the next morning. Sometimes there seem to be surgical cases, like that of a man who had a spear-head extracted from his jaw, and found it laid in his hands when he awoke in the morning, and there are many examples resembling those known at the present day at Lourdes or Tenos, where hysterical or other similar affections are cured by the influence of imagination or sudden emotion. It is, however, difficult to make any scientific use of the records, owing to the indiscriminate manner in which genuine and apocryphal cases are mingled, and circumstantial details are added. We learn the practice of later times from some dedicated inscriptions. Apparently the old faith-healing had lost its efficacy, and the priests substituted for it elaborate prescriptions as to diet, baths and regimen which must have made Epidaurus and its visitors resemble their counterparts in a modern spa. At this time there were extensive buildings provided for the accommodation of invalids, some of which have been discovered and partially cleared; one was built by Antoninus Pius. They were in the form of great courtyards surrounded by colonnades and chambers.

Between the precinct and the theatre was a large gymnasium, which was in later times converted to other purposes, a small odeum being built in the middle of it. In a valley just to the south-west of the precinct is the stadium, of which the seats and goal are well preserved. There is a gutter round the level space of the stadium, with basins at intervals for the use of spectators or competitors, and a post at every hundred feet of the course, thus dividing it into six portions. The goal, which is well preserved at the upper end, is similar to that at Olympia; it consists of a sill of stone sunk level with the ground, with parallel grooves for the feet of the runners at starting, and sockets to hold the posts that separated the spaces assigned to the various competitors, and served as guides to them in running. For these were substituted later a set of stone columns resembling those in the proscenium of a theatre. There was doubtless a similar sill at the lower end for the start of the stadium, this upper one being intended for the start of the diaulos and longer races.

The theatre still deserves the praise given it by Pausanias as the most beautiful in Greece. The auditorium is in remarkable preservation, almost every seat being still *in situ*, except a few where the supporting walls have given way on the wings. The whole plan is drawn from three centres, the outer portion of the curves being arcs of a larger circle than the one used for the central portion; the complete circle of the orchestra is marked by a sill of white limestone, and greatly enhances the effect of the whole. There are benches with backs not only in the bottom row, but also above and below the diazoma. The acoustic properties of the theatre are extraordinarily good, a speaker in the orchestra being heard throughout the auditorium without raising his voice. The stage buildings are not preserved much above their foundations, and show signs of later repairs; but their general character can be clearly seen. They consist of a long rectangular building, with a proscenium or column front which almost forms a tangent to the circle of the orchestra; at the middle and at either end of this proscenium are doors leading into the orchestra, those at the end set in projecting wings; the top of the proscenium is approached by a ramp, of which the lower part is still preserved, running parallel to the parodi, but sloping up as they slope down. The proscenium was originally about 14 ft. high and 12 ft. broad; so corresponding approximately to the Greek stage as described by Vitruvius. M. Kavvadias, who excavated the theatre, believes that the proscenium is contemporary with the rest of the theatre, which, like the Tholos, was built by Polyclitus (the younger); but Professor W. Dörpfeld maintains that it is a later addition. In any case, the theatre at Epidaurus ranks as the most typical of Greek theatres, both from the simplicity of its plan and the beauty of its proportions.

See Pausanias i. 29; *Expédition de la Morée*, ii.; Curtius, *Peloponnesus*, ii.; *Transactions of Roy. Soc. of Lit.*, 2nd series, vol. ii.; Weclawski, *De rebus Epidauriorum* (Posen, 1854).

The excavations at the Hieron have been recorded as they went on in the Πρακτικά of the Greek Archaeological Society, especially for 1881–1884 and 1889, and also in the Ἐφημερὶς Ἀρχαιολογική, especially for 1883 and 1885; see also Kavvadias, *Les Fouilles d'Épidaure* and Τὸ Ἱερὸν τοῦ Ἀσκληπιοῦ ἐν Ἐπιδαύρῳ καὶ ἡ θεραπεία τῶν ἀσθενῶν; Defrasse and Lechat, *Épidaure.* A museum was completed in 1910.

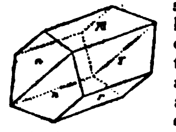
2. A city of Peloponnesus on the east coast of Laconia, distinguished by the epithet of Limera (either "The Well-havened" or "The Hungry"). It was founded by the people of Epidaurus the Holy, and its principal temples were those of Asclepius and Aphrodite. It was abandoned during the middle ages; its inhabitants took posession of the promontory of Minoa, turned it into an island, and built and fortified thereon the city of Monembasia, which became the most flourishing of all the towns in the Morea, and gave its name to the well-known Malmsey or Malvasia wine. The ruins of Epidaurus are to be seen at the place now called Palaea Monemvasia.

A third Epidaurus was situated in Illyricum, on the site of the present Ragusa Vecchia; but it is not mentioned till the time of the civil wars of Pompey and Caesar, and has no special interest. (E. Gr.)

EPIDIORITE, in petrology, a typical member of a family of rocks consisting essentially of hornblende and felspar, often with epidote, garnet, sphene, biotite, or quartz, and having usually a foliated structure. The term is to some extent synonymous with "amphibolite" and "hornblende-schist." These rocks are metamorphic, and though having a mineral constitution somewhat similar to that of diorite, they have been produced really from rocks of more basic character, such as diabase, dolerite and gabbro. They occur principally among the schists, slates and gneisses of such districts as the Scottish Highlands, the north-west of Ireland, Brittany, the Harz, the Alps, and the crystalline ranges of eastern N. America. Their hornblende in microscopic section is usually dark green, rarely brownish; their felspar may be clear and recrystallized, but more frequently is converted into a turbid aggregate of epidote, zoisite, quartz, sericite and albite. In the less complete stages of alteration, ophitic structure may persist, and the original augite of the rock may not have been entirely replaced by hornblende. Pink or brownish garnets are common and may be an inch or two in diameter. The iron oxides, originally ilmenite, are usually altered to sphene. Biotite, if present, is brown; epidote is yellow or colourless; rutile, apatite and quartz all occur with some frequency. The essential minerals, hornblende and felspar, rarely show crystalline outlines, and this is generally true also of the others. The rocks may be fine grained, so that their constituents are hardly visible to the unaided eye; or may show crystals of hornblende an inch in length. Their prevalent colour is dark green and they weather with brown surfaces. In many parts of the world epidiorites and the quartz veins which sometimes occur in them have proved to be auriferous. As they are tough, hard rocks, when fresh, they are well suited for use as road-mending stones. (J. S. F.)

EPIDOSITE, in petrology, a typical member of a family of metamorphic rocks composed mainly of epidote and quartz. In colour they are pale yellow or greenish yellow, and they are hard and somewhat brittle. They may occur in more than one way and are derived from several kinds of rock. Some have been epidotic grits and sandstones; others are limestones which have undergone contact-alteration; probably the majority, however, are allied to epidiorite and amphibolite, and are local modifications of rocks which were primarily basic intrusions or lavas. The sedimentary epidosites occur with mica-schists, sheared grits and granulitic gneisses; they often show, on minute examination, the remains of clastic structures. The epidosites derived from limestones may contain a great variety of minerals such as calcite, augite, garnet, scapolite, &c., but their source may usually be inferred from their close association with calc-silicate rocks in the field. The third group of epidosites may form bands, veins, or irregular streaks and nodules in masses of epidiorite and hornblende-schist. In microscopic section they are often merely a granular mosaic of quartz and epidote with some iron oxides and chlorite, but in other cases they retain much of the structure of the original rock though there has been a complete replacement of the former minerals by new ones. Epidosites when streaked and variegated have been cut and polished as ornamental stones. They are translucent and hard, and hence serve for brooch stones, and the simpler kinds of jewelry. These rocks occasionally carry gold in visible yellow specks. (J. S. F.)

EPIDOTE, a mineral species consisting of basic calcium, aluminium and iron orthosilicate, $Ca_2(AlOH)(Al,Fe)_2(SiO_4)_3$, crystallizing in the monoclinic system. Well-developed crystals are of frequent occurrence: they are commonly prismatic in habit, the direction of elongation being perpendicular to the single plane of symmetry. The faces lettered *M*, *T* and *r* in the figure are often deeply striated in the same direction: *M* is a direction of perfect cleavage, and *T* of imperfect cleavage: crystals are often twinned on the face *T*. Many of the characters of the mineral vary with the amount of iron present (Fe_2O_3, 5-17%), for instance, the colour, the optical constants, and the specific gravity (3·3-3·5). The hardness is 6½. The colour is green, grey, brown or nearly black, but usually a characteristic shade of yellowish-green or pistachio-green. The pleochroism is strong, the pleochroic colours being usually green, yellow and brown. The names thallite (from θαλλός, "a young shoot") and pistacite (from πιστάκια, "pistachio nut") have reference to the colour. The name epidote is one of R. J. Haüy's crystallographic names, and is derived from ἐπίδοσις, "increase," because the base of the primitive prism has one side longer than the other. Several other names (achmatite, bucklandite, escherite, puschkinite, &c.) have been applied to this species. Withamite is a carmine-red to straw-yellow, strongly pleochroic variety from Glencoe in Scotland. Fouqueite and clinozoisite are white or pale rose-red varieties containing very little iron, thus having the same chemical composition as the orthorhombic mineral zoisite (*q.v.*).



Epidote is an abundant rock-forming mineral, but one of secondary origin. It occurs in crystalline limestones and schistose rocks of metamorphic origin; and is also a product of weathering of various minerals (felspars, micas, pyroxenes, amphiboles, garnets, &c.) composing igneous rocks. A rock composed of quartz and epidote is known as epidosite. Well-developed crystals are found at many localities, of which the following may be specially mentioned: Knappenwand, near the Gross-Venediger in the Untersulzbachthal in Salzburg, as magnificent, dark green crystals of long prismatic habit in cavities in epidote-schist, with asbestos, adularia, calcite, and apatite; the Ala valley and Traversella in Piedmont; Arendal in Norway (arendalite); Le Bourg d'Oisans in Dauphiné (oisanite and delphinite); Haddam in Connecticut; Prince of Wales Island in Alaska, here as large, dark green, tabular crystals with copper ores in metamorphosed limestone.

The perfectly transparent, dark green crystals from the Knappenwand and from Brazil have occasionally been cut as gem-stones.

Belonging to the same isomorphous group with epidote are the species piedmontite and allanite, which may be described as manganese and cerium epidotes respectively.

Piedmontite has the composition $Ca_2(AlOH)(Fe,Mn)_2(SiO_4)_3$; it occurs as small, reddish-black, monoclinic crystals in the manganese mines at San Marcel, near Ivrea in Piedmont, and in crystalline schists at several places in Japan. The purple colour of the Egyptian *porfido rosso antico* is due to the presence of this mineral.

Allanite has the same general formula $R_2''(R'''OH)R_2'''(SiO_4)_3$, where R'' represents calcium and ferrous iron, and R''' aluminium, ferric iron and metals of the cerium group. In external appearance it differs widely from epidote, being black or dark brown in colour, pitchy in lustre, and opaque in the mass; further, there is little or no cleavage, and well-developed crystals are rarely met with. The crystallographic and optical characters are similar to those of epidote; the pleochroism is strong with reddish-, yellowish-, and greenish-brown colours. Although not a common mineral, allanite is of fairly wide distribution as a primary accessory constituent of many crystalline rocks, *e.g.* gneiss, granite, syenite, rhyolite, andesite, &c. It was first found in the granite of east Greenland and described by Thomas Allan in 1808, after whom the species was named. Allanite is a mineral readily altered by hydration, becoming optically isotropic and amorphous: for this reason several varieties have been distinguished, and many different names applied. Orthite, from ὀρθός, "straight," was the name given by J. J. Berzelius in 1818 to a hydrated form found as slender prismatic crystals, sometimes a foot in length, at Finbo, near Falun in Sweden. (L. J. S.)

EPIGONI ("descendants"), in Greek legend, the sons of the seven heroes who fought against Thebes (see ADRASTUS). Ten years later, to avenge their fathers, the Epigoni undertook a second expedition, which was completely successful. Thebes was forced to surrender and razed to the ground. In early times the war of the Epigoni was a favourite subject of epic poetry. The term is also applied to the descendants of the Diadochi, the successors of Alexander the Great.

EPIGONION (Gr. ἐπιγόνειον), an ancient stringed instrument mentioned in Athenaeus 183 C, probably a psaltery. The epigonion was invented, or at least introduced into Greece, by Epigonus, a Greek musician of Ambracia in Epirus, who was admitted to citizenship at Sicyon as a recognition of his great musical ability and of his having been the first to pluck the strings with his fingers, instead of using the plectrum.[1] The instrument, which Epigonus named after himself, had forty strings.[2] It was undoubtedly a kind of harp or psaltery, since in an instrument of so many strings some must have been of different lengths, for tension and thickness only could hardly have produced forty different sounds, or even twenty, supposing that they were arranged in pairs of unisons. Strings of varying lengths require a frame like that of the harp, or of the Egyptian cithara which had one of the arms supporting the cross bar or zugon shorter than the other,[1] or else strings stretched over harp-shaped bridges on a sound-board in the case of a psaltery. Juba II., king of Mauretania, who reigned from 30 B.C., said (*op.* Athen. *l.c.*) that Epigonus brought the instrument from Alexandria and played upon it with the fingers of both hands, not only using it as an accompaniment to the voice, but introducing chromatic passages, and a chorus of other stringed instruments, probably citharas, to accompany the voice. Epigonus was also a skilled citharist and played with his bare hands without plectrum.[2] Unfortunately we have no record of when Epigonus lived. Vincenzo Galilei[3] has given us a description of the epigonion accompanied by an illustration, representing his conception of the ancient instrument, an upright psaltery with the outline of the clavicytherium (but no keyboard). (K. S.)

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[1] Michael Praetorius, *Syntagma musicum*, tom. 1, c. 13, p. 380; Salomon van Til, *Sing-Dicht und Spiel-Kunst*, p. 95.

[2] Pollux, *Onomasticon*, lib. iv. cap. 9, 59.

EPIGRAM, properly speaking, anything that is inscribed. Nothing could be more hopeless, however, than an attempt to discover or devise a definition wide enough to include the vast multitude of little poems which at one time or other have been honoured with the title of epigram, and precise enough to exclude all others. Without taking account of its evident misapplications, we find that the name has been given—first, in strict accordance with its Greek etymology, to any actual inscription on monument, statue or building; secondly, to verses never intended for such a purpose, but assuming for artistic reasons the epigraphical form; thirdly, to verses expressing with something of the terseness of an inscription a striking or beautiful thought; and fourthly, by unwarrantable restriction, to a little poem ending in a "point," especially of the satirical kind. The last of these has obtained considerable popularity from the well-known lines—

> "The qualities rare in a bee that we meet
> In an epigram never should fail;
> The body should always be little and sweet,
> And a sting should be left in its tail"—

which represent the older Latin of some unknown writer—

> "Omne epigramma sit instar apis: sit aculeus illi;
> Sint sua mella; sit et corporis exigui."

Attempts not a few of a more elaborate kind have been made to state the essential element of the epigram, and to classify existing specimens; but, as every lover of epigrams must feel, most of them have been attended with very partial success. Scaliger, in the third book of his *Poetics*, gives a fivefold division, which displays a certain ingenuity in the nomenclature but is very superficial: the first class takes its name from *mel*, or honey, and consists of adulatory specimens; the second from *fel*, or gall; the third from *acetum*, or vinegar; and the fourth from *sal*, or salt; while the fifth is styled the condensed, or multiplex. This classification is adopted by Nicolaus Mercerius in his *De conscribendo epigrammate* (Paris, 1653); but he supplemented it by another of much more scientific value, based on the figures of the ancient rhetoricians. Lessing, in the preface to his own epigrams, gives an interesting treatment of the theory, his principal doctrine being practically the same as that of several of his less eminent predecessors, that there ought to be two parts more or less clearly distinguished,—the first awakening the reader's attention in the same way as an actual monument might do, and the other satisfying his curiosity in some unexpected manner. An attempt was made by Herder to increase the comprehensiveness and precision of the theory; but as he himself confesses, his classification is rather vague—the expository, the paradigmatic, the pictorial, the impassioned, the artfully turned, the illusory, and the swift. After all, if the arrangement according to authorship be rejected, the simplest and most satisfactory is according to subjects. The epigram is one of the most catholic of literary forms, and lends itself to the expression of almost any feeling or thought. It may be an elegy, a satire, or a love-poem in miniature, an embodiment of the wisdom of the ages, a bon-mot set off with a couple of rhymes.

> "I cannot tell thee who lies buried here;
> No man that knew him followed by his bier;
> The winds and waves conveyed him to this shore,
> Then ask the winds and waves to tell thee more."
> ANONYMOUS.
>
> "Wherefore should I vainly try
> To teach thee what my love will be
> In after years, when thou and I
> Have both grown old in company,
> If words are vain to tell thee how,
> Mary, I do love thee now?"
> ANONYMOUS.
>
> "O Bruscus, cease our aching ears to vex,
> With thy loud railing at the softer sex;
> No accusation worse than this could be,
> That once a woman did give birth to thee."
> ACILIUS.
>
> "Treason doth never prosper. What's the reason?
> For if it prospers none dare call it treason."
> HARRINGTON.
>
> "Ward has no heart they say, but I deny it;
> He has a heart, and gets his speeches by it."
> ROGERS.

From its very brevity there is no small danger of the epigram passing into childish triviality: the paltriest pun, a senseless anagram, is considered stuff enough and to spare. For proof of this there is unfortunately no need to look far; but perhaps the reader could not find a better collection ready to his hand than the second twenty-five of the *Epigrammatum centuriae* of Samuel Erichius; by the time he reaches No. 11 of the 47th century, he will be quite ready to grant the appropriateness of the identity maintained between the German *Seele*, or soul, and the German *Esel*, or ass.

Of the epigram as cultivated by the Greeks an account is given in the article ANTHOLOGY, discussing those wonderful collections which bid fair to remain the richest of their kind. The delicacy and simplicity of so much of what has been preserved is perhaps their most striking feature; and one cannot but be surprised at the number of poets proved capable of such work. In Latin literature, on the other hand, the epigrammatists whose work has been preserved are comparatively few, and though several of them, as Catullus and Martial, are men of high literary genius, too much of what they have left behind is vitiated by brutality and obscenity. On the subsequent history of the epigram, indeed, Martial has exercised an influence as baneful as it is extensive, and he may fairly be counted the far-off progenitor of a host of scurrilous verses. Nearly all the learned Latinists of the 16th and 17th centuries may claim admittance into the list of epigrammatists,—Bembo and Scaliger, Buchanan and More, Stroza and Sannazaro. Melanchthon, who succeeded in combining so much of Pagan culture with his Reformation Christianity, has left us some graceful specimens, but his editor, Joannes Major Joachimus, has so little idea of what an epigram is, that he includes in his collection some translations from the Psalms. The Latin epigrams of Étienne Pasquier were among the most admirable which the Renaissance produced in France. John Owen, or, as he Latinized his name, Johannes Audoenus, a Cambro-Briton, attained quite an unusual celebrity in this department, and is regularly distinguished as Owen the Epigrammatist. The tradition of the Latin epigram has been kept alive in England by such men as Porson, Vincent Bourne and Walter Savage Landor. Happily there is now little danger of any too personal epigrammatist suffering the fate of Niccolo Franco, who paid the forfeit of his life for having launched his venomous Latin against Pius V., though he may still incur the milder penalty of having his name inserted in the *Index Expurgatorius*, and find, like John Owen, that he consequently has lost an inheritance.

In English literature proper there is no writer like Martial in Latin or Logau in German, whose fame is entirely due to his epigrams; but several even of those whose names can perish never have not disdained this diminutive form. The designation epigram, however, is used by earlier English writers with excessive laxity, and given or withheld without apparent reason.

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[1] For an illustration, see Kathleen Schlesinger, *Orchestral Instruments*, part ii. "Precursors of the Violin Family," fig. 165, p. 219.

[2] Athenaeus, iv. p. 183 d. and xiv. p. 638 a.

[3] *Dialogo della musica antica e moderna*, ed. 1602, p. 40.

The epigrams of Robert Crowley (1550) and of Henry Parrot (1613) are worthless so far as form goes. John Weever's collection (1599) is of interest mainly because of its allusion to Shakespeare. Ben Jonson furnishes a number of noble examples in his *Underwoods*; and one or two of Spenser's little poems and a great many of Herrick's are properly classed as epigrams. Cowley, Waller, Dryden, Prior, Parnell, Swift, Addison, Johnson, Goldsmith and Young have all been at times successful in their epigrammatical attempts; but perhaps none of them has proved himself so much "to the manner born" as Pope, whose name indeed is almost identified with the epigrammatical spirit in English literature. Few English modern poets have followed in his footsteps, and though nearly all might plead guilty to an epigram or two, there is no one who has a distinct reputation as an epigrammatist. Such a reputation might certainly have been Landor's, had he not chosen to write the best of his minor poems in Latin, and thus made his readers nearly as select as his language.

The French are undoubtedly the most successful cultivators of the "salt" and the "vinegar" epigram; and from the 16th century downwards many of their principal authors have earned no small celebrity in this department. The epigram was introduced into French literature by Mellin de St Gelais and Clément Marot. It is enough to mention the names of Boileau, J. B. Rousseau, Lebrun, Voltaire, Marmontel, Piron, Rulhière, and M. J. Chénier. In spite of Rapin's dictum that a man ought to be content if he succeeded in writing one really good epigram, those of Lebrun alone number upwards of 600, and a very fair proportion of them would doubtless pass muster even with Rapin himself. If Piron was never anything better, "pas même académicien," he appears at any rate in Grimm's phrase to have been "une machine à saillies, à épigrammes, et à bons mots." Perhaps more than anywhere else the epigram has been recognized in France as a regular weapon in literary and political contests, and it might not be altogether a hopeless task to compile an epigrammatical history from the Revolution to the present time.

While any fair collection of German epigrams will furnish examples that for keenness of wit would be quite in place in a French anthology, the Teutonic tendency to the moral and didactic has given rise to a class but sparingly represented in French. The very name of *Sinngedichte* bears witness to this peculiarity, which is exemplified equally by the rude *priameln* or *procameln*, of the 13th and 14th centuries and the polished lines of Goethe and Schiller. Logau published his *Deutsche Sinngetichte Drey Tausend* in 1654, and Wernicke no fewer than six volumes of *Ueberschriften oder Epigrammata* in 1697; Kästner's *Sinngedichte* appeared in 1782, and Haug and Weissen's *Epigrammatische Anthologie* in 1804. Kleist, Opitz, Gleim, Hagedorn, Klopstock and A. W. Schlegel all possess some reputation as epigrammatists; Lessing is *facile princeps* in the satirical style; and Herder has the honour of having enriched his language with much of what is best from Oriental and classical sources.

It is often by no means easy to trace the history of even a single epigram, and the investigator soon learns to be cautious of congratulating himself on the attainment of a genuine original. The same point, refurbished and fitted anew to its tiny shaft, has been shot again and again by laughing cupids or fierce-eyed furies in many a frolic and many a fray. During the period when the epigram was the favourite form in Germany, Gervinus tells us how the works, not only of the Greek and Roman writers, but of Neo-Latinists, Spaniards, Dutchmen, Frenchmen, Englishmen and Poles were ransacked and plundered; and the same process of pillage has gone on in a more or less modified degree in other times and countries. Very noticeable often are the modifications of tone and expression occasioned by national and individual characteristics; the simplicity of the prototype may become common-place in the imitation, the sublime be distorted into the grotesque, the pathetic degenerate into the absurdly sentimental; or on the other hand, an unpromising *motif* may be happily developed into unexpected beauty. A good illustration of the variety with which the same epigram may be translated and travestied is afforded by a little volume published in Edinburgh in 1808, under the title of *Lucubrations on the Epigram*—

Εἰ μὲν ἦν μαθεῖν ἃ δεῖ παθεῖν,
καὶ μὴ παθεῖν, καλὸν ἦν τὸ μαθεῖν·
εἰ δὲ δεῖ παθεῖν ἃ δ' ἦν μαθεῖν,
τί δεῖ μαθεῖν; χρὴ γὰρ παθεῖν.

The two collections of epigrams most accessible to the English reader are Booth's *Epigrams, Ancient and Modern* (1863) and Dodd's *The Epigrammatists* (1870). In the appendix to the latter is a pretty full bibliography, to which the following list may serve as a supplement:—Thomas Corraeus, *De toto eo poëmatis genere quod epigramma dicitur* (Venice, 1569; Bologna, 1590); Cottunius, *De conficiendo epigrammate* (Bologna, 1632); Vincentius Gallus, *Opusculum de epigrammate* (Milan, 1641); Vavassor, *De epigrammate liber* (Paris, 1669); *Gedanke von deutschen Epigrammatibus* (Leipzig, 1698); *Doctissimorum nostra aetate Italorum epigrammata; Flaminii Moleae Naugerii, Cottae, Lampridii, Sadoleti, et aliorum, cura Jo. Gagnaei* (Paris, c. 1550); Brugière de Barante, *Recueil des plus belles épigrammes des poëtes français* (2 vols., Paris, 1698); Chr. Aug. Heumann, *Anthologia Latina: hoc est, epigrammata partim a priscis partim junioribus a poëtis* (Hanover, 1721); Fayolle, *Acontologie ou dictionnaire d'épigrammes* (Paris, 1817); Geijsbeck, *Epigrammatische Anthologie*, Sauvage, *Les Guêpes gauloises: petit encyclopédie des meilleurs épigrammes, &c., depuis Clément Marot jusqu'aux poëtes de nos jours* (1859); *La Récréation et passe-temps des tristes: recueil d'épigrammes et de petits contes en vers réimprimé sur l'édition de Rouen* 1595, &c. (Paris, 1863). A large number of epigrams and much miscellaneous information in regard to their origin, application and translation is scattered through *Notes and Queries*.

See also an article in *The Quarterly Review*, No. 233.

EPIGRAPHY (Gr. ἐπί, on, and γράφειν, to write), a term used to denote (1) the study of inscriptions collectively, and (2) the science connected with the classification and explanation of inscriptions. It is sometimes employed, too, in a more contracted sense, to denote the palaeography, in inscriptions. Generally, it is that part of archaeology which has to do with inscriptions engraved on stone, metal or other permanent material (not, however, coins, which come under the heading NUMISMATICS).

See INSCRIPTIONS; PALAEOGRAPHY.

EPILEPSY (Gr. ἐπί, upon, and λαμβάνειν, to seize), or FALLING SICKNESS, a term applied generally to a nervous disorder, characterized by a fit of sudden loss of consciousness, attended with convulsions. There may, however, exist manifestations of epilepsy much less marked than this, yet equally characteristic of the disease; while, on the other hand, it is to be borne in mind that many other attacks of a convulsive nature have the term "epileptic" or "epileptiform" applied to them.

Epilepsy was well known in ancient times, and was regarded as a special infliction of the gods, hence the names *morbus sacer*, *morbus divus*. It was also termed *morbus Herculeus*, from Hercules having been supposed to have been epileptic, and *morbus comitialis*, from the circumstance that when any member of the forum was seized with an epileptic fit the assembly was broken up. *Morbus caducus*, *morbus lunaticus astralis*, *morbus demoniacus*, *morbus major*, were all terms employed to designate epilepsy.

There are three well-marked varieties of the epileptic seizure; to these the terms *le grand mal*, *le petit mal* and *Jacksonian epilepsy* are usually applied. Any of these may exist alone, but the two former may be found to exist in the same individual. The first of these, if not the more common, is at least that which attracts the most attention, being what is generally known as an *epileptic fit*.

Although in most instances such an attack comes on suddenly, it is in many cases preceded by certain premonitory indications or warnings, which may be present for a greater or less time previously. These are of very varied character, and may be in the form of some temporary change in the disposition, such as unusual depression or elevation of spirits, or of some alteration in the look. Besides these general symptoms, there are frequently peculiar sensations which immediately precede the onset of the fit, and to such the name of *aura epileptica* is applied. In its strict sense this term refers to a feeling of a breath of air blowing upon some part of the body, and passing upwards towards the head. This sensation, however, is not a common one, and the term has now come to be applied to any peculiar feeling which the patient experiences as a precursor of the attack. The so-called *aura* may be of mental character, in the form of an agonizing feeling of momentary duration; of sensorial character, in the form of pain in a limb or in some internal organ, such as the stomach, or morbid feeling connected with the special senses; or, further, of motorial character, in the form of contractions or trembling in some of the muscles. When such sensations affect a limb, the employment of firm compression by the hand or by a ligature occasionally succeeds in warding off an attack. The aura may be so distinct and of such duration as to enable the patient to lie down, or seek a place of safety before the fit comes on.

The seizure is usually preceded by a loud scream or cry, which is not to be ascribed, as was at one time supposed, to terror or pain, but is due to the convulsive action of the muscles of the larynx, and the expulsion of a column of air through the narrowed glottis. If the patient is standing he immediately falls, and often sustains serious injury. Unconsciousness is complete, and the muscles generally are in a state of stiffness or tonic contraction, which will usually be found to affect those of one side of the body in particular. The head is turned by a series of jerks towards one or other shoulder, the breathing is for the moment arrested, the countenance first pale then livid, the pupils dilated and the pulse rapid. This, the first stage of the fit, generally lasts for about half a minute, and is followed by the state of clonic (*i.e.* tumultuous) spasm of the muscles, in which the whole body is thrown into violent agitation, occasionally so great that bones may be fractured or dislocated. The eyes roll wildly, the teeth are gnashed together, and the tongue and cheeks are often severely bitten. The breathing is noisy and laborious, and foam (often tinged with blood) issues from the mouth, while the contents of the bowels and bladder are ejected. The aspect of the patient in this condition is shocking to witness, and the sight has been known to induce a similar attack in an onlooker. This stage lasts for a period varying from a few seconds to several minutes, when the convulsive movements gradually subside, and relaxation of the muscles takes place, together with partial return of consciousness, the patient looking confusedly about him and attempting to speak. This, however, is soon followed by drowsiness and stupor, which may continue for several hours, when he awakes either apparently quite recovered or fatigued and depressed, and occasionally in a state of excitement which sometimes assumes the form of mania.

Epileptic fits of this sort succeed each other with varying degrees of frequency, and occasionally, though not frequently, with regular periodicity. In some persons they only occur once in a lifetime, or once in the course of many years, while in others they return every week or two, or even are of daily occurrence, and occasionally there are numerous attacks each day. According to Sir J. R. Reynolds, there are four times as many epileptics who have their attacks more frequently than once a month as there are of those whose attacks recur at longer intervals. When the fit returns it is not uncommon for one seizure to be followed by another within a few hours or days. Occasionally there occurs a constant succession of attacks extending over many hours, and with such rapidity that the patient appears as if he had never come out of the one fit. The term *status epilepticus* is applied to this condition, which is sometimes followed with fatal results. In many epileptics the fits occur during the night as well as during the day, but in some instances they are entirely nocturnal, and it is well known that in such cases the disease may long exist and yet remain unrecognized either by the patient or the physician.

The second manifestation of epilepsy, to which the names *epilepsia mitior* or *le petit mal* are given, differs from that above described in the absence of the convulsive spasms. It is also termed by some authors *epileptic vertigo* (giddiness), and consists essentially in the sudden arrest of volition and consciousness, which is of but short duration, and may be accompanied with staggering or some alteration in position or motion, or may simply exhibit itself in a look of absence or confusion, and should the patient happen to be engaged in conversation, by an abrupt termination of the act. In general it lasts but a few seconds, and the individual resumes his occupation without perhaps being aware of anything having been the matter. In some instances there is a degree of spasmodic action in certain muscles which may cause the patient to make some unexpected movement, such as turning half round, or walking abruptly aside, or may show itself by some unusual expression of countenance, such as squinting or grinning. There may be some amount of *aura* preceding such attacks, and also of faintness following them. The *petit mal* most commonly co-exists with the *grand mal*, but has no necessary connexion with it, as each may exist alone. According to Armand Trousseau, the *petit mal* in general precedes the manifestation of the *grand mal*, but sometimes the reverse is the case.

The third manifestation—*Jacksonian epilepsy* or *partial epilepsy*—is distinguished by the fact that consciousness is retained or lost late. The patient is conscious throughout, and is able to watch the march of the spasm. The attacks are usually the result of lesions in the motor area of the brain, such being caused, in many instances, by depression of the vault of the skull, due to trauma.

Epilepsy appears to exert no necessarily injurious effect upon the general health, and even where it exists in an aggravated form is quite consistent with a high degree of bodily vigour. It is very different, however, with regard to its influence upon the mind; and the question of the relation of epilepsy to insanity is one of great and increasing importance. Allusion has already been made to the occasional occurrence of maniacal excitement as one of the results of the epileptic seizure. Such attacks, to which the name of *furor epilepticus* is applied, are generally accompanied with violent acts on the part of the patient, rendering him dangerous, and demanding prompt measures of restraint. These attacks are by no means limited to the more severe form of epilepsy, but appear to be even more frequently associated with the milder form—the epileptic vertigo—where they either replace altogether or immediately follow the short period of absence characteristic of this form of the disease. Numerous cases are on record of persons known to be epileptic being suddenly seized, either after or without apparent spasmodic attack, with some sudden impulse, in which they have used dangerous violence to those beside them, irrespective altogether of malevolent intention, as appears from their retaining no recollection whatever, after the short period of excitement, of anything that had occurred; and there is reason to believe that crimes of heinous character, for which the perpetrators have suffered punishment, have been committed in a state of mind such as that now described. The subject is obviously one of the greatest medico-legal interest and importance in regard to the question of criminal responsibility.

Apart, however, from such marked and comparatively rare instances of what is termed epileptic insanity, the general mental condition of the epileptic is in a large proportion of cases unfavourably affected by the disease. There are doubtless examples (and their number according to statistics is estimated at less than one-third) where, even among those suffering from frequent and severe attacks, no departure from the normal condition of mental integrity can be recognized. But in general there exists some peculiarity, exhibiting itself either in the form of defective memory, or diminishing intelligence, or what is perhaps as frequent, in irregularities of temper, the patient being irritable or perverse and eccentric. In not a few cases there is a steady mental decline, which ends in dementia or idiocy. It is stated by some high authorities that epileptic women suffer in regard to their mental condition more than men. It also appears to be the case that the later in life the disease shows itself the more likely is the mind to suffer. Neither the frequency nor the severity of the seizures seem to have any necessary influence in the matter; and the general opinion appears to be that the milder form of the disease is that with which mental failure is more apt to be associated. (For a consideration of the conditions of the nervous system which result in epilepsy, see the article NEUROPATHOLOGY.)

The influence of hereditary predisposition in epilepsy is very marked. It is necessary, however, to bear in mind the point so forcibly insisted on by Trousseau in relation to epilepsy, that hereditary transmission may be either direct or indirect, that is to say, that what is epilepsy in one generation may be some other form of neurosis in the next, and conversely, nervous diseases being remarkable for their tendency to transformation in their descent in families. Where epilepsy is hereditary, it generally manifests itself at an unusually early period of life. A singular fact, which also bears to some extent upon the pathology of this disease, was brought to light by Dr Brown Séquard in his experiments, namely, that the young of animals which had been artifically rendered epileptic were liable to similar seizures. In connexion with the hereditary transmission of epilepsy it must be observed that all authorities concur in the opinion that this disease is one among the baneful effects that often follow marriages of consanguinity. Further, there is reason to believe that intemperance, apart altogether from its direct effect in favouring the occurrence of epilepsy, has an evil influence in the hereditary transmission of this as of other nervous diseases. A want of symmetry in the formation of the skull and defective cerebral development are not infrequently observed where epilepsy is hereditarily transmitted.

Age is of importance in reference to the production of epilepsy. The disease may come on at any period of life, but it appears from the statistics of Reynolds and others, that it most frequently first manifests itself between the ages of ten and twenty years, the period of second dentition and puberty, and again at or about the age of forty.

Among other causes which are influential in the development of epilepsy may be mentioned sudden fright, prolonged mental anxiety, over-work and debauchery. Epileptic fits also occur in connexion with a depraved stage of the general health, and with irritations in distant organs, as seen in the fits occurring in dentition, in kidney disease, and as a result of worms in the intestines. The symptoms traceable to these causes are sometimes termed *sympathetic* or *eccentric epilepsy*; these are but rarely *epileptic* in the strictest sense of the word, but rather epileptiform.

Epilepsy is occasionally feigned for the purpose of extortion, but an experienced medical practitioner will rarely be deceived; and when it is stated that although many of the phenomena of an attack, particularly the convulsive movements, can be readily simulated, yet that the condition of the pupils, which are dilated during the fit, cannot be feigned, and that the impostor seldom bites his tongue or injures himself, deception is not likely to succeed even with non-medical persons of intelligence.

The *medical treatment* of epilepsy can only be briefly alluded to here. During the fit little can be done beyond preventing as far as possible the patient from injuring himself while unconsciousness continues. Tight clothing should be loosened, and a cork or pad inserted between the teeth. When the fit is of long continuance, the dashing of cold water on the face and chest, or the inhalation of chloroform, or of nitrite of amyl, may be useful; in general, however, the fit terminates independently of any such measures. When the fit is over the patient should be allowed to sleep, and have the head and shoulders well raised.

In the intervals of the attack, the general health of the patient is one of the most important points to be attended to. The strictest hygienic and dietetic rules should be observed, and all such causes as have been referred to as favouring the development of the disease should, as far as possible, be avoided. In the case of children, parents must be made to realize that epilepsy is a chronic disease, and that therefore the seizures must not be allowed to interfere unnecessarily with the child's training. The patient must be treated as such only during the attack; between times, though being carefully watched, must be made to follow a child's normal pursuits, and no distinction must be made from other children. The same applies to adults: it is far better for them to have some definite occupation, preferably one that keeps them in the open air. If such patients become irritable, then they should be placed under supervision. As regards those who cannot be looked after at home, colonies on a self-supporting basis have been tried, and where the supervision has been intelligent the success has been proved, a fairly high level of health and happiness being attained.

The various bromides are the only medical drugs that have produced any beneficial results. They require to be given in large doses which are carefully regulated for every individual patient, as the quantities required vary enormously. Children take far larger doses in proportion than adults. They are best given in a very diluted form, and after meals, to diminish the chances of gastric disturbance. Belladonna seems also to have some influence on the disease, and forms a useful addition; arsenic should also be prescribed at times, both as a tonic, and for the sake of the improvement it effects in those patients who develop a tendency to *acne*, which is one of the troublesome results of bromism. The administration of the bromides should be maintained until three years after the cessation of the fits. The occurrence of gastric pain, palpitations and loss of the palate reflex are indications to stop, or to decrease the quantity of the drug. In very severe cases opium may be required.

Surgical treatment for epilepsy is yet in its infancy, and it is too early to judge of its results. This does not apply, however, to cases of *Jacksonian epilepsy*, where a very large number have been operated on with marked benefit. Here the lesion of the brain is, in a very large percentage of the patients, caused by pressure from outside, from the presence of a tumour or a depressed fracture; the removal of the one, or the elevation of the other is the obvious procedure, and it is usually followed by the complete disappearance of the seizures.

EPILOGUE. The appendix or supplement to a literary work, and in particular to a drama in verse, is called an *epilogue*, from ἐπίλογος, the name given by the Greeks to the peroration of a speech. As we read in Shakespeare's *Midsummer Night's Dream*, the epilogue was generally treated as the apology for a play; it was a final appeal made to encourage the good-nature of the audiences, and to deprecate attack. The epilogue should form no part of the work to which it is attached, but should be independent of it; it should be treated as a sort of commentary. Sometimes it adds further information with regard to what has been left imperfectly concluded in the work itself. For instance, in the case of a play, the epilogue will occasionally tell us what became of the characters after the action closed; but this is irregular and unusual, and the epilogue is usually no more than a graceful way of dismissing the audience. Among the ancients the form was not cultivated, further than that the leader of the chorus or the last speaker advanced and said "Vos valete, et plaudite, cives"—"Good-bye, citizens, and we hope you are pleased." Sometimes this formula was reduced to the one word, "Plaudite!" The epilogue as a literary species is almost entirely confined to England, and it does not occur in the earliest English plays. It is rare in Shakespeare, but Ben Jonson made it a particular feature of his drama, and may almost be said to have invented the tradition of its regular use. He employed the epilogue for two purposes, either to assert the merit of the play or to deprecate censure of its defects. In the former case, as in *Cynthia's Revels* (1600), the actor went off, and immediately came on again saying:—

> "Gentles, be't known to you, since I went in
> I am turned rhymer, and do thus begin:—
> The author (jealous how your sense doth take
> His travails) hath enjoined me to make
> Some short and ceremonious epilogue,"—

and then explained to the audience what an exremely interesting play it had been. In the second case, when the author was less confident, his epilogue took a humbler form, as in the comedy of *Volpone* (1605), where the actor said:—

> "The seasoning of a play is the applause.
> Now, as the Fox be punished by the laws,
> He yet doth hope, there is no suffering due
> For any fact which he hath done 'gainst you.
> If there be, censure him; here he doubtful stands:
> If not, fare jovially and clap your hands."

Beaumont and Fletcher used the epilogue sparingly, but after their day it came more and more into vogue, and the form was almost invariably that which Ben Jonson had brought into fashion, namely, the short complete piece in heroic couplets. The hey-day of the epilogue, however, was the Restoration, and from 1660 to the decline of the drama in the reign of Queen Anne scarcely a play, serious or comic, was produced on the London stage without a prologue and an epilogue. These were almost always in verse, even if the play itself was in the roughest prose, and they were intended to impart a certain literary finish to the piece. These Restoration epilogues were often very elaborate essays or satires, and were by no means confined to the subject of the preceding play. They dealt with fashions, or politics, or criticism. The prologues and epilogues of Dryden are often brilliantly finished exercises in literary polemic. It became the custom for playwrights to ask their friends to write these poems for them, and the publishers would even come to a prominent poet and ask him to supply one for a fee. It gives us an idea of the seriousness with which the epilogue was treated that Dryden originally published his valuable "Defence of the Epilogue; or An Essay on the Dramatic Poetry of the Last Age" (1672) as a defence of the epilogue which he had written for *The Conquest of Granada*. In France the custom of reciting dramatic epilogues has never prevailed. French criticism gives the name to such adieux to the public, at the close of a non-dramatic work, as are reserved by La Fontaine for certain critical points in the "Fables." (E. G.)

EPIMENIDES, poet and prophet of Crete, lived in the 6th century B.C. Many fabulous stories are told of him, and even his existence is doubted. While tending his father's sheep, he is said to have fallen into a deep sleep in the Dictaean cave near Cnossus where he lived, from which he did not awake for fifty-seven years (Diogenes Laërtius i. 109-115). When the Athenians were visited by a pestilence in consequence of the murder of Cylon, he was invited by Solon (596) to purify the city. The only reward he would accept was a branch of the sacred olive, and a promise of perpetual friendship between Athens and Cnossus (Plutarch, *Solon*, 12; Aristotle, *Ath. Pol.* 1). He died in Crete at an advanced age; according to his countrymen, who afterwards honoured him as a god, he lived nearly three hundred years. According to another story, he was taken prisoner in a war between the Spartans and Cnossians, and put to death by his captors, because he refused to prophesy favourably for them. A collection of oracles, a theogony, an epic poem on the Argonautic expedition, prose works on purifications and sacrifices, and a cosmogony, were attributed to him. Epimenides must be reckoned with Melampus and Onomacritus as one of the founders of Orphism. He is supposed to be the Cretan prophet alluded to in the epistle to Titus (i. 12).

See C. Schultess, *De Epimenide Cretensi* (1877); O. Kern, *De Orphei, Epimenidis . . . Theogoniis* (1888); G. Barone di Vincenzo, *E. di Creta e le Credenze religiose de' suoi Tempi* (1880); H. Demoulin, *Épiménide de Crète* (1901); H. Diels, *Die Fragmente der Vorsokratiker* (1903); O. Kern in Pauly-Wissowa's *Realencyclopädie*.

ÉPINAL, a town on the north-eastern frontier of France, capital of the department of Vosges, 46 m. S.S.E. of Nancy on the Eastern railway between that town and Belfort. Pop. (1906), town 21,296, commune (including garrison) 29,058. The town proper—the Grande Ville—is situated on the right bank of the Moselle, which at this point divides into two arms forming an island whereon another quarter—the Petite Ville—is built. The lesser of these two arms, which is canalized, separates the island from the suburb of Hospice on its left bank. The right bank of the Moselle is bordered for some distance by pleasant promenades, and an extensive park surrounds the ruins of an old stronghold which dominated the Grande Ville from an eminence on the east. Apart from the church of St Goëry (or St Maurice) rebuilt in the 13th century but preserving a tower of the 12th century, the public buildings of Épinal offer little of architectural interest. The old hospital on the island-quarter contains a museum with interesting collections of paintings, Gallo-Roman antiquities, sculpture, &c. Close by stands the library, which possesses many valuable MSS.

The fortifications of Épinal are connected to the southward with Belfort, Dijon and Besançon, by the fortified line of the Moselle, and north of it lies the unfortified zone called the *Trouée d'Épinal*, a gap designedly left open to the invaders between Épinal and Toul, another great fortress which is itself connected by the Meuse *forts d'arrêt* with Verdun and the places of the north-east. Épinal therefore is a fortress of the greatest possible importance to the defence of France, and its works, all built since 1870, are formidable permanent fortifications. The Moselle runs from S. to N. through the middle of the girdle of forts; the fortifications of the right bank, beginning with Fort de la Mouche, near the river 3 m. above Épinal, form a chain of detached forts and batteries over 6 m. long from S. to N., and the northernmost part of this line is immensely strengthened by numerous advanced works between the villages of Dognéville and Longchamp. On the left bank, a larger area of ground is included in the perimeter of defence for the purposes of encampment, the most westerly of the forts, Girancourt, being 7 m. distant from Épinal; from the lower Moselle to Girancourt the works are grouped principally about Uxegney and Sarchey; from Girancourt to the upper river and Fort de la Mouche a long ridge extends in an arc, and on this south-western section the principal defence is Fort Ticha and its annexes. The circle of forts, which has a perimeter of nearly 30 m., was in 1895 reinforced by the construction of sixteen new works, and the area of ground enclosed and otherwise protected by the defences of Épinal is sufficiently extensive to accommodate a large army.

Épinal is the seat of a prefect and of a court of assizes and has tribunals of first instance and of commerce, a board of trade-arbitrators, a chamber of commerce, training-colleges, a communal college and industrial school, and exchange and a branch of the Bank of France. The town, which is important as the centre of a cotton-spinning region, carries on cotton-spinning, -weaving and -printing, brewing and distilling, and the manufacture of machinery and iron goods, glucose, embroidery, hats, wall-paper and tapioca. An industry peculiar to Épinal is the production of cheap images, lithographs and engravings. There is also trade in wine, grain, live-stock and starch products made in the vicinity. Épinal is an important junction on the Eastern railway.

Épinal originated towards the end of the 10th century with the founding of a monastery by Theodoric (Dietrich) I., bishop of Metz, whose successors ruled the town till 1444, when its inhabitants placed themselves under the protection of King Charles VII. In 1466 it was transferred to the duchy of Lorraine, and in 1766 it was, along with that duchy, incorporated with France. It was occupied by the Germans on the 12th of October 1870 after a short fight, and until the 15th was the headquarters of General von Werder.

EPINAOS (Gr. *ἐπί*, after, and *ναός*, a temple), in architecture, the open vestibule behind the nave. The term is not found in any classic author, but is a modern coinage, originating in Germany, to differentiate the feature from "opisthodomus," which in the Parthenon was an enclosed chamber.

ÉPINAY, LOUISE FLORENCE PÉTRONILLE TARDIEU D'ESCLAVELLES D' (1726–1783), French writer, was born at Valenciennes on the 11th of March 1726. She is well known on account of her *liaisons* with Rousseau and Baron von Grimm, and her acquaintanceship with Diderot, D'Alembert, D'Holbach and other French men of letters. Her father, Tardieu d'Esclavelles, a brigadier of infantry, was killed in battle when she was nineteen; and she married her cousin Denis Joseph de La Live d'Épinay, who was made a collector-general of taxes. The marriage was an unhappy one; and Louise d'Épinay believed that the prodigality, dissipation and infidelities of her husband justified her in obtaining a formal separation in 1749 She settled in the château of La Chevrette in the valley of Montmorency, and there received a number of distinguished visitors. Conceiving a strong attachment for J. J. Rousseau, she furnished for him in 1756 in the valley of Montmorency a cottage which she named the "Hermitage," and in this retreat he found for a time the quiet and natural rural pleasures he praised so highly. Rousseau, in his *Confessions*, affirmed that the inclination was all on her side; but as, after her visit to Geneva, Rousseau became her bitter enemy, little weight can be given to his statements on this point. Her intimacy with Grimm, which began in 1755, marks a turning-point in her life, for under his influence she escaped from the somewhat compromising conditions of her life at La Chevrette. In 1757–1759 she paid a long visit to Geneva, where she was a constant guest of Voltaire. In Grimm's absence from France (1775–1776), Madame d'Épinay continued, under the superintendence of Diderot, the correspondence he had begun with various European sovereigns. She spent most of her later life at La Briche, a small house near La Chevrette, in the society of Grimm and of a small circle of men of letters. She died on the 17th of April 1783. Her *Conversations d'Émilie* (1774), composed for the education of her grand-daughter, Émilie de Belsunce, was crowned by the French Academy in 1783. The *Mémoires et Correspondance de Mme d'Épinay, renfermant un grand nombre de lettres inédites de Grimm, de Diderot, et de J.-J. Rousseau, ainsi que des détails*, &c., was published at Paris (1818) from a MS. which she had bequeathed to Grimm. The *Mémoires* are written by herself in the form of a sort of autobiographic romance. Madame d'Épinay figures in it as Madame de Montbrillant, and René is generally recognized as Rousseau, Volx as Grimm, Garnier as Diderot. All the letters and documents published along with the *Mémoires* are genuine. Many of Madame d'Épinay's letters are contained in the *Correspondance de l'abbé Galiani* (1818). Two anonymous works, *Lettres à mon fils* (Geneva, 1758) and *Mes moments heureux* (Geneva, 1759), are also by Madame d'Épinay.

See Rousseau's *Confessions*; Lucien Perey [Mlle Herpin] and Gaston Maugras, *La Jeunesse de Mme d'Épinay, les dernières années de Mme d'Épinay* (1882–1883); Sainte-Beuve, *Causeries du lundi*, vol. ii.; Edmond Scherer, *Études sur la littérature contemporaine*, vols. iii. and vii. There are editions of the *Mémoires* by L. Énault (1855) and by P. Boiteau (1865); and an English translation, with introduction and notes (1897), by J. H. Freese.

EPIPHANIUS, SAINT (*c.* 315–402), a celebrated Church Father, born in the beginning of the 4th century at Bezanduca, a village of Palestine, near Eleutheropolis. He is said to have been of Jewish extraction. In his youth he resided in Egypt, where he began an ascetic course of life, and, freeing himself from Gnostic influences, invoked episcopal assistance against heretical thinkers, eighty of whom were driven from the cities. On his return to Palestine he was ordained presbyter by the bishop of Eleutheropolis, and became the president of a monastery which he founded near his native place. The account of his intimacy with the patriarch Hilarion is not trustworthy. In 367 he was nominated bishop of Constantia, previously known as Salamis, the metropolis of Cyprus—an office which he held till his death in 402. Zealous for the truth, but passionate and bigoted, he devoted himself to two great labours, namely, the spread of the recently established monasticism, and the confutation of heresy, of which he regarded Origen and his followers as the chief representatives. The first of the Origenists that he attacked was John, bishop of Jerusalem, whom he denounced from his own pulpit at Jerusalem (394) in terms so violent that the bishop sent his archdeacon to request him to desist; and afterwards, instigated by Theophilus, bishop of Alexandria, he proceeded so far as to summon a council of Cyprian bishops to condemn the errors of Origen. In his closing years he came into conflict with Chrysostom, the patriarch of Constantinople, who had given temporary shelter to four Nitrian monks whom Theophilus had expelled on the charge of Origenism. The monks gained the support of the empress Eudoxia, and when she summoned Theophilus to Constantinople that prelate forced the aged Epiphanius to go with him. He had some controversy with Chrysostom but did not stay to see the result of Theophilus's machinations, and died on his way home. The principal work of Epiphanius is the *Panarion*, or treatise on heresies, of which he also wrote an abridgment. It is a "medicine chest" of remedies for all kinds of heretical belief, of which he names eighty varieties. His accounts of the earlier errors (where he has preserved for us large excerpts from the original Greek of Irenaeus) are more reliable than those of contemporary heresies. In his desire to see the Church safely moored he also wrote the *Ancoratus*, or discourse on the true faith. His encyclopaedic learning shows itself in a treatise on Jewish weights and measures, and another (incomplete) on ancient gems. These, with two epistles to John of Jerusalem and Jerome, are his only genuine remains. He wrote a large number of works which are lost. In allusion to his knowledge of Hebrew, Syriac, Egyptian, Greek and Latin, Jerome styles Epiphanius Πεντάγλωσσος (Five-tongued); but if his knowledge of languages was really so extensive, it is certain that he was utterly destitute of critical and logical power. His early asceticism seems to have imbued him with a love of the marvellous; and his religious zeal served only to increase his credulity. His erudition is outweighed by his prejudice, and his inability to recognize the responsibilities of authorship makes it necessary to assign most value to those portions of his works which he simply cites from earlier writers.

The primary sources for the life are the church histories of Socrates and Sozomen, Palladius's *De vita Chrysostomi* and Jerome's *De vir. illust.* 114. Petau (Petavius) published an edition of the works in 2 vols. fol. at Paris in 1622; cf. Migne, *Patr. Graec.* 41-43. The *Panarion* and other works were edited by F. Oehler (Berlin, 1859–1861). For more recent work especially on the fragments see K. Bonwetsch's art. in Herzog-Hauck's *Realencyk.* v. 417.

Other theologians of the same name were: (1) Epiphanius Scholasticus, friend and helper of Cassiodorus; (2) Epiphanius, bishop of Ticinum (Pavia), *c.* 438–496; (3) Epiphanius, bishop of Constantia and Metropolitan of Cyprus (the Younger), *c.* A.D. 680, to whom some critics have ascribed certain of the works supposed to have been written by the greater Epiphanius; (4) Epiphanius, bishop of Constantia in the 9th century, to whom a similar attribution has been made.

EPIPHANY, FEAST OF. The word epiphany, in Greek, signifies an apparition of a divine being. It was used as a singular or a plural, both in its Greek and Latin forms, according as one epiphany was contemplated or several united in a single commemoration. For in the East from an early time were associated with the feast of the Baptism of Christ commemorations of the physical birth, of the Star of the Magi, of the miracles of Cana, and of the feeding of the five thousand. The commemoration of the Baptism was also called by the Greek fathers of the 4th century the Theophany or Theophanies, and the Day of Lights, *i.e.* of the Illumination of Jesus or of the Light which shone in the Jordan. In the Teutonic west it has become the Festival of the three kings (*i.e.* the Magi), or simply Twelfth day. Leo the Great called it the Feast of the *Declaration*; Fulgentius, of the *Manifestation*; others, of the *Apparition* of Christ.

In the following article it is attempted to ascertain the date of institution of the Epiphany feast, its origin, and its significance and development.

Clement of Alexandria first mentions it. Writing *c.* 194 he states that the Basilidians feasted the day of the Baptism, devoting the whole night which preceded it to lections of the scriptures. They fixed it in the 15th year of Tiberius, on the 15th or 11th of the month Tobi, dates of the Egyptian fixed calendar equivalent to January 10th and 6th. When Clement wrote the great church had not adopted the feast, but toward A.D. 300 it was widely in vogue. Thus the Acts of Philip the Martyr, bishop of Heraclea in Thrace, A.D. 304, mention the "holy day of the Epiphany." Note the singular. Origen seems not to have heard of it as a feast of the Catholic church, but Hippolytus (died *c.* 235) recognized it in a homily which may be genuine.

In the age of the Nicene Council, A.D. 325, the primate of Alexandria was charged at every Epiphany Feast to announce to the churches in a "Festal Letter" the date of the forthcoming Easter. Several such letters written by Athanasius and others remain. In the churches so addressed the feast of Jan. 6 must have been already current.

In Jerusalem, according to the Epistle of Macarius[1] to the Armenians, *c.* 330, the feast was kept with zeal and splendour, and was with Easter and Pentecost a favourite season for Baptism.

We have evidence of the 4th century from Spain that a long fast marked the season of Advent, and prepared for the feast of Epiphany on the 6th of January. The council of

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[1] For its text see *The Key of Truth*, translated by F. C. Conybeare, Oxford, and the article ARMENIAN CHURCH.

Saragossa *c.* 380 enacted that for 21 days, from the 17th of December to the 6th of January, the Epiphany, the faithful should not dance or make merry, but steadily frequent the churches. The synod of Lerida in 524 went further and forbade marriages during Advent. Our earliest Spanish lectionary, the *Liber comicus* of Toledo, edited by Don Morin (*Anecd. Maredsol.* vol. i.), provides lections for five Sundays in Advent, and the gospel lections[1] chosen regard the Baptism of Christ, not His Birth, of which the feast, like that of the Annunciation, is mentioned, but not yet dated, December 25 being assigned to St Stephen. It is odd that for "the Apparition of the Lord" the lection Matt. ii. 1-15 is assigned, although the lections for Advent belong to a scheme which identified Epiphany with the Baptism. This anomaly we account for below. The old editor of the Mozarabic Liturgy, Fr. Antonio Lorenzano, notes in his preface § 28 that the Spaniards anciently terminated the Advent season with the Epiphany Feast. In Rome also the earliest fixed system of the ecclesiastical year, which may go back to 300, makes Epiphany the *caput festorum* or chief of feasts. The Sundays of Advent lead up to it, and the first Sundays of the year are "The Sunday within the octave of Epiphany," "the first Sunday after," and so forth. December 25 is no critical date at all. In Armenia as early as 450 a month of fasting prepared for the Advent of the Lord at Epiphany, and the fast was interpreted as a reiteration of John the Baptist's season of Repentance.

In Antioch as late as about 386 Epiphany and Easter were the two great feasts, and the physical Birth of Christ was not yet feasted. On the eve of Epiphany after nightfall the springs and rivers were blessed, and water was drawn from them and stored for the whole year to be used in lustrations and baptisms. Such water, says Chrysostom, to whose orations we owe the information, kept pure and fresh for one, two and three years, and like good wine actually improved the longer it was kept. Note that Chrysostom speaks of the Feast of the *Epiphanies*, implying two, one of the Baptism, the other of the Second Advent, when Christ will be manifested afresh, and we with him in glory. This Second Epiphany inspired, as we saw, the choice of Pauline lections in the *Liber comicus*. But the salient event commemorated was the Baptism, and Chrysostom almost insists on this as the exclusive significance of the feast:—"It was not when he was born that he became manifest to all, but when he was baptized." In his commentary on Ezekiel Jerome employs the same language *absconditus est et non apparuit*, by way of protest against an interpretation of the Feast as that of the Birth of Jesus in Bethlehem, which was essayed as early as 375 by Epiphanius in Cyprus, and was being enforced in Jerome's day by John, bishop of Jerusalem. Epiphanius boldly removed the date of the Baptism to the 8th of November. "January 6" (=Tobi 11), he writes, "is the day of Christ's Birth, that is, of the Epiphanies." He uses the plural, because he adds on January 6 the commemoration of the water miracle of Cana. Although in 375 he thus protested that January 6 was the day "of the Birth after the Flesh," he became before the end of the century a convert, according to John of Nice, to the new opinion that December 25 was the real day of this Birth. That as early as about 385, January 6 was kept as the physical birthday in Jerusalem, or rather in Bethlehem, we know from a contemporary witness of it, the lady pilgrim of Gaul, whose *peregrinatio*, recently discovered by Gamurrini, is confirmed by the old Jerusalem Lectionary preserved in Armenian.[2] Ephraem the Syrian father is attested already by Epiphanius (*c.* 375) to have celebrated the physical birth on January 6. His genuine Syriac hymns confirm this, but prove that the Baptism, the Star of the Magi, and the Marriage at Cana were also commemorated on the same day. That the same union prevailed in Rome up to the year 354 may be inferred from Ambrose. Philastrius (*De haer.* ch. 140) notes that some abolished the Epiphany feast and substituted a Birth feast. This was between 370 and 390.

In 385 Pope Siricius[3] calls January 6 *Natalicia*, "the Birthday of Christ or of Apparition," and protests against the Spanish custom (at Tarragona) of baptizing on that day—another proof that in Spain in the 4th century it commemorated the Baptism. In Gaul at Vienna in 360 Julian the Apostate, out of deference to Christian feeling, went to church "on the festival which they keep in January and call Epiphania." So Ammianus; but Zonaras in his Greek account of the event calls it the day of the Saviour's Birth.

Why the feast of the Baptism was called the feast or day of the Saviour's Birth, and why fathers of that age when they call Christmas the birthday constantly qualify and add the words "in the flesh," we are able to divine from Pope Leo's (*c.* 447) 18th Epistle to the bishops of Sicily. For here we learn that in Sicily they held that in His Baptism the Saviour was reborn through the Holy Spirit. "The Lord," protests Leo, "needed no remission of sins, no remedy of rebirth." The Sicilians also baptized neophytes on January 6, "because baptism conveyed to Jesus and to them one and the same grace." Not so, argues Leo, the Lord sanctioned and hallowed the power of regeneration, not when He was baptized, but "when the blood of redemption and the water of baptism flowed forth from his side." Neophytes should therefore be baptized at Easter and Pentecost alone, never at Epiphany.

Fortune has preserved to us among the *Spuria* of several Latin fathers, Ambrose, Augustine, Jerome and Maximus of Turin, various homilies for Sundays of the Advent fast and for Epiphany. The Advent lections of these homilists were much the same as those of the Spanish *Liber comicus*; and they insist on Advent being kept as a strict fast, without marriage celebrations. Their Epiphany lection is however Matt. iii. 1-17, which must therefore have once on a time been assigned in the *Liber comicus* also in harmony with its general scheme. The psalms used on the day are, cxiii. (cxiv.) "When Israel went forth," xxviii. (xxix.) "Give unto the Lord," and xxii. (xxiii.) "the Lord is my Shepherd." The same lection of Matthew and also Ps. xxix. are noted for Epiphany in the Greek oration for the day ascribed to Hippolytus, which is at least earlier than 300, and also in special old Epiphany rites for the Benediction of the waters found in Latin, Greek, Armenian, Coptic, Syriac, &c. Now by these homilists as by Chrysostom,[4] the Baptism is regarded as the occasion on which "the Saviour first *appeared* after the flesh in the world or on earth." These words were classical to the homilists, who explain them as best they can. The baptism is also declared to have been "the consecration of Christ," and "regeneration of Christ and a strengthening of our faith," to have been "Christ's second nativity." "This *second birth* hath more renown than his first . . . for now the God of majesty is inscribed (as his father), but then (at his first birth) Joseph the Carpenter was assumed to be his father . . . he hath more honour who cries aloud from Heaven (viz. God the Father), than he who labours upon earth" (viz. Joseph).[5]

Similarly the old *ordo Romanus* of the age of Pepin (given by Montfaulcon in his preface to the Mozarabic missal in Migne, *Patr. Latina*, 85, col. 46), under the rubric of the Vigil of the Theophany, insists that "the *second birth* of Christ (in Baptism) being distinguished by so many mysteries (*e.g.* the miracle of Cana) is more honoured than the first" (birth from Mary).

These homilies mostly belong to an age (? 300-400) when the commemoration of the physical Birth had not yet found its own day (Dec. 25), and was therefore added alongside of the Baptism on January 6. Thus the two Births, the physical and the spiritual, of Jesus were celebrated on one and the same day, and one homily contains the words: "Not yet is the feast of his origin fully completed, and already we have to celebrate the solemn commemoration of his Baptism. He has hardly been born humanwise, and already he is being *reborn* in sacramental wise. For to-day, though after a lapse of many annual cycles, he was hallowed (or consecrated) in Jordan. So the Lord arranged as to link rite with rite; I mean, in such wise as to be brought forth through the Virgin and to be begotten through the mystery (*i.e.* sacrament) in one and the same season." Another homily preserved in a MS. of the 7th or 8th century and assigned to Maximus of Turin declares that the Epiphany was known as the Birthday of Jesus, either because He was then born of the Virgin or *reborn in baptism*. This also was the classical defence made by Armenian fathers of their custom of keeping the feast of the Birth and Baptism together on January 6. They argued from Luke's gospel that the Annunciation took place on April 6, and therefore the Birth on January 6. The Baptism was on Christ's thirtieth birthday, and should therefore be also kept on January 6. Cosmas Indicopleustes (*c.* 550) relates that on the same grounds believers of Jerusalem joined the feasts. All such reasoning was of course *après coup*. As late as the 9th century the Armenians had at least three discrepant dates for the Annunciation—January 5, January 9, April 6; and of these January 5 and 9 were older than April 6, which they perhaps borrowed from Epiphanius's commentary on the Gospels. The old Latin homilist, above quoted, hits the mark when he declares that the innate logic of things required the Baptism (which must, he says, be any how called a *natal* or birth festival) to fall on the same day as Christmas —*Ratio enim exigit.* Of the argument from the 6th of April as the date of the Annunciation he knows nothing. The 12th century Armenian Patriarch Nerses, like this homilist, merely rests his case against the Greeks, who incessantly reproached the Armenians for ignoring their Christmas on December 25, on the inherent logic of things, as follows:

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[1] These are Matt. iii. 1-11, xi. 2-15, xxi. 1-9; Mark i. 1-8; Luke iii. 1-18. The Pauline lections regard the Epiphany of the Second Advent, of the prophetic or Messianic kingdom.

[2] Translated in *Rituale Armenorum* (Oxford, 1905).

[3] Epist. ad Himerium, c. 2.

[4] Hom. I. in Pentec. *op.* tom. ii. 458; "With us the Epiphanies is the first festival. What is this festival's significance? This, that God was seen upon earth and consorted with men." For this idea there had soon to be substituted that of the manifestation of Christ to the Gentiles.

[5] See the Paris edition of Augustine (1838), tom. v., Appendix, *Sermons* cxvi., cxxv., cxxxv., cxxxvi., cxxxvii.; cf. tom. vi. *dial. quaestionum*, xlvi.; Maximus of Turin, Homily xxx.

> "Just as he was born after the flesh from the holy virgin, so he was *born* through baptism and from the Jordan, by way of example unto us. And since there are here *two births*, albeit differing one from the other in mystic import and in point of time, therefore it was appointed that we should feast them together, as the first, so also the second birth."

The Epiphany feast had therefore in its own right acquired the name of *natalis dies* or birthday, as commemorating the spiritual rebirth of Jesus in Jordan, before the *natalis in carne*, the Birthday *in the flesh*, as Jerome and others call it, was associated with it. This idea was condemned as Ebionite in the 3rd century, yet it influences Christian writers long before and long afterwards. So Tertullian says: "We little fishes (*pisciculi*), after the example of our great fish (ἰχθύν) Jesus Christ the Lord, are born (*gignimur*) in the water, nor except by abiding in the water are we in a state of salvation." And Hilary, like the Latin homilists cited above, writes of Jesus that "he was *born again* through baptism, and then became Son of God," adding that the Father cried, when he had gone up out of the water, "My Son art thou, I have this day begotten thee" (Luke iii. 22). "But this," he adds, "was with the begetting of a man who is being reborn; on that occasion too he himself was being reborn unto God to be perfect son; as he was son of man, so in baptism, he was constituted son of God as well." The idea frequently meets us in Hilary; it occurs in the Epiphany hymn of the orthodox Greek church, and in the Epiphany hymns and homilies of the Armenians.

A letter is preserved by John of Nice of a bishop of Jerusalem to the bishop of Rome which attests a temporary union of both feasts on January 6 in the holy places. The faithful, it says, met before dawn at Bethlehem to celebrate the Birth from the Virgin in the cave; but before their hymns and lections were finished they had to hurry off to Jordan, 13 m. the other side of Jerusalem, to celebrate the Baptism, and by consequence neither commemoration could be kept fully and reverently. The writer therefore begs the pope to look in the archives of the Jews brought to Rome after the destruction of Jerusalem, and to ascertain from them the real date of Christ's birth. The pope looked in the works of Josephus and found it to be December 25. The letter's genuineness has been called in question; but revealing as it does the Church's ignorance of the date of the Birth, the inconvenience and precariousness of its association with the Baptism, the recency of its separate institution, it could not have been invented. It is too tell-tale a document. Not the least significant fact about it is that it views the Baptism as an established feast which cannot be altered and set on another date. Not it but the physical birth must be removed from January 6 to another date. It has been shown above that perhaps as early as 380 the difficulty was got over in Jerusalem by making the Epiphany wholly and solely a commemoration of the miraculous birth, and suppressing the commemoration of the Baptism. Therefore this letter must have been written—or, if invented, then invented before that date. Chrysostom seems to have known of it, for in his Epiphany homily preached at Antioch, *c.* 392 (op. vol. ii. 354, ed. Montf.), he refers to the archives at Rome as the source from which the date December 25 could be confirmed, and declares that he had obtained it from those who dwell there, and who observing it from the beginning and by old tradition, had communicated it to the East. The question arises why the feast of the Baptism was set on January 6 by the sect of Basilides? And why the great church adopted the date? Now we know what sort of considerations influenced this sect in fixing other feasts, so we have a clue. They fixed the Birth of Jesus on Pachon 25 (= May 20), the day of the Niloa, or feast of the descent of the Nile from heaven. We should thus expect January 6 to be equally a Nile festival. And this from various sources we know it was. On Tobi 11, says Epiphanius[1] (*c.* 370), every one draws up water from the river and stores it up, not only in Egypt itself, but in many other countries. In many places, he adds, springs and rivers turn into wine on this day, *e.g.* at Cibyra in Caria and Gerasa in Arabia. Aristides Rhetor (*c.* 160) also relates how in the winter, which began with Tobi, the Nile water was at its purest. Its water, he says, if drawn at the right time conquers time, for it does not go bad, whether you keep it on the spot or export it. Galleys were waiting on a certain night to take it on board and transport it to Italy and elsewhere for libations and lustrations in the Temples of Isis. "Such water," he adds, "remained fresh, long after other water supplies had gone bad. The Egyptians filled their pitchers with this water, as others did with wine; they stored it in their houses for three or four years or more, and recommended it the more, the older it grew, just as the Greeks did their wines."

Two centuries later Chrysostom, as we have seen, commends in identical terms the water blessed and drawn from the rivers at the Baptismal feast. It is therefore probable that the Basilidian feast was a Christianized form of the blessing of the Nile, called by Chabas in his Coptic calendar *Hydreusis*. Mas'ūdī the Arab historian of the 10th century, in his *Prairies d'or* (French trans. Paris, 1863, ii. 364), enlarges on the splendours of this feast as he saw it still celebrated in Egypt.

Epiphanius also (*Haer.* 51) relates a curious celebration held at Alexandria of the Birth of the Aeon. On January 5 or 6 the votaries met in the holy compound or Temple of the Maiden (Korē), and sang hymns to the music of the flute till dawn, when they went down with torches into a shrine under ground, and fetched up a wooden idol on a bier representing Korē, seated and naked, with crosses marked on her brow, her hands and her knees. Then with flute-playing, hymns and dances they carried the image seven times round the central shrine, before restoring it again to its dwelling-place below. He adds: "And the votaries say that to-day at this hour *Korē*, that is, the Virgin, gave birth to the Aeon."

Epiphanius says this was a heathen rite, but it rather resembles some Basilidian or Gnostic commemoration of the spiritual birth of the Divine life in Jesus of the Christhood, from the older creation the Ecclesia.

The earliest extant Greek text of the Epiphany rite is in a

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[1] Perhaps Epiphanius is here, after his wont, transcribing an earlier source.

Euchologion of about the year 795, now in the Vatican. The prayers recite that at His baptism Christ hallowed the waters by His presence in Jordan,[1] and ask that they may now be blessed by the Holy Spirit visiting them, by its power and inworking, as the streams of Jordan were blessed. So they will be able to purify soul and body of all who draw up and partake of them. The hymn sung contains such clauses as these:

> "To-day the grace of the Holy Spirit hallowing the waters appears (ἐπιφαίνεται, cf. Epiphany) . . . To-day the systems of waters spread out their backs under the Lord's footsteps. To-day the unseen is seen, that he may reveal himself to us. To-day the Increate is of his own will ordained (*lit.* hath hands laid on him) by his own creature. To-day the Unbending bends his neck to his own servant, in order to free us from servitude. To-day we were liberated from darkness and are illumined by light of divine knowledge. To-day for us the Lord by means of rebirth (*lit.* palingenesy) of the Image reshapes the Archetype."

This last clause is obscure. In the Armenian hymns the ideas of the rebirth not only of believers, but of Jesus, and of the latter's ordination by John, are very prominent.

The history of the Epiphany feast may be summed up thus:—

From the Jews the Church took over the feasts of Pascha and Pentecost; and Sunday was a weekly commemoration of the Resurrection. It was inevitable, however, that believers should before long desire to commemorate the Baptism, with which the oldest form of evangelical tradition began, and which was widely regarded as the occasion when the divine life began in Jesus; when the Logos or Holy Spirit appeared and rested on Him, conferring upon Him spiritual unction as the promised Messiah; when, according to an old reading of Luke iii. 22, He was begotten of God. Perhaps the Ebionite Christians of Palestine first instituted the feast, and this, if a fact, must underlie the statement of John of Nice, a late but well-informed writer (*c.* 950), that it was fixed by the disciples of John the Baptist who were present at Jesus' Baptism. The Egyptian gnostics anyhow had the feast and set it on January 6, a day of the blessing of the Nile. It was a feast of Adoptionist complexion, as one of its names, viz. the Birthday (Greek γενέθλια, Latin *Natalicia* or *Natalis dies*), implies. This explains why in east and west the feast of the physical Birth was for a time associated with it; and to justify this association it was suggested that Jesus was baptized just on His thirtieth birthday. In Jerusalem and Syria it was perhaps the Ebionite or Adoptionist, we may add also the Gnostic, associations of the Baptism that caused this aspect of Epiphany to be relegated to the background, so that it became wholly a feast of the miraculous birth. At the same time other epiphanies of Christ were superadded, *e.g.* of Cana where Christ began His miracles by turning water into wine and *manifested* forth His glory, and of the Star of the Magi. Hence it is often called the Feast of *Epiphanies* (in the plural). In the West the day is commonly called the Feast of the three kings, and its early significance as a commemoration of the Baptism and season of blessing the waters has been obscured; the Eastern churches, however, of Greece, Russia, Georgia, Armenia, Egypt, Syria have been more conservative. In the far East it is still the season of seasons for baptisms, and in Armenia children born long before are baptized at it. Long ago it was a baptismal feast in Sicily, Spain, Italy (see Pope Gelasius to the Lucanian Bishops), Africa and Ireland. In the Manx prayer-book of Bishop Phillips of the year 1610 Epiphany is called the "little Nativity" (*La nolicky bigge*), and the Sunday which comes between December 25 and January 6 is "the Sunday between *the two Nativities*," or *Jih dûni oedyr 'a Nolick*; Epiphany itself is the "feast of the water vessel," *lail ymmyrt uyskey*, or "of the well of water," *Chibbyrt uysky*.

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EPIRUS, or **EPEIRUS**, an ancient district of Northern Greece extending along the Ionian Sea from the Acroceraunian promontory on the N. to the Ambracian gulf on the S. It was conterminous on the landward side with Illyria, Macedonia and Thessaly, and thus corresponds to the southern portion of Albania (*q.v.*). The name Epirus (Ἤπειρος) signified "mainland," and was originally applied to the whole coast southward to the Corinthian Gulf, in contradistinction to the neighbouring islands, Corcyra, Leucas, &c. The country is all mountainous, especially towards the east, where the great rivers of north-western Greece —Achelous, Arachthus and Aous—rise in Mt Lacmon, the backbone of the Pindus chain. In ancient times Epirus did not produce corn sufficient for the wants of its inhabitants; but it was celebrated, as it has been almost to the present day, for its cattle and its horses. According to Theopompus (4th cent. B.C.), the Epirots were divided into fourteen independent tribes, of which the principal were the Chaones, the Thesproti and the Molossi. The Chaones (perhaps akin to the Chones who dwelt in the heel of Italy) inhabited the Acroceraunian shore, the Molossians the inland districts round the lake of Pambotis (mod. Jannina), and the Thesprotians the region to the north of the Ambracian gulf. In spite of its distance from the chief centres of Greek thought and action, and the barbarian repute of its inhabitants, Epirus was believed to have exerted at an early period no small influence on Greece, by means more especially of the oracle of Dodona. Aristotle even placed in Epirus the original home of the Hellenes. But in historic times its part in Greek history is mainly passive. The states of Greece proper founded a number of colonies on its coast, which formed stepping-stones towards the Adriatic and the West. Of these one of the earliest and most flourishing was the Corinthian colony of Ambracia, which gives its name to the neighbouring gulf. Elatria, Bucheta and Pandosia, in Thesprotia, originated from Elis. Among the other towns in the country the following were of some importance. In Chaonia: Palaeste and Chimaera, fortified posts to which the dwellers in the open country could retire in time of war; Onchesmus or Anchiasmus, opposite Corcyra (Corfu), now represented by Santi Quarante; Phoenice, still so called, the wealthiest of all the native cities of Epirus, and after the fall of the Molossian kingdom the centre of an Epirotic League; Buthrotum, the modern Butrinto; Phanote, important in the Roman campaigns in Epirus; and Adrianopolis, founded by the emperor whose name it bore. In Thesprotia: Cassope, the chief town of the most powerful of the Thesprotian clans; and Ephyra, afterwards Cichyrus, identified by W. M. Leake with the monastery of St John 3 or 4 m. from Phanari, and by C. Bursian with Kastri at the northern end of the Acherusian Lake. In Molossia: Passaron, where the kings were wont to take the oath of the constitution and receive their people's allegiance; and Tecmon, Phylace and Horreum, all of doubtful identification. The Byzantine town of Rogus is probably the same as the modern Luro, the Greek Oropus.

History.—The kings, or rather chieftains, of the Molossians, who ultimately extended their power over all Epirus, claimed to be descended from Pyrrhus, son of Achilles, who, according to legend, settled in the country after the sack of Troy, and transmitted his kingdom to Molossus, his son by Andromache. The early history of the dynasty is very obscure; but Admetus, who lived in the 5th century B.C., is remembered for his hospitable reception of the banished Themistocles, in spite of the fact that the great Athenian had persuaded his countrymen to refuse the alliance tardily offered by the Molossians when victory against the Persians was already secured. Admetus was succeeded, about 429 B.C., by his son or grandson, Tharymbas or Arymbas I., who being placed by a decree of the people under the guardianship of Sabylinthus, chief of the Atintanes, was educated at Athens, and at a later date introduced a higher civilization among his subjects. Alcetas, the next king mentioned in history, was restored to his throne by Dionysius of Syracuse about 385 B.C. His son Arymbas II. (who succeeded by the death of his brother Neoptolemus) ruled with prudence and equity, and gave encouragement to literature and the arts.

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[1] The same idea is frequent in Epiphany homilies of Chrysostom and other 4th-century fathers.

To him Xenocrates of Chalcedon dedicated his four books on the art of governing; and it is specially mentioned that he bestowed great care on the education of his brother's children. One of them, Troas, he married; Olympias, the other niece, was married to Philip II. of Macedon and became the mother of Alexander the Great. On the death of Arymbas, Alexander the brother of Olympias, was put on the throne by Philip and married his daughter Cleopatra. Alexander assumed the new title of king of Epirus, and raised the reputation of his country abroad. Asked by the Tarentines for aid against the Samnites and Lucanians, he made a descent at Paestum in 332 B.C., and reduced several cities of the Lucani and Bruttii; but in a second attack he was surrounded, defeated and slain near Pandosia in Bruttium.

Aeacides, the son of Arymbas II., succeeded Alexander. He espoused the cause of Olympias against Cassander, but was dethroned by his own soldiers, and had hardly regained his position when he fell in battle (313 B.C.) against Philip, brother of Cassander. He had, by his wife Phthia, a son, the celebrated Pyrrhus, and two daughters, Deidamia and Troas, of whom the former married Demetrius Poliorcetes. His brother Alcetas, who succeeded him, continued unsuccessfully the war with Cassander; he was put to death by his rebellious subjects in 295 B.C., and was succeeded by Pyrrhus (*q.v.*), who for six years fought against the Romans in south Italy and Sicily, and gave to Epirus a momentary importance which it never again possessed.

Alexander, his son, who succeeded in 272 B.C., attempted to seize Macedonia, and defeated Antigonus Gonatas, but was himself shortly afterwards driven from his kingdom by Demetrius. He recovered it, however, and spent the rest of his days in peace. Two other insignificant reigns brought the family of Pyrrhus to its close, and Epirus was thenceforward governed by a magistrate, elected annually in a general assembly of the nation held at Passaron. Having imprudently espoused the cause of Perseus (*q.v.*) in his ill-fated war against the Romans, 168 B.C., it was exposed to the fury of the conquerors, who destroyed, it is said, seventy towns, and carried into slavery 150,000 of the inhabitants. From this blow it never recovered. At the dissolution of the Achaean League (*q.v.*), 146 B.C., it became part of the province of Macedonia, receiving the name Epirus Vetus, to distinguish it from Epirus Nova, which lay to the east.

On the division of the empire it fell to the East, and so remained until the taking of Constantinople by the Latins in 1204, when Michel Angelus Comnenus seized Aetolia and Epirus. On the death of Michel in 1216, these countries fell into the hands of his brother Theodore. Thomas, the last of the direct line, was murdered in 1318 by his nephew Thomas, lord of Zante and Cephalonia, and his dominions were dismembered. Not long after, Epirus was overrun by the Samians and Albanians, and the confusion which had been growing since the division of the empire was worse confounded still. Charles II. Tocco, lord of Cephalonia and Zante, obtained the recognition of his title of Despot of Epirus from the emperor Manuel Comnenus in the beginning of the 15th century; but his family was deprived of their possession in 1431 by Murad (Amurath) II. In 1443, Scanderbeg, king of Albania, made himself master of a considerable part of Epirus; but on his death it fell into the power of the Venetians. From these it passed again to the Turks, under whose dominion it still remains. For modern history see ALBANIA.

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EPISCOPACY (from Late Lat. *episcopatus*, the office of a bishop, *episcopus*); the general term technically applied to that system of church organization in which the chief ecclesiastical authority within a defined district, or diocese, is vested in a bishop. As such it is distinguished on the one hand from Presbyterianism, government by elders, and Congregationalism, in which the individual church or community of worshippers is autonomous, and on the other from Papalism. The origin and development of episcopacy in the Christian Church, and the functions and attributes of bishops in the various churches, are dealt with elsewhere (see CHURCH HISTORY and BISHOP). Under the present heading it is proposed only to discuss briefly the various types of episcopacy actually existing, and the different principles that they represent.

The deepest line of cleavage is naturally between the view that episcopacy is a divinely ordained institution essential to the effective existence of a church as a channel of grace, and the view that it is merely a convenient form of church order, evolved as the result of a variety of historical causes, and not necessary to the proper constitution of a church. The first of these views is closely connected with the doctrine of the Apostolical Succession. According to this, Christ committed to his apostles certain powers of order and jurisdiction in the Church, among others that of transmitting these powers to others through "the laying on of hands"; and this power, whatever obscurity may surround the practice of the primitive Church (see APOSTLE, *ad fin.*) was very early confined to the order of bishops, who by virtue of a special consecration became the successors of the apostles in the function of handing on the powers and graces of the ministry.[1] A valid episcopate, then, is one derived in an unbroken series of "layings on of hands" by bishops from the time of the apostles (see ORDER, HOLY). This is the Catholic view, common to all the ancient Churches whether of the West or East, and it is one that necessarily excludes from the union of Christendom all those Christian communities which possess no such apostolically derived ministry.

Apart altogether, however, from the question of orders, episcopacy represents a very special conception of the Christian Church. In the fully developed episcopal system the bishop sums up in his own person the collective powers of the Church in his diocese, not by delegation of these powers from below, but by divinely bestowed authority from above. "Ecclesia est in episcopo," wrote St Cyprian (Cyp. iv. *Ep.* 9); the bishop, as the successor of the apostles, is the centre of unity in his diocese, the unity of the Church as a whole is maintained by the intercommunion of the bishops, who for this purpose represent their dioceses. The bishops, individually and collectively, are thus the essential ties of Catholic unity; they alone, as the depositories of the apostolic traditions, establish the norm of Catholic orthodoxy in the general councils of the Church. This high theory of episcopacy which, if certain of the Ignatian letters be genuine, has a very early origin, has, of course, fallen upon evil days. The power of the collective episcopate to maintain Catholic unity was disproved long before it was overshadowed by the centralized authority of Rome; before the Reformation, its last efforts to assert its supremacy in the Western Church, at the councils of Basel and Constance, had broken down; and the religious revolution of the 16th century left it largely discredited and exposed to a double attack, by the papal monarchy on the one hand and the democratic Presbyterian model on the other. Within the Roman Catholic Church the high doctrine of episcopacy continued to be maintained by the Gallicans and Febronians (see GALLICANISM and FEBRONIANISM) as against the claims of the Papacy, and for a while with success; but a system which had failed to preserve the unity of the Church even when the world was united under the Roman empire could not be expected to do so in a world split up into a series of rival states, of which many had already reorganized their churches on a national basis. "Febronius," indeed, was in favour of a frank recognition of this national basis of ecclesiastical organization, and saw in Episcopacy the best means of reuniting the dissidents to the Catholic Church, which was to consist, as it were, of a free federation of episcopal churches under the presidency of the bishop of Rome. The idea had considerable success; for it happened to march with the views of the secular princes. But religious people could hardly be expected to see in the worldly prince-bishops of the Empire, or the wealthy courtier-prelates of France, the trustees of the apostolical tradition. The Revolution intervened; and when, during the religious reaction that followed, men sought for an ultimate authority, they found it in the papal monarch, exalted now by ultramontane zeal into the sole depositary of the apostolical tradition (see ULTRAMONTANISM). At the Vatican Council of 1870 episcopacy made its last stand against papalism, and was vanquished (see VATICAN COUNCIL). The pope still addresses his fellow-bishops as "venerable brothers"; but from the Roman Catholic Church the fraternal union of coequal authorities, which is of the essence of episcopacy, has vanished; and in its place is set the autocracy of one. The modern Roman Catholic Church is episcopal, for it preserves the bishops, whose *potestas ordinis* not even the pope can exercise until he has been duly consecrated; but the bishops as such are now but subordinate elements in a system for which "Episcopacy" is certainly no longer an appropriate term.

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[1] See Bishop C. Gore, *The Church and the Ministry* (1882).

The word Episcopacy has, in fact, since the Reformation, been more especially associated with those churches which, while ceasing to be in communion with Rome, have preserved the episcopal model. Of these by far the most important is the Church of England, which has preserved its ecclesiastical organization essentially unchanged since its foundation by St Augustine, and its daughter churches (see ENGLAND, CHURCH OF, and ANGLICAN COMMUNION). The Church of England since the Reformation has been the chief champion of the principle of Episcopacy against the papal pretensions on the one hand and Presbyterianism and Congregationalism on the other. As to the divine origin of Episcopacy and, consequently, of its universal obligation in the Christian Church, Anglican opinion has been, and still is, considerably divided.[1] The "High Church" view, now predominant, is practically identical with that of the Gallicans and Febronians, and is based on Catholic practice in those ages of the Church to which, as well as to the Bible, the formularies of the Church of England make appeal. So far as this view, however, is the outcome of the general Catholic movement of the 19th century, it can hardly be taken as typical of Anglican tradition in this matter. Certainly, in the 16th and 17th centuries, the Church of England, while rigorously enforcing the episcopal model at home, and even endeavouring to extend it to Presbyterian Scotland, did not regard foreign non-episcopal Churches otherwise than as sister communions. The whole issue had, in fact, become confused with the confusion of functions of the Church and State. In the view of the Church of England the ultimate governance of the Christian community, in things spiritual and temporal, was vested not in the clergy but in the "Christian prince" as the vicegerent of God.[2] It was the transference to the territorial sovereigns of modern Europe of the theocratic character of the Christian heads of the Roman world-empire; with the result that for the reformed Churches the unit of church organization was no longer the diocese, or the group of dioceses, but the Christian state. Thus in England the bishops, while retaining their *potestas ordinis* in virtue of their consecration as successors of the apostles, came to be regarded not as representing their dioceses in the state, but the state in their dioceses. Forced on their dioceses by the royal *Congé d'élire* (*q.v.*), and enthusiastic apostles of the High Church doctrine of non-resistance, the bishops were looked upon as no more than lieutenants of the crown;[3] and Episcopacy was ultimately resisted by Presbyterians and Independents as an expression and instrument of arbitrary government, "Prelacy" being confounded with "Popery" in a common condemnation. With the constitutional changes of the 18th and 19th centuries, however, a corresponding modification took place in the character of the English episcopate; and a still further change resulted from the multiplication of colonial and missionary sees having no connexion with the state (see ANGLICAN COMMUNION). The consciousness of being in the line of apostolic succession helped the English clergy to revert to the principle *Ecclesia est in episcopo*, and the great periodical conferences of Anglican bishops from all parts of the world have something of the character, though they do not claim the ecumenical authority, of the general councils of the early Church (see LAMBETH CONFERENCES).

Of the reformed Churches of the continent of Europe only the Lutheran Churches of Denmark, Iceland, Norway, Sweden and Finland preserve the episcopal system in anything of its historical sense; and of these only the two last can lay claim to the possession of bishops in the unbroken line of episcopal succession.[4] The superintendents (variously entitled also archpriests, deans, provosts, ephors) of the Evangelical (Lutheran) Church, as established in the several states of Germany and in Austria, are not bishops in any canonical sense, though their jurisdictions are known as dioceses and they exercise many episcopal functions. They have no special powers of order, being presbyters, and their legal status is admittedly merely that of officials of the territorial sovereign in his capacity as head of the territorial church (see SUPERINTENDENT). The "bishops" of the Lutheran Church in Transylvania are equivalent to the superintendents.

Episcopacy in a stricter sense is the system of the Moravian Brethren (*q.v.*) and the Methodist Episcopal Church of America (see METHODISM). In the case of the former, claim is laid to the unbroken episcopal succession through the Waldenses, and the question of their eventual intercommunion with the Anglican

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[1] Neither the Articles nor the authoritative Homilies of the Church of England speak of episcopacy as essential to the constitution of a church. The latter make "the three notes or marks" by which a true church is known "pure and sound doctrine, the sacraments administered according to Christ's holy institution, and the right use of ecclesiastical discipline." These marks are perhaps ambiguous, but they certainly do not depend on the possession of the Apostolic Succession; for it is further stated that "the bishops of Rome and their adherents are not the true Church of Christ" (Homily "concerning the Holy Ghost," ed. Oxford, 1683, p. 292).

[2] "He and his holy apostles likewise, namely Peter and Paul, did forbid unto all Ecclesiastical Ministers, dominion over the Church of Christ" (*Homilies appointed to be read in Churches*, "The V. part of the Sermon against Wilful Rebellion," ed. Oxford, 1683, p. 378). Princes are "God's lieutenants, God's presidents, God's officers, God's commissioners, God's judges . . . God's vicegerents" ("The II. part of the Sermon of Obedience," *ib.* p. 64).

[3] Juridically they were, of course, never this in the strict sense in which the term could be used of the Lutheran superintendents (see below). They were never mere royal officials, but peers of parliament, holding their temporalities as baronies under the crown.

[4] During the crisis of the Reformation all the Swedish sees became vacant but two, and the bishops of these two soon left the kingdom. The episcopate, however, was preserved by Peter Magnusson, who, when residing as warden of the Swedish hospital of St Bridget in Rome, had been duly elected bishop of the see of Westeraes, and consecrated, *c.* 1524. No official record of his consecration can be discovered, but there is no sufficient reason to doubt the fact; and it is certain that during his lifetime he was acknowledged as a canonical bishop both by Roman Catholics and by Protestants. In 1528 Magnusson consecrated bishops to fill the vacant sees, and, assisted by one of these, Magnus Sommar, bishop of Strengness, he afterwards consecrated the Reformer, Lawrence Peterson, as archbishop of Upsala, Sept. 22, 1531. Some doubt has been raised as to the validity of the consecration of Peterson's successor, also named Lawrence Peterson, in 1575, from the insufficiency of the documentary evidence of the consecration of his consecrator, Paul Justin, bishop of Abo. The integrity of the succession has, however, been accepted after searching investigation by men of such learning as Grabe and Routh, and has been formally recognized by the convention of the American Episcopal Church. The succession to the daughter church of Finland, now independent, stands or falls with that of Sweden.

Church was accordingly mooted at the Lambeth Conference of 1908. The bishops of the Methodist Episcopal Church, on the other hand, derive their orders from Thomas Coke, a presbyter of the Church of England, who in 1784 was ordained by John Wesley, assisted by two other presbyters, "superintendent" of the Methodist Society in America. Methodist episcopacy is therefore based on the denial of any special *potestas ordinis* in the degree of bishop, and is fundamentally distinct from that of the Catholic Church—using this term in its narrow sense as applied to the ancient churches of the East and West.

In all of these ancient churches episcopacy is regarded as of divine origin; and in those of them which reject the papal supremacy the bishops are still regarded as the guardians of the tradition of apostolic orthodoxy and the stewards of the gifts of the Holy Ghost to men (see Orthodox Eastern Church; Armenian Church; Copts: *Coptic Church*, &c.). In the West, Gallican and Febronian Episcopacy are represented by two ecclesiastical bodies: the Jansenist Church under the archbishop of Utrecht (see Jansenism and Utrecht), and the Old Catholics (*q.v.*). Of these the latter, who separated from the Roman communion after the promulgation of the dogma of papal infallibility, represent a pure revolt of the system of Episcopacy against that of Papalism. (W. A. P.)

EPISCOPIUS, SIMON (1583–1643), the Latin form of the name of Simon Bischop, Dutch theologian, was born at Amsterdam on the 1st of January 1583. In 1600 he entered the university of Leiden, where he studied theology under Jacobus Arminius, whose teaching he followed. In 1610, the year in which the Arminians presented the famous Remonstrance to the states of Holland, he became pastor at Bleyswick, a small village near Rotterdam; in the following year he advocated the cause of the Remonstrants (*q.v.*) at the Hague conference. In 1612 he succeeded Francis Gomarus as professor of theology at Leiden, an appointment which awakened the bitter enmity of the Calvinists, and, on account of the influence lent by it to the spread of Arminian opinions, was doubtless an ultimate cause of the meeting of the synod of Dort in 1618. Episcopius was chosen as the spokesman of the thirteen representatives of the Remonstrants before the synod; but he was refused a hearing, and the Remonstrant doctrines were condemned without any explanation or defence of them being permitted. At the end of the synod's sittings in 1619, Episcopius and the other twelve Arminian representatives were deprived of their offices and expelled from the country (see Dort, Synod of). Episcopius retired to Antwerp and ultimately to France, where he lived partly at Paris, partly at Rouen. He devoted most of his time to writings in support of the Arminian cause; but the attempt of Luke Wadding (1588–1657) to win him over to the Romish faith involved him also in a controversy with that famous Jesuit. After the death (1625) of Maurice, prince of Orange, the violence of the Arminian controversy began to abate, and Episcopius was permitted in 1626 to return to his own country. He was appointed preacher at the Remonstrant church in Rotterdam and afterwards rector of the Remonstrant college in Amsterdam. Here he died in 1643. Episcopius may be regarded as in great part the theological founder of Arminianism, since he developed and systematized the principles tentatively enunciated by Arminius. Besides opposing at all points the peculiar doctrines of Calvinism, Episcopius protested against the tendency of Calvinists to lay so much stress on abstract dogma, and argued that Christianity was practical rather than theoretical—not so much a system of intellectual belief as a moral power—and that an orthodox faith did not necessarily imply the knowledge of and assent to a system of doctrine which included the whole range of Christian truth, but only the knowledge and acceptance of so much of Christianity as was necessary to effect a real change on the heart and life.

The principal works of Episcopius are his *Confessio s. declaratio sententiae pastorum qui in foederato Belgio Remonstrantes vocantur super praecipuis articulis religionis Christianae* (1621), his *Apologia pro confessione* (1629), his *Verus theologus remonstrans*, and his uncompleted work *Institutiones theologicae*. A life of Episcopius was written by Philip Limborch, and one was also prefixed by his successor, Étienne de Courcelles (Curcellaeus) (1586–1659), to an edition of his collected works published in 2 vols. (1650–1665). See also article in Herzog-Hauck, *Realencyklopädie*.

EPISODE, an incident occurring in the history of a nation, an institution or an individual, especially with the significance of being an interruption of an ordered course of events, an irrelevance. The word is derived from a word (*ἐπείσοδος*) with a technical meaning in the ancient Greek tragedy. It is defined by Aristotle (*Poetics*, 12) as *μέρος ὅλον τραγῳδίας τὸ μεταξὺ ὅλων χορικῶν μελῶν*, all the scenes, that is, which fall between the choric songs. *εἴσοδος*, or entrance, is generally applied to the entrance of the chorus, but the reference may be to that of the actors at the close of the choric songs. In the early Greek tragedy the parts which were spoken by the actors were considered of subsidiary importance to those sung by the chorus, and it is from this aspect that the meaning of the word, as something which breaks off the course of events, is derived (see A. E. Haigh, *The Tragic Drama of the Greeks*, 1896, at p. 353).

EPISTAXIS (Gr. *ἐπί*, upon, and *στάζειν*, to drop), the medical term for bleeding from the nose, whether resulting from local injury or some constitutional condition. In persistent cases of nose-bleeding, various measures are adopted, such as holding the arms over the head, the application of ice, or of such astringents as zinc or alum, or plugging the nostrils.

EPISTEMOLOGY (Gr. *ἐπιστήμη*, knowledge, and *λόγος*, theory, account; Germ. *Erkenntnistheorie*), in philosophy, a term applied, probably first by J. F. Ferrier, to that department of thought whose subject matter is the nature and origin of knowledge. It is thus contrasted with metaphysics, which considers the nature of reality, and with psychology, which deals with the objective part of cognition, and, as Prof. James Ward said, "is essentially genetic in its method" (*Mind*, April 1883, pp. 166–167). Epistemology is concerned rather with the possibility of knowledge in the abstract (*sub specie aeternitatis*, Ward, *ibid.*). In the evolution of thought epistemological inquiry succeeded the speculations of the early thinkers, who concerned themselves primarily with attempts to explain existence. The differences of opinion which arose on this problem naturally led to the inquiry as to whether any universally valid statement was possible. The Sophists and the Sceptics, Plato and Aristotle, the Stoics and the Epicureans took up the question, and from the time of Locke and Kant it has been prominent in modern philosophy. It is extremely difficult, if not impossible, to draw a hard and fast line between epistemology and other branches of philosophy. If, for example, philosophy is divided into the theory of knowing and the theory of being, it is impossible entirely to separate the latter (Ontology) from the analysis of knowledge (Epistemology), so close is the connexion between the two. Again, the relation between logic in its widest sense and the theory of knowledge is extremely close. Some thinkers have identified the two, while others regard Epistemology as a subdivision of logic; others demarcate their relative spheres by confining logic to the science of the laws of thought, *i.e.* to formal logic. An attempt has been made by some philosophers to substitute "Gnosiology" (Gr. *γνῶσις*) for "Epistemology" as a special term for that part of Epistemology which is confined to "systematic analysis of the conceptions employed by ordinary and scientific thought in interpreting the world, and including an investigation of the art of knowledge, or the nature of knowledge as such." "Epistemology" would thus be reserved for the broad questions of "the origin, nature and limits of knowledge" (Baldwin's *Dict. of Philos.* i. pp. 333 and 414). The term Gnosiology has not, however, come into general use. (See Philosophy.)

EPISTLE, in its primary sense any letter addressed to an absent person; from the Greek word *ἐπιστολή*, a thing sent on a particular occasion. Strictly speaking, any such communication is an epistle, but at the present day the term has become archaic, and is used only for letters of an ancient time, or for elaborate literary productions which take an epistolary form, that is to say, are, or affect to be, written to a person at a distance.

1. *Epistles and Letters.*—The student of literary history soon discovers that a broad distinction exists between the letter and the epistle. The letter is essentially a spontaneous, non-literary production, ephemeral, intimate, personal and private, a substitute for a spoken conversation. The epistle, on the other hand, rather takes the place of a public speech; it is written with an audience in view, it is a literary form, a distinctly artistic effort aiming at permanence; and it bears much the same relation to a letter as a Platonic dialogue does to a private talk between two friends. The posthumous value placed on a great man's letters would naturally lead to the production of epistles, which might be written to set forth the views of a person or a school, either genuinely or as forgeries under some eminent name. Pseudonymous epistles were especially numerous under the early Roman empire, and mainly attached themselves to the names of Plato, Demosthenes, Aristotle and Cicero.

Both letters and epistles have come down to us in considerable variety and extent from the ancient world. Babylonia and Assyria, Egypt, Greece and Rome alike contribute to our inheritance of letters. Those of Aristotle are of questionable genuineness, but we can rely, at any rate in part, on those of Isocrates and Epicurus. Some of the letters of Cicero are rather epistles, since they were meant ultimately for the general eye. The papyrus discoveries in Egypt have a peculiar interest, for they are mainly the letters of people unknown to fame, and having no thought of publicity. It is less to be wondered at that we have a large collection of ancient epistles, especially in the realm of magic and religion, for epistles were meant to live, were published in several copies, and were not a difficult form of literary effort. The Tell el-Amarna tablets found in Upper Egypt in 1887 are a series of despatches in cuneiform script from Babylonian kings and Phoenician and Palestinian governors to the Pharaohs (*c.* 1400 B.C.). The epistles of Dionysius of Halicarnassus, Plutarch, Seneca and the Younger Pliny claim mention at this point. In the later Roman period and into the middle ages, formal epistles were almost a distinct branch of literature. The ten books of Symmachus' *Epistolae*, so highly esteemed in the cultured circles of the 4th century, may be contrasted with the less elegant but more forceful epistles of Jerome.

The distinction between letters and epistles has particular interest for the student of early Christian literature. G. A. Deissmann (*Bible Studies*) assigns to the category of letters all the Pauline writings as well as 2 and 3 John. The books bearing the names of James, Peter and Jude, together with the Pastorals (though these may contain fragments of genuine Pauline letters) and the Apocalypse, he regards as epistles. The first epistle of John he calls less a letter or an epistle than a religious tract. It is doubtful, however, whether we can thus reduce all the letters of the New Testament to one or other of these categories; and W. M. Ramsay (Hastings' *Dict. Bib.* Extra vol. p. 401) has pointed out with some force that "in the new conditions a new category had been developed—the general letter addressed to a whole class of persons or to the entire Church of Christ." Such writings have affinities with both the letter and the epistle, and they may further be compared with the "edicts and rescripts by which Roman law grew, documents arising out of special circumstances but treating them on general principles." Most of the literature of the sub-apostolic age is epistolary, and we have a particularly interesting form of epistle in the communications between churches (as distinct from individuals) known as the *First Epistle of Clement* (Rome to Corinth), the *Martyrdom of Polycarp* (Smyrna to Philomelium), and the *Letters of the Churches of Vienne and Lyons* (to the congregations of Asia Minor and Phrygia) describing the Gallican martyrdoms of A.D. 177. In the following centuries we have the valuable epistles of Cyprian, of Gregory Nazianzen (to Cledonius on the Apollinarian controversy), of Basil (to be classed rather as letters), of Ambrose, Chrysostom, Augustine and Jerome. The encyclical letters of the Roman Catholic Church are epistles, even more so than bulls, which are usually more special in their destination. In the Renaissance one of the most common forms of literary production was that modelled upon Cicero's letters. From Petrarch to the *Epistolae obscurorum virorum* there is a whole epistolary literature. The *Epistolae obscurorum virorum* have to some extent a counterpart in the Epistles of Martin Marprelate. Later satires in an epistolary form are Pascal's *Provincial Letters*, Swift's *Drapier Letters*, and the *Letters of Junius*. The "open letter" of modern journalism is really an epistle. (A. J. G.)

2. *Epistles in Poetry.*—A branch of poetry bears the name of the Epistle, and is modelled on those pieces of Horace which are almost essays (*sermones*) on moral or philosophical subjects, and are chiefly distinguished from other poems by being addressed to particular patrons or friends. The epistle of Horace to his agent (or *villicus*) is of a more familiar order, and is at once a masterpiece and a model of what an epistle should be. Examples of the work in this direction of Ovid, Claudian, Ausonius and other late Latin poets have been preserved, but it is particularly those of Horace which have given this character to the epistles in verse which form so very characteristic a section of French poetry. The graceful precision and dignified familiarity of the epistle are particularly attractive to the temperament of France. Clement Marot, in the 16th century, first made the epistle popular in France, with his brief and spirited specimens. We pass the witty epistles of Scarron and Voiture, to reach those of Boileau, whose epistles, twelve in number, are the classic examples of this form of verse in French literature; they were composed at different dates between 1668 and 1695. In the 18th century Voltaire enjoyed a supremacy in this graceful and sparkling species of writing; the *Épître à Uranie* is perhaps the most famous of his verse-letters. Gresset, Bernis, Sedaine, Dorat, Gentil-Bernard, all excelled in the epistle. The curious "Épîtres" of J. P. G. Viennet (1777–1868) were not easy and mundane like their predecessors, but violently polemical. Viennet, a hot defender of lost causes, may be considered the latest of the epistolary poets of France.

In England the verse-epistle was first prominently employed by Samuel Daniel in his "Letter from Octavia to Marcus Antonius" (1599), and later on, more legitimately, in his "Certain Epistles" (1601–1603). His letter, in *terza rima*, to Lucy, Countess of Bristol, is one of the finest examples of this form in English literature. It was Daniel's deliberate intention to introduce the Epistle into English poetry, "after the manner of Horace." He was supported by Ben Jonson, who has some fine Horatian epistles in his *Forests* (1616) and his *Underwoods*. *Letters to Several Persons of Honour* form an important section in the poetry of John Donne. Habington's *Epistle to a Friend* is one of his most finished pieces. Henry Vaughan (1622–1695) addressed a fine epistle in verse to the French romance-writer Gombauld (1570–1666). Such "letters" were not unfrequent down to the Restoration, but they did not create a department of literature such as Daniel had proposed. At the close of the 17th century Dryden greatly excelled in this class of poetry, and his epistles to Congreve (1694) and to the duchess of Ormond (1700) are among the most graceful and eloquent that we possess. During the age of Anne various Augustan poets in whom the lyrical faculty was slight, from Congreve and Richard Duke down to Ambrose Philips and William Somerville, essayed the epistle with more or less success, and it was employed by Gay for several exercises in his elegant persiflage. Among the epistles of Gay, one rises to an eminence of merit, that called "Mr Pope's welcome from Greece," written in 1720. But the great writer of epistles in English is Pope himself, to whom the glory of this kind of verse belongs. His "Eloisa to Abelard" (1717) is carefully modelled on the form of Ovid's "Heroides," while in his *Moral Essays* he adopts the Horatian formula for the epistle. In either case his success was brilliant and complete. The "Epistle to Dr Arbuthnot" has not been surpassed, if it has been equalled, in Latin or French poetry of the same class. But Pope excelled, not only in the voluptuous and in the didactic epistle, but in that of compliment as well, and there is no more graceful example of this in literature than is afforded by the letter about the poems of Parnell addressed, in 1721, to Robert, earl of Oxford. After the day of Pope the epistle again fell into desuetude, or occasional use, in England. It revived in the charming naïveté of Cowper's lyrical letters in octosyllabics to his friends, such as William Bull and Lady Austin (1782). At the close of the century Samuel Rogers endeavoured to resuscitate the neglected form in his "Epistle to a Friend" (1798). The formality and conventional grace of the epistle were elements with which the leaders of romantic revival were out of sympathy, and it was not cultivated to any important degree in the 19th century. It is, however, to be noted that Shelley's "Letter to Maria Gisborne" (1820), Keats's "Epistle to Charles Clarke" (1816), and Landor's "To Julius Hare" (1836), in spite of their romantic colouring, are genuine Horatian epistles and of the pure Augustan type. This type, in English literature, is commonly, though not at all universally, cast in heroic verse. But Daniel employs *rime royal* and *terza rima*, while some modern epistles have been cast in short iambic rhymed measures or in blank verse. It is sometimes not easy to distinguish the epistle from the elegy and from the dedication. (E. G.)

For St Paul's Epistles see PAUL, for St Peter's see PETER, for Apocryphal Epistles see APOCRYPHAL LITERATURE, for Plato's see PLATO, &c.

EPISTYLE (Gr. *ἐπί*, upon, and *στῦλος*, column), the Greek architectural term for architrave, the lower member of the entablature of the classic orders (*q.v.*).

EPISTYLIS (C. G. Ehrenberg), in zoology, a genus of peritrichous Infusoria with a short oral disc and collar, and a rigid stalk, often branching to form a colony.

EPITAPH (Gr. ἐπιτάφιος, sc. λόγος, from ἐπί, upon, and τάφος, a tomb), strictly, an inscription upon a tomb, though by a natural extension of usage the name is applied to anything written ostensibly for that purpose whether actually inscribed upon a tomb or not. When the word was introduced into English in the 14th century it took the form *epitaphy*, as well as *epitaphe*, which latter word is used both by Gower and Lydgate. Many of the best-known epitaphs, both ancient and modern, are merely literary memorials, and find no place on sepulchral monuments. Sometimes the intention of the writer to have his production placed upon the grave of the person he has commemorated may have been frustrated, sometimes it may never have existed; what he has written is still entitled to be called an epitaph if it be suitable for the purpose, whether the purpose has been carried out or not. The most obvious external condition that suitability for mural inscription imposes is one of rigid limitation as to length. An epitaph cannot in the nature of things extend to the proportions that may be required in an elegy.

The desire to perpetuate the memory of the dead being natural to man, the practice of placing epitaphs upon their graves has been common among all nations and in all ages. And the similarity, amounting sometimes almost to identity, of thought and expression that often exists between epitaphs written more than two thousand years ago and epitaphs written only yesterday is as striking an evidence as literature affords of the close kinship of human nature under the most varying conditions where the same primary elemental feelings are stirred. The grief and hope of the Roman mother as expressed in the touching lines—

"Lagge fili bene quiescas;
Mater tua rogat te,
Ut me ad te recipias:
Vale!"

find their echo in similar inscriptions in many a modern cemetery.

Probably the earliest epitaphial inscriptions that have come down to us are those of the ancient Egyptians, written, as their mode of sepulture necessitated, upon the sarcophagi and coffins. Those that have been deciphered are all very much in the same form, commencing with a prayer to a deity, generally Osiris or Anubis, on behalf of the deceased, whose name, descent and office are usually specified. There is, however, no attempt to delineate individual character, and the feelings of the survivors are not expressed otherwise than in the fact of a prayer being offered. Ancient Greek epitaphs, unlike the Egyptian, are of great literary interest, deep and often tender in feeling, rich and varied in expression, and generally epigrammatic in form. They are written usually in elegiac verse, though many of the later epitaphs are in prose. Among the gems of the Greek anthology familiar to English readers through translations are the epitaphs upon those who had fallen in battle. There are several ascribed to Simonides on the heroes of Thermopylae, of which the most celebrated is the epigram—

"Go tell the Spartans, thou that passest by,
That here, obedient to their laws, we lie."

A hymn of Simonides on the same subject contains some lines of great beauty in praise of those who were buried at Thermopylae, and these may be regarded as forming a literary epitaph. In Sparta epitaphs were inscribed only upon the graves of those who had been especially distinguished in war; in Athens they were applied more indiscriminately. They generally contained the name, the descent, the demise, and some account of the life of the person commemorated. It must be remembered, however, that many of the so-called Greek epitaphs are merely literary memorials not intended for monumental inscription, and that in these freer scope is naturally given to general reflections, while less attention is paid to biographical details. Many of them, even some of the monumental, do not contain any personal name, as in the one ascribed to Plato—

"I am a shipwrecked sailor's tomb; a peasant's there doth stand:
Thus the same world of Hades lies beneath both sea and land."

Others again are so entirely of the nature of general reflections upon death that they contain no indication of the particular case that called them forth. It may be questioned, indeed, whether several of this character quoted in ordinary collections are epitaphs at all, in the sense of being intended for a particular occasion.

Roman epitaphs, in contrast to those of the Greeks, contained, as a rule, nothing beyond a record of facts. The inscriptions on the urns, of which numerous specimens are to be found in the British Museum, present but little variation. The letters D.M. or D.M.S. (*Diis Manibus* or *Diis Manibus Sacrum*) are followed by the name of the person whose ashes are enclosed, his age at death, and sometimes one or two other particulars. The inscription closes with the name of the person who caused the urn to be made, and his relationship to the deceased. It is a curious illustration of the survival of traces of an old faith after it has been formally discarded to find that the letters D.M. are not uncommon on the Christian inscriptions in the catacombs. It has been suggested that in this case they mean *Deo Maximo* and not *Diis Manibus*, but the explanation would be quite untenable, even if there were not many other undeniable instances of the survival of pagan superstitions in the thought and life of the early Christians. In these very catacomb inscriptions there are many illustrations to be found, apart from the use of the letters D.M., of the union of heathen with Christian sentiment, (see Maitland's *Church in the Catacombs*). The private burial-places for the ashes of the dead were usually by the side of the various roads leading into Rome, the Via Appia, the Via Flaminia, &c. The traveller to or from the city thus passed for miles an almost uninterrupted succession of tombstones, whose inscriptions usually began with the appropriate words *Siste Viator* or *Aspice Viator*, the origin doubtless of the "Stop Passenger," which still meets the eye in many parish churchyards of Britain. Another phrase of very common occurrence on ancient Roman tombstones, *Sit tibi terra levis* ("Light lie the earth upon thee"), has continued in frequent use, as conveying an appropriate sentiment, down to modern times. A remarkable feature of many of the Roman epitaphs was the terrible denunciation they often pronounced upon those who violated the sepulchre. Such denunciations were not uncommon in later times. A well-known instance is furnished in the lines on Shakespeare's tomb at Stratford-on-Avon, said to have been written by the poet himself—

"Good frend, for Jesus' sake forbeare
To digg the dust enclosed heare;
Bleste be y^e man y^t spares thes stones,
And curst be he y^t moves my bones."

The earliest existing British epitaphs belonged to the Roman period, and are written in Latin after the Roman form. Specimens are to be seen in various antiquarian museums throughout the country; some of the inscriptions are given in Bruce's *Roman Wall*, and the seventh volume of the *Corpus Inscriptionum Latinarum* edited by Hübner, containing the British inscriptions, is a valuable repertory for the earlier Roman epitaphs in Britain. The earliest, of course, are commemorative of soldiers, belonging to the legions of occupation, but the Roman form was afterwards adopted for native Britons. Long after the Roman form was discarded, the Latin language continued to be used, especially for inscriptions of a more public character, as being from its supposed permanence the most suitable medium of communication to distant ages. It is only, in fact, within recent years that Latin has become unusual, and the more natural practice has been adopted of writing the epitaphs of distinguished men in the language of the country in which they lived. While Latin was the chief if not the sole literary language, it was, as a matter of course, almost exclusively used for epitaphial inscriptions. The comparatively few English epitaphs that remain of the 11th and 12th centuries are all in Latin. They are generally confined to a mere statement of the name and rank of the deceased following the words "Hic jacet." Two noteworthy exceptions to this general brevity are, however, to be found in most of the collections. One is the epitaph to Gundrada, daughter of the Conqueror (d. 1085), which still exists at Lewes, though in an imperfect state, two of the lines having been lost; another is that to William de Warren, earl of Surrey (d. 1089), believed to have been inscribed in the abbey of St Pancras, near Lewes, founded by him. Both are encomiastic, and describe the character and work of the deceased with considerable fulness and beauty of expression. They are written in leonine verse. In the 13th century French began to be used in writing epitaphs, and most of the inscriptions to celebrated historical personages between 1200 and 1400 are in that language. Mention may be made of those to Robert, the 3rd earl of Oxford (d. 1221), as given in Weever, to Henry III. (d. 1272) at Westminster Abbey, and to Edward the Black Prince (d. 1376) at Canterbury. In most of the inscriptions of this period the deceased addresses the reader in the first person, describes his rank and position while alive, and, as in the case of the Black Prince, contrasts it with his wasted and loathsome state in the grave, and warns the reader to prepare for the same inevitable change. The epitaph almost invariably closes with a request, sometimes very urgently worded, for the prayers of the reader that the soul of the deceased may pass to glory, and an invocation of blessing, general or specific, upon all who comply. Epitaphs preserved much of the same character after English began to be used towards the close of the 14th century. The following, to a member of the Savile family at Thornhill, is probably even earlier, though its precise date cannot be fixed:—

> "Bonys emongg stonys lys ful
> steyl gwylste the sawle wan-
> deris were that God wylethe"—

that is, Bones among stones lie full still, whilst the soul wanders whither God willeth. It may be noted here that the majority of the inscriptions, Latin and English, from 1300 to the period of the Reformation, that have been preserved, are upon brasses (see BRASSES, MONUMENTAL). The very curious epitaph on St Bernard, probably written by a monk of Clairvaux, has the peculiarity of being a dialogue in Latin verse.

It was in the reign of Elizabeth that epitaphs in English began to assume a distinct literary character and value, entitling them to rank with those that had hitherto been composed in Latin. We learn from Nash that at the close of the 16th century it had become a trade to supply epitaphs in English verse. There is one on the dowager countess of Pembroke (d. 1621), remarkable for its successful use of a somewhat daring hyperbole. It was written by William Browne, author of *Britannia's Pastorals*:—

> "Underneath this sable hearse
> Lies the subject of all verse;
> Sydney's sister, Pembroke's mother;
> Death, ere thou hast slain another
> Fair and learn'd and good as she,
> Time will throw his dart at thee.
> Marble piles let no man raise
> To her name for after days;
> Some kind woman, born as she,
> Reading this, like Niobe,
> Shall turn marble, and become
> Both her mourner and her tomb."

If there be something of the exaggeration of a conceit in the second stanza, it needs scarcely to be pointed out that epitaphs, like every other form of composition, necessarily reflect the literary characteristics of the age in which they were written. The deprecation of marble as unnecessary suggests one of the finest literary epitaphs in the English language, that by Milton upon Shakespeare.

The epitaphs of Pope are still considered to possess very great literary merit, though they were rated higher by Johnson and critics of his period than they are now.

Dr Johnson, who thought so highly of Pope's epitaphs, was himself a great authority on both the theory and practice of this species of composition. His essay on epitaphs is one of the few existing monographs on the subject, and his opinion as to the use of Latin had great influence. The manner in which he met the delicately insinuated request of a number of eminent men that English should be employed in the case of Oliver Goldsmith was characteristic, and showed the strength of his conviction on the subject. His arguments in favour of Latin were chiefly drawn from its inherent fitness for epitaphial inscriptions and its classical stability. The first of these has a very considerable force, it being admitted on all hands that few languages are in themselves so suitable for the purpose, the second is outweighed by considerations that had considerable force in Dr Johnson's time, and have acquired more since. Even to the learned Latin is no longer the language of daily thought and life as it was at the period of the Reformation, and the great body of those who may fairly claim to be called the well-educated classes can only read it with difficulty, if at all. It seems, therefore, little less than absurd, for the sake of a stability which is itself in great part delusive, to write epitaphs in a language unintelligible to the vast majority of those for whose information presumably they are intended. Though a stickler for Latin, Dr Johnson wrote some very beautiful English epitaphs, as, for example, the following on Philips, a musician:—

> "Philips, whose touch harmonious could remove
> The pangs of guilty power or hapless love;
> Rest here, distressed by poverty no more,
> Here find that calm thou gav'st so oft before;
> Sleep undisturbed within this peaceful shrine
> Till angels wake thee with a note like thine!"

In classifying epitaphs various principles of division may be adopted. Arranged according to nationality they indicate distinctions of race less clearly perhaps than any other form of literature does,—and this obviously because when under the influence of the deepest feeling men think and speak very much in the same way whatever be their country. At the same time the influence of nationality may to some extent be traced in epitaphs. The characteristics of the French style, its grace, clearness, wit and epigrammatic point, are all recognizable in French epitaphs. In the 16th century those of Étienne Pasquier were universally admired. Instances such as "La première au rendez-vous," inscribed on the grave of a mother, Piron's epitaph, written for himself after his rejection by the French Academy—

> "Ci-gît Piron, qui ne fut rien,
> Pas même académicien"—

and one by a relieved husband, to be seen at Père la Chaise—

> "Ci-gît ma femme. Ah! qu'elle est bien
> Pour son repos et pour le mien"—

might be multiplied indefinitely. One can hardly look through a collection of English epitaphs without being struck with the fact that these represent a greater variety of intellectual and emotional states than those of any other nation, ranging through every style of thought from the sublime to the commonplace, every mood of feeling from the most delicate and touching to the coarse and even brutal. Few subordinate illustrations of the complex nature of the English nationality are more striking.

Epitaphs are sometimes classified according to their authorship and sometimes according to their subject, but neither division is so interesting as that which arranges them according to their characteristic features. What has just been said of English epitaphs is, of course, more true of epitaphs generally. They exemplify every variety of sentiment and taste, from lofty pathos and dignified eulogy to coarse buffoonery and the vilest scurrility. The extent to which the humorous and even the low comic element prevails among them is a noteworthy circumstance. It is curious that the most solemn of all subjects should have been frequently treated, intentionally or unintentionally, in a style so ludicrous that a collection of epitaphs is generally one of the most amusing books that can be picked up. In this as in other cases, too, it is to be observed that the unintended humour is generally of a much more entertaining kind than that which has been deliberately perpetrated.

See Weever, *Ancient Funerall Monuments* (1631, 1661, Tooke's edit., 1767); Philippe Labbe, *Thesaurus epitaphiorum* (Paris, 1666); *Theatrum funebre extructum a Dodone Richea seu Ottone Aicher* (1675); Hackett, *Select and Remarkable Epitaphs* (1757); de Laplace, *Épitaphes sérieuses, badines, satiriques et burlesques* (3 vols., Paris, 1782); Pulleyn, *Churchyard Gleanings* (c. 1830); L. Lewysohn, *Sechzig Epitaphien von Grabsteinen d. israelit Friedhofes zu Worms* (1855); Pettigrew, *Chronicles of the Tombs* (1857); S. Tissington, *Epitaphs* (1857); Robinson, *Epitaphs from Cemeteries in London, Edinburgh, &c.* (1859); le Blant, *Inscriptions chrétiennes de la Gaule antérieures au VIII^e siècle* (1856, 1865); Blommaert, Galliard, &c., *Inscriptions funéraires et monumentales de la prov. de Flandre Orient* (Ghent, 1857, 1860); *Inscriptions fun. et mon. de la prov. d'Anvers* (Antwerp, 1857–1860); Chwolson, *Achtzehn hebräische Grabschriften aus der Krim* (1859); J. Brown, *Epitaphs, &c., in Greyfriars Churchyard, Edinburgh* (1867); H. J. Loaring, *Quaint, Curious, and Elegant Epitaphs* (1872); J. R. Kippax, *Churchyard Literature, a Choice Collection of American Epitaphs* (Chicago, 1876); also the poet William Wordsworth's *Essay on Epitaphs*.

EPITHALAMIUM (Gr. ἐπί, at or upon, and *θάλαμος*, a nuptial chamber), originally among the Greeks a song in praise of bride and bridegroom, which was sung by a number of boys and girls at the door of the nuptial chamber. According to the scholiast on Theocritus, one form, the *κατακοιμητικόν*, was employed at night, and another, the *διεγερτικόν*, to arouse the bride and bridegroom on the following morning. In either case, as was natural, the main burden of the song consisted of invocations of blessing and predictions of happiness, interrupted from time to time by the ancient chorus of *Hymen hymenaee*. Among the Romans a similar custom was in vogue, but the song was sung by girls only, after the marriage guests had gone, and it contained much more of what modern morality would condemn as obscene. In the hands of the poets the epithalamium was developed into a special literary form, and received considerable cultivation. Sappho, Anacreon, Stesichorus and Pindar are all regarded as masters of the species, but the finest example preserved in Greek literature is the 18th Idyll of Theocritus, which celebrates the marriage of Menelaus and Helen. In Latin, the epithalamium, imitated from Fescennine Greek models, was a base form of literature, when Catullus redeemed it and gave it dignity by modelling his *Marriage of Thetis and Peleus* on a lost ode of Sappho. In later times Statius, Ausonius, Sidonius Apollinaris and Claudian are the authors of the best-known epithalamia in classical Latin; and they have been imitated by Buchanan, Scaliger, Sannazaro, and a whole host of modern Latin poets, with whom, indeed, the form was at one time in great favour. The names of Ronsard, Malherbe and Scarron are especially associated with the species in French literature, and Marini and Metastasio in Italian. Perhaps no poem of this class has been more universally admired than the *Epithalamium* of Spenser (1595), though he has found no unworthy rivals in Ben Jonson, Donne and Quarles. At the close of *In Memoriam* Tennyson has appended a poem, on the nuptials of his sister, which is strictly an epithalamium.

EPITHELIAL, ENDOTHELIAL and **GLANDULAR TISSUES**, in anatomy. Every surface of the body which may come into contact with foreign substances is covered with a protecting layer of cells closely bound to one another to form continuous sheets. These are epithelial cells (from θηλή, a nipple). By the formation of outgrowths or ingrowths from these surfaces further structures, consisting largely or entirely of cells directly derived from the surface epithelium, may be formed. In this way originate the central nervous system, the sensitive surfaces of the special sense organs, the glands, and the hairs, nails, &c. The epithelial cells possess typical microscopical characters which enable them to be readily distinguished from all others. Thus the cell outline is clearly marked, the nucleus large and spherical or ellipsoidal. The protoplasm of the cell is usually large in amount and often contains large numbers of granules.

Epithelium.

The individual cells forming an epithelial membrane are classified according to their shape. Thus we find *flattened*, or *squamous*, *cubical*, *columnar*, *irregular*, *ciliated* or *flagellated* cells. Many of the membranes formed by these cells are only one cell thick, as for instance is the case for the major part of the alimentary canal. In other instances the epithelial membrane may consist of a number of layers of cells, as in the case of the epidermis of the skin. Considering in the first place those membranes of which the cells are in a single layer we may distinguish the following:—

Varieties.

1. *Columnar Epithelium* (figs. 1 and 2).—This variety covers the main part of the intestinal tract, *i.e.* from the end of the oesophagus to the commencement of the rectum. It is also found lining the ducts of many glands. In a highly typical form it is found covering the villi of the small intestine (fig. 1). The external layer of the cell is commonly modified to form a thin membrane showing a number of very fine radially arranged lines, which are probably the expression of very minute tubular perforations through the membrane.

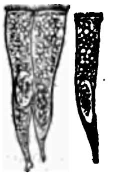
FIG. 1.—Isolated Epithelial Cells from the Small Intestine of the Frog.

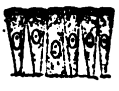
FIG. 2.—Columnar Epithelial Cells resting upon a Basement Membrane.

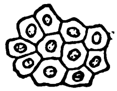
FIG. 3.—Mosaic appearance of a Columnar Epithelial Surface as seen from above.

The close apposition of these cells to form a closed membrane is well seen when a surface covered by them is examined from above (fig. 3). The surfaces of the cells are then seen to form a mosaic, each cell area having a polyhedral shape.

2. *Cubical Epithelium.*—This differs from the former in that the cells are less in height. It is found in many glands and ducts (*e.g.* the kidney), in the middle ear, choroid plexuses of the brain, &c.

3. *Squamous or Flattened Epithelium* (fig. 4).—In this variety the cell is flattened, very thin and irregular in outline. It occurs as the covering epithelium of the alveoli of the lung, of the kidney glomerules and capsule, &c. The surface epithelial cells of a stratified epithelium are also of this type (fig. 4). Closely resembling these cells are those known as endothelial (see later).

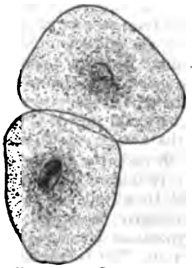
FIG. 4.—Squamous Epithelial Cells from the Mucous Membrane of the Mouth.

4. *Ciliated Epithelium* (fig. 5).—The surface cells of many epithelial membranes are often provided with a number of very fine protoplasmic processes or *cilia*. Most commonly the cells are columnar, but other shapes are also found. During life the cilia are always in movement, and set up a current tending to drive fluid or other material on the surface in one direction along the membrane or tube lined by such epithelium. It is found lining the trachea, bronchi, parts of the nasal cavities and the

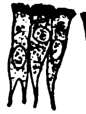
FIG. 5.—Isolated ciliated Epithelial Cells from the Trachea.

uterus, oviduct, vas deferens, epididymis, a portion of the renal tubule, &c.

In the instance of some cells there may be but a single process from the exposed surface of the cell, and then the process is usually of large size and length. It is then known as a *flagellum*. Such cells are common among the surface cells of many of the simple animal organisms.

When the cells of an epithelial surface are arranged several layers deep, we can again distinguish various types:—

1. *Stratified Epithelium* (figs. 6 and 7).—This is found in the epithelium of the skin and of many mucous membranes (mouth, oesophagus, rectum, conjunctiva, vagina, &c.). Here the surface cells are very much flattened (squamous epithelium), those of the middle layer are polyhedral and those of the lowest layer are cubical or columnar. This type of epithelium is found covering surfaces commonly exposed to friction. The surface may be dry as in the skin, or moist, *e.g.* the mouth. The surface cells are constantly being rubbed off, and are then replaced by new cells growing up from below. Hence the deepest layer, that nearest the blood supply, is a formative layer, and in successive stages from this we can trace the gradual transformation of these protoplasmic cells into scaly cells, which no longer show any sign of being alive. In the moist mucous surfaces the number of cells forming the epithelial layer is usually much smaller than in a dry stratified epithelium.

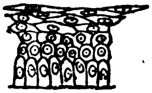
FIG. 6.—A Stratified Epithelium from a Mucous Membrane.

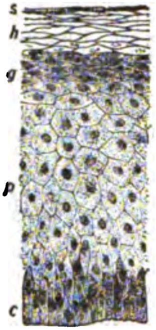

FIG. 7.—Stratified Epithelium from the Skin.
c, Columnar cells resting on the fibrous true skin.
p, The so-called prickle cells.
g, Stratum granulosum.
h, Horny cells.
s, Squamous horny cells.

2 *Stratified Ciliated Epithelium.*—In this variety the superficial cells are ciliated and columnar, between the bases of these are found fusiform cells and the lowest cells are cubical or pyramidal. This epithelium is found lining parts of the respiratory passages, the vas deferens and the epididymis.

3. *Transitional Epithelium* (fig. 8).—This variety of epithelium is found lining the bladder, and the appearance observed depends upon the contracted or distended state of the bladder from which the preparation was made. If the bladder was contracted the form seen in fig. 8 is obtained. The epithelium is in three or more layers, the superficial one being very characteristic. The cells are cubical and fit over the rounded ends of the cells of the next layer. These are pear-shaped, the points of the pear resting on the basement membrane. Between the bases of these cells lie those of the lowermost layer. These are irregularly columnar. If the bladder is distended before the preparation is made, the cells are then found stretched out transversely. This is especially the case with the surface cells, which may then become very flattened.

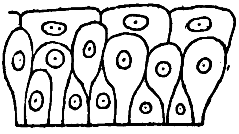
FIG. 8.—Transitional Epithelium from the Urinary Bladder, showing the outlines of the cells only.

Considering epithelium from the point of view of function, it may be classified as protective, absorptive or secretory. It may produce special outgrowths for protective or ornamental purposes, such are hairs, nails, horns, &c., and for such purposes it may manufacture within itself chemical material best suited for that purpose, *e.g.* keratin; here the whole cell becomes modified. In other instances may be seen in the interior of the cells many chemical substances which indicate the nature of their work, *e.g.* fat droplets, granules of various kinds, protein, mucin, watery granules, glycogen, &c. In a typical absorbing cell granules of material being absorbed may be seen. A secreting cell of normal type forming specific substances stores these in its interior until wanted, *e.g.* fat as in sebaceous and mammary glands, ferment precursors (salivary, gastric glands, &c.), and various excretory substances, as in the renal epithelium.

Initially the epithelium cell might have all these functions, but later came specialization and therefore to most cells a specific work. Some of that work does not require the cell to be at the surface, while for other work this is indispensable, and hence when the surface becomes limited those of the former category are removed from the surface to the deeper parts. This is seen typically in secretory and excretory cells, which usually lie below the surface on to which they pour their secretions. If the secretion required at any one point is considerable, then the secreting cells are numerous in proportion and a typical gland is formed. The secretion is then conducted to the surface by a duct, and this duct is also lined with epithelium.

Glands.

Glandular Tissues.—Every gland is formed by an ingrowth from an epithelial surface. This ingrowth may from the beginning possess a tubular structure, but in other instances may start as a solid column of cells which subsequently becomes tubulated. As growth proceeds, the column of cells may divide or give off offshoots, in which case a compound gland is formed. In many glands the number of branches is limited, in others (salivary, pancreas) a very large structure is finally formed by repeated growth and subdivision. As a rule the branches do not unite with one another, but in one instance, the liver, this does occur when a reticulated compound gland is produced. In compound glands the more typical or secretory epithelium is found forming the terminal portion of each branch, and the uniting portions form ducts and are lined with a less modified type of epithelial cell.

Glands are classified according to their shape. If the gland retains its shape as a tube throughout it is termed a *tubular* gland, simple tubular if there is no division (large intestine), *compound* tubular (fig. 9) if branching occurs (pyloric glands of stomach). In the simple tubular glands the gland may be coiled without losing its tubular form, *e.g.* in sweat glands. In the second main variety of gland the secretory portion is enlarged and the lumen variously increased in size. These are termed *alveolar* or *saccular* glands. They are again subdivided into simple or compound alveolar glands, as in the case of the tubular glands (fig. 10). A further complication in the case of the alveolar glands may occur in the form of still smaller saccular diverticuli growing out from the main sacculi (fig. 11). These are termed *alveoli*.

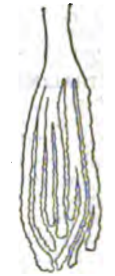
FIG. 9.—A Compound Tubular Gland. One of the pyloric glands of the stomach of the dog.

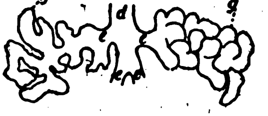

FIG. 10.—A Tubulo-alveolar Gland. One of the mucous salivary glands of the dog. On the left the alveoli are unfolded to show their general arrangement. *d*, Small duct of gland subdividing into branches; *e*, *f* and *g*, terminal tubular alveoli of gland.

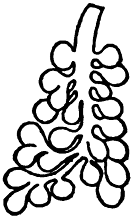
FIG. 11.—A Compound Alveolar Gland. One of the terminal lobules of the pancreas, showing the spherical form of the alveoli.

The typical secretory cells of the glands are found lining the terminal portions of the ramifications and extend upwards to varying degrees. Thus in a typical acinous gland the cells are restricted to the final alveoli. The remaining tubes are to be considered mainly as ducts. In tubulo-alveolar glands the secreting epithelium lines the alveus as well as the terminal tubule.

The gland cells are all placed upon a basement membrane. In many instances this membrane is formed of very thin flattened cells, in other instances it is apparently a homogeneous membrane and according to some observers is simply a modified part of the basal surface of the cell, while according to others it is a definite structure distinct from the epithelium.

In the secretory portion of the gland and in the smaller ducts the epithelial layer is one cell thick only. In the larger ducts there are two layers of cells, but even here the surface cell usually extends by a thinned-out stalk down to the basement membrane.

The detailed characters of the epithelium of the different glands of the body are given in separate articles (see ALIMENTARY CANAL, &c.). It will be sufficent here to give the more general characters possessed by these cells. They are cubical or conical cells with distinct oval nuclei and granular protoplasm. Within the protoplasm is accumulated a large number of spherical granules arranged in diverse manners in different cells. The granules vary much in size in different glands, and in chemical composition, but in all cases represent a store of material ready to be discharged from the cell as its secretion. Hence the general appearance of the cell is found to vary according to the previous degree of activity of the cell. If it has been at rest for some time the cell contains very many granules which swell it out and increase its size. The nucleus is then largely hidden by the granules. In the opposite condition, *i.e.* when the cell has been actively secreting, the protoplasm is much clearer, the nucleus obvious and the cell shrunken in size, all these changes being due to the extrusion of the granules.

Endothelium and mesothelium.

Endothelium and Mesothelium.—Lining the blood vessels, lymph vessels and lymph spaces are found flattened cells apposed to one another by their edges to form an extremely thin membrane. These cells are developed from the middle embryonic layer and are termed endothelium. A very similar type of cells is also found, formed into a very thin continuous sheet, lining the body-cavity, *i.e.* pleural pericardial and peritoneal cavities. These cells develop from that portion of the mesoderm known as the mesothelium, and are therefore frequently termed mesothelial, though by many they are also included as endothelial cells.

A mesothelial cell is very flattened, thus resembling a squamous epithelial cell. It possesses a protoplasm with faint granules and an oval or round nucleus (fig. 12). The outline of the cell is irregularly polyhedral, and the borders may be finely serrated. The cells are united to one another by an intercellular cement substance which, however, is very scanty in amount, but can be made apparent by staining with silver nitrate when the appearance reproduced in the figure is seen. By being thus united together, the cells form a continuous layer. This layer is pierced by a number of small openings, known as stomata, which bring the cavity into direct communication with lymph spaces or vessels lying beneath the membrane. The stomata are surrounded by a special layer of cubical and granular cells. Through these stomata fluids and other materials present in the body-cavity can be removed into the lymph spaces.

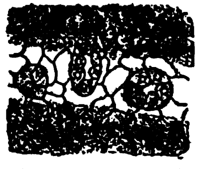

FIG. 12.—Mesothelial Cells forming the Peritoneal Serous Membrane. Three stomata are seen surrounded by cubical cells. One of these is closed. The light band marks the position of a lymphatic. (After Klein.)

Endothelial membranes (fig. 13) are quite similar in structure to mesothelial. They are usually elongated cells of irregular outline and serrated borders.

By means of endothelial or mesothelial membranes the surfaces of the parts covered by them are rendered very smooth, so that movement over the surface is greatly facilitated. Thus the abdominal organs can glide easily over one another within the peritoneal cavity; the blood or lymph experiences the least amount of friction; or again the friction is reduced to a minimum between a tendon and its sheath or in the joint cavities. The cells forming these membranes also possess further physiological properties. Thus it is most probable that they play an active part in the blood capillaries in transmitting substances from the blood into the tissue spaces, or conversely in preventing the passage of materials from blood to tissue space or from tissue space to blood. Hence the fluid of the blood and that of the tissue space need not be of the same chemical composition. (T. G. BR.)

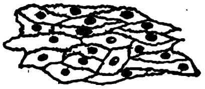

FIG. 13.—Endothelial Cells from the Interior of an Artery.

EPITOME (Gr. ἐπιτομή, from ἐπιτέμνειν, to cut short), an abridgment, abstract or summary giving the salient points of a book, law case, &c., a short and concise account of any particular subject or event. By transference *epitome* is also used to express the representation of a larger thing, concrete or abstract, reproduced in miniature. Thus St Mark's was called by Ruskin the "epitome of Venice," as it embraces examples of all the periods of architecture from the 10th to the 19th centuries.

EPOCH (Gr. ἐποχή, holding in suspense, a pause, from ἐπέχειν, to hold up, to stop), a term for a stated period of time, and so used of a date accepted as the starting-point of an era or of a new period in chronology, such as the birth of Christ. It is hence transferred to a period which marks a great change, whether in the history of a country or a science, such as a great discovery or invention. Thus an event may be spoken of as "epoch-making." The word is also used, synonymously with "period," for any space of time marked by a distinctive condition or by a particular series of events.

In astronomy the word is used for a moment from which time is measured, or at which a definite position of a body or a definite relation of two bodies occurs. For example, the position of a body moving in an orbit cannot be determined unless its position at some given time is known. The given time is then the epoch; but the term is often applied to the mean longitude of the body at the given time.

EPODE, in verse, the third part in an ode, which followed the strophe and the antistrophe, and completed the movement; it was called ἐπῳδὸς περίοδος by the Greeks. At a certain moment the choirs, which had chanted to right of the altar or stage and then to left of it, combined and sang in unison, or permitted the coryphaeus to sing for them all, standing in the centre. When, with the appearance of Stesichorus and the evolution of choral lyric, a learned and artificial kind of poetry began to be cultivated in Greece, a new form, the εἶδος ἐπῳδικόν, or epode-song, came into existence. It consisted of a verse of trimeter iambic, followed by a dimeter iambic, and it is reported that, although the epode was carried to its highest perfection by Stesichorus, an earlier poet, Archilochus, was really the inventor of this form. The epode soon took a firm place in choral poetry, which it lost when that branch of literature declined. But it extended beyond the ode, and in the early dramatists we find numerous examples of monologues and dialogues framed on the epodical system. In Latin poetry the epode was cultivated, in conscious archaism, both as a part of the ode and as an independent branch of poetry. Of the former class, the epithalamia of Catullus, founded on an imitation of Pindar, present us with examples of strophe, antistrophe and epode; and it has been observed that the celebrated ode of Horace beginning *Quem virum aut heroa lyra vel acri*, possesses this triple character. But the word is now mainly familiar from an experiment of Horace in the second class, for he entitled his fifth book of odes *Epodon liber* or the Book of Epodes. He says in the course of these poems, that in composing them he was introducing a new form, at least in Latin literature, and that he was imitating the effect of the iambic distichs invented by Archilochus. Accordingly we find the first ten of these epodes composed in alternate verses of iambic trimeter and iambic dimeter, thus:—

> "At o Deorum quicquid in coelo regit
> Terras et humanum genus."

In the seven remaining epodes Horace has diversified the measures, while retaining the general character of the distich. This group of poems belongs in the main to the early youth of the poet, and displays a truculence and a controversial heat which are absent from his more mature writings. As he was imitating Archilochus in form, he believed himself justified, no doubt, in repeating the sarcastic violence of his fierce model. The curious thing is that these particular poems of Horace, which are really short lyrical satires, have appropriated almost exclusively the name of epodes, although they bear little enough resemblance to the genuine epode of early Greek literature.

EPONA, a goddess of horses, asses and mules, worshipped by the Romans, though of foreign, probably Gallic, origin. The majority of inscriptions and images bearing her name have been found in Gaul, Germany and the Danube countries; of the few that occur in Rome itself most were exhumed on the site of the barracks of the *equites singulares*, a foreign imperial bodyguard mainly recruited from the Batavians. Her name does not appear in Tertullian's list of the *indigetes di*, and Juvenal contrasts her worship unfavourably with the old Roman Numa ritual. Her cult does not appear to have been introduced before imperial times, when she is often called Augusta and invoked on behalf of the emperor and the imperial house. Her chief function, however, was to see that the beasts of burden were duly fed, and to protect them against accidents and malicious influence. In the countries in which the worship of Epona was said to have had its origin it was a common belief that certain beings were in the habit of casting a spell over stables during the night. The Romans used to place the image of the goddess, crowned with flowers on festive occasions, in a sort of shrine in the centre of the architrave of the stable. In art she is generally represented seated, with her hand on the head of the accompanying horse or animal.

See Tertullian, *Apol.* 16; Juvenal viii. 157; Prudentius, *Apoth.* 197; Apuleius, *Metam.* iii. 27; articles in Daremberg and Saglio's *Dict. des antiquités* and Pauly-Wissowa's *Realencyclopädie*.

EPONYMOUS, that which gives a name to anything (Gr. ἐπώνυμος, from ὄνομα, a name), a term especially applied to the mythical or semi-mythical personages, heroes, deities, &c. from whom a country or city took its name. Thus Pelops is the giver of the name to the Peloponnese. At Athens the chief archon of the year was known as the ἄρχων ἐπώνυμος, as the year was known by his name. There was a similar official in ancient Assyria. In ancient times, as in historical and modern cases, a country or a city has been named after a real personage, but in many cases the person has been invented to account for the name.

EPPING, a market town in the Epping parliamentary division of Essex, England, 17 m. N.N.E. from London by a branch of the Great Eastern railway. Pop. of urban district (1901), 3789. The town lies high and picturesquely, at the northern outskirts of Epping Forest. The modern church of St John the Baptist replaces the old parish church of All Saints in the village of Epping Upland 2 m. N.W. This is in part Norman. There is considerable trade in butter, cheese and sausages.

Epping Forest forms part of the ancient Waltham Forest, which covered the greater part of the county. All the "London Basin," within which the Forest lies, was densely wooded. The Forest became one of the commonable lands of Royal Chases or hunting-grounds. It was threatened with total disafforestation, when under the Epping Forest Act of 1871 a board of commissioners was appointed for the better management of the lands. The corporation of the city of London then acquired the freehold interest of waste land belonging to the lords of the manor, and finally secured 5559½ acres, magnificently timbered, to the use of the public for ever, the tract being declared open by Queen Victoria in 1882. The Ancient Court of Verderers was also revived, consisting of an hereditary lord warden together with four verderers elected by freeholders of the county. The present forest lies between the valleys of the Roding and the Lea, and extends southward from Epping to the vicinity of Woodford and Walthamstow, a distance of about 7 m. It is readily accessible from the villages on its outskirts, such as Woodford, Chingford and Loughton, which are served by branches of the Great Eastern railway. These are centres of residential districts, and, especially on public holidays in the summer, receive large numbers of visitors.

EPPS, the name of an English family, well known in commerce and medicine. In the second half of the 18th century they had been settled near Ashford, Kent, for some generations, claiming descent from an equerry of Charles II., but were reduced in circumstances, when JOHN EPPS rose to prosperity as a provision merchant in London, and restored the family fortunes. He had four sons, of whom JOHN EPPS (1805–1869), GEORGE NAPOLEON EPPS (1815–1874), and JAMES EPPS (1821–1907) were notable men of their day, the two former as prominent doctors who were ardent converts to homoeopathy, and James as a homoeopathic chemist and the founder of the great cocoa business associated with his name. Among Dr G. N. Epps's children were Dr Washington Epps, a well-known homoeopathist, Lady Alma-Tadema, and Mrs Edmund Gosse.

ÉPRÉMESNIL (ÉSPRÉMESNIL or ÉPRÉMÉNIL), **JEAN JACQUES DUVAL D'** (1745–1794), French magistrate and politician, was born in India on the 5th of December 1745 at Pondicherry, his father being a colleague of Dupleix. Returning to France in 1750 he was educated in Paris for the law, and became in 1775 *conseiller* in the parlement of Paris, where he soon distinguished himself by his zealous defence of its rights against the royal prerogative. He showed bitter enmity to Marie Antoinette in the matter of the diamond necklace, and on the 19th of November 1787 he was the spokesman of the parlement in demanding the convocation of the states-general. When the court retaliated by an edict depriving the parlement of its functions, Éprémesnil bribed the printers to supply him with a copy before its promulgation, and this he read to the assembled parlement. A royal officer was sent to the palais de justice to arrest Éprémesnil and his chief supporter Goislard de Montsabert, but the parlement (5th of May 1788) declared that they were all Éprémesnils, and the arrest was only effected on the next day on the voluntary surrender of the two members. After four months' imprisonment on the island of Ste Marguerite, Eprémesnil found himself a popular hero, and was returned to the states-general as deputy of the nobility of the outlying districts of Paris. But with the rapid advance towards revolution his views changed; in his *Réflexions impartiales* . . . (January 1789) he defended the monarchy, and he led the party among the nobility that refused to meet with the third estate until summoned to do so by royal command. In the Constituent Assembly he opposed every step towards the destruction of the monarchy. After a narrow escape from the fury of the Parisian populace in July 1792 he was imprisoned in the Abbaye, but was set at liberty before the September massacres. In September 1793, however, he was arrested at Le Havre, taken to Paris, and denounced to the Convention as an agent of Pitt. He was brought to trial before the revolutionary tribunal on the 21st of April 1794, and was guillotined the next day.

D'Éprémesnil's speeches were collected in a small volume in 1823. See also H. Carré, *Un Précurseur inconscient de la Révolution* (Paris, 1897).

EPSOM, a market town in the Epsom parliamentary division of Surrey, England, 14 m. S.W. by S, of London Bridge. Pop. of urban district (1901), 10,915. It is served by the London & South-Western and the London, Brighton & South Coast railways, and on the racecourse on the neighbouring Downs there is a station (Tattenham Corner) of the South-Eastern & Chatham railway. The principal building is the parish church of St Martin, a good example of modern Gothic, the interior of which contains some fine sculptures by Flaxman and Chantrey. Epsom (a contraction of Ebbisham, still the name of the manor) first came into notice when mineral springs were discovered there about 1618. For some time after their discovery the town enjoyed a wonderful degree of prosperity. After the Restoration it was often visited by Charles II., and when Queen Anne came to the throne, her husband, Prince George of Denmark, made it his frequent resort. Epsom gradually lost its celebrity as a spa, but the annual races held on its downs arrested the decay of the town. Races appear to have been established here as early as James I's residence at Nonsuch, but they did not assume a permanent character until 1730. The principal races—the Derby and Oaks—are named after one of the earls of Derby and his seat, the Oaks, which is in the neighbourhood. The latter race was established in 1779, and the former in the following year. The spring races are held on a Thursday and Friday towards the close of April; and the great Epsom meeting takes place on the Tuesday and three following days immediately before Whitsuntide,—the Derby on the Wednesday, and the Oaks on the Friday (see HORSE-RACING). The grand stand was erected in 1829, and subsequently enlarged; and there are numerous training stables in the vicinity. Close to the town are the extensive buildings of the Royal Medical Benevolent College, commonly called Epsom College, founded in 1855. Scholars on the foundation must be the sons of medical men, but in other respects the school is open. In the neighbourhood is the Durdans, a seat of the earl of Rosebery.

EPSOM SALTS, heptohydrated magnesium sulphate, $MgSO_4 \cdot 7H_2O$, the *magnesii sulphas* of pharmacy (Ger. *Bittersalz*). It occurs dissolved in sea water and in most mineral waters, especially in those at Epsom (from which place it takes its name), Seidlitz, Saidschutz and Pulina. It also occurs in nature in fibrous excrescences, constituting the mineral epsomite or hair-salt; and as compact masses (reichardite), as in the Stassfurt mines. It is also found associated with limestone, as in the Mammoth Caves, Kentucky, and with gypsum, as at Montmartre. Epsom salts crystallizes in the orthorhombic system, being isomorphous with the corresponding zinc and nickel sulphates, and also with magnesium chromate. Occasionally monoclinic crystals are obtained by crystallizing from a strong solution. It is used in the arts for weighting cotton fabrics, as a top-dressing for clover hay in agriculture, and in dyeing. In medicine it is frequently employed as a hydragogue purgative, specially valuable in febrile diseases, in congestion of the portal system, and in the obstinate constipation of painters' colic. In the last case it is combined with potassium iodide, the two salts being exceedingly effective in causing the elimination of lead from the system. It is also very useful as a supplement to mercury, which needs a saline aperient to complete its action. The salt should be given a few hours after the mercury, *e.g.* in the early morning, the mercury having been given at night. It possesses the advantage of exercising but little irritant effect upon the bowels. Its nauseous bitter taste may to some extent be concealed by acidifying the solution with dilute sulphuric acid, and in some cases where full doses have failed the repeated administration of small ones has proved effectual.

For the manufacture of Epsom salts and for other hydrated magnesium sulphates see MAGNESIUM.

EQUATION (from Lat. *aequatio*, *aequare*, to equalize), an expression or statement of the equality of two quantities. Mathematical equivalence is denoted by the sign =, a symbol invented by Robert Recorde (1510–1558), who considered that nothing could be more equal than two equal and parallel straight lines. An equation states an equality existing between two classes of quantities, distinguished as known and unknown; these correspond to the data of a problem and the thing sought. It is the purpose of the mathematician to state the unknowns separately in terms of the knowns; this is called solving the equation, and the values of the unknowns so obtained are called the roots or solutions. The unknowns are usually denoted by the terminal letters, ... x, y, z, of the alphabet, and the knowns are either actual numbers or are represented by the literals a, b, c, &c...., *i.e.* the introductory letters of the alphabet. Any number or literal which expresses what multiple of term occurs in an equation is called the coefficient of that term; and the term which does not contain an unknown is called the absolute term. The degree of an equation is equal to the greatest index of an unknown in the equation, or to the greatest sum of the indices of products of unknowns. If each term has the sum of its indices the same, the equation is said to be homogeneous. These definitions are exemplified in the equations:—

$$
\begin{aligned}
&(1)\quad ax^2+2bx+c=0,\\
&(2)\quad xy^2+4a^2x=8a^3,\\
&(3)\quad ax^2+2hxy+by^2=0.
\end{aligned}
$$

In (1) the unknown is x, and the knowns a, b, c; the coefficients of x^2 and x are a and $2b$; the absolute term is c, and the degree is 2. In (2) the unknowns are x and y, and the known a; the degree is 3, *i.e.* the sum of the indices in the term xy^2. (3) is a homogeneous equation of the second degree in x and y. Equations of the first degree are called *simple* or *linear*; of the second, *quadratic*; of the third, *cubic*; of the fourth, *biquadratic*; of the fifth, *quintic*, and so on. Of equations containing only one unknown the number of roots equals the degree of the equation; thus a simple equation has one root, a quadratic two, a cubic three, and so on. If one equation be given containing two unknowns, as for example $ax+by=c$ or $ax^2+by^2=c$, it is seen that there are an infinite number of roots, for we can give x, say, any value and then determine the corresponding value of y; such an equation is called *indeterminate*; of the examples chosen the first is a linear and the second a quadratic indeterminate equation. In general, an indeterminate equation results when the number of unknowns exceeds by unity the number of equations. If, on the other hand, we have two equations connecting two unknowns, it is possible to solve the equations separately for one unknown, and then if we equate these values we obtain an equation in one unknown, which is soluble if its degree does not exceed the fourth. By substituting these values the corresponding values of the other unknown are determined. Such equations are called *simultaneous*; and a simultaneous system is a series of equations equal in number to the number of unknowns. Such a system is not always soluble, for it may happen that one equation is implied by the others; when this occurs the system is called *porismatic* or *poristic*. An *identity* differs from an equation inasmuch as it cannot be solved, the terms mutually cancelling; for example, the expression $x^2-a^2=(x-a)(x+a)$ is an identity, for on reduction it gives $0=0$. It is usual to employ the sign $\equiv$ to express this relation.

An equation admits of description in two ways:—(1) It may be regarded purely as an algebraic expression, or (2) as a geometrical locus. In the first case there is obviously no limit to the number of unknowns and to the degree of the equation; and, consequently, this aspect is the most general. In the second case the number of unknowns is limited to three, corresponding to the three dimensions of space; the degree is unlimited as before. It must be noticed, however, that by the introduction of appropriate hyperspaces, *i.e.* of degree equal to the number of unknowns, any equation theoretically admits of geometrical visualization, in other words, every equation may be represented by a geometrical figure and every geometrical figure by an equation. Corresponding to these two aspects, there are two typical methods by which equations can be solved, viz. the algebraic and geometric. The former leads to exact results, or, by methods of approximation, to results correct to any required degree of accuracy. The latter can only yield approximate values: when theoretically exact constructions are available there is a source of error in the draughtsmanship, and when the constructions are only approximate, the accuracy of the results is more problematical. The geometric aspect, however, is of considerable value in discussing the theory of equations.

History.—There is little doubt that the earliest solutions of equations are given in the Rhind papyrus, a hieratic document written some 2000 years before our era. The problems solved were of an arithmetical nature, assuming such forms as "a mass and its $\frac{1}{7}$th makes 19." Calling the unknown mass x, we have given $x+\frac{1}{7}x=19$, which is a simple equation. Arithmetical problems also gave origin to equations involving two unknowns; the early Greeks were familiar with and solved simultaneous linear equations, but indeterminate equations, such, for instance, as the system given in the "cattle problem" of Archimedes, were not seriously studied until Diophantus solved many particular problems. Quadratic equations arose in the Greek investigations in the doctrine of proportion, and although they were presented and solved in a geometrical form, the methods employed have no relation to the generalized conception of algebraic geometry which represents a curve by an equation and vice versa. The simplest quadratic arose in the construction of a mean proportional (x) between two lines (a, b), or in the construction of a square equal to a given rectangle; for we have the proportion $a:x=x:b$; *i.e.* $x^2=ab$. A more general equation, viz. $x^2-ax+a^2=0$, is the algebraic equivalent of the problem to divide a line in medial section; this is solved in *Euclid*, ii. 11. It is possible that Diophantus was in possession of an algebraic solution of quadratics; he recognized, however, only one root, the interpretation of both being first effected by the Hindu Bhaskara. A simple cubic equation was presented in the problem of finding two mean proportionals, x, y, between two lines, one double the other. We have $a:x=x:y=y:2a$, which gives $x^2=ay$ and $xy=2a^2$; eliminating y we obtain $x^3=2a^3$, a simple cubic. The Greeks could not solve this equation, which also arose in the problems of duplicating a cube and trisecting an angle, by the ruler and compasses, but only by mechanical curves such as the cissoid, conchoid and quadratrix. Such solutions were much improved by the Arabs, who also solved both cubics and biquadratics by means of intersecting conics; at the same time, they developed methods, originated by Diophantus and improved by the Hindus, for finding approximate roots of numerical equations by algebraic processes. The algebraic solution of the general cubic and biquadratic was effected in the 16th century by S. Ferro, N. Tartaglia, H. Cardan and L. Ferrari (see ALGEBRA: *History*). Many fruitless attempts were made to solve algebraically the quintic equation until P. Ruffini and N. H. Abel proved the problem to be impossible; a solution involving elliptic functions has been given by C. Hermite and L. Kronecker, while F. Klein has given another solution.

In the geometric treatment of equations the Greeks and Arabs based their constructions upon certain empirically deduced properties of the curves and figures employed. Knowing various metrical relations, generally expressed as proportions, it was found possible to solve particular equations, but a general method was wanting. This lacuna was not filled until the 17th century, when Descartes discovered the general theory which explained the nature of such solutions, in particular those wherein conics were employed, and, in addition, established the most important facts that every equation represents a geometrical locus, and conversely. To represent equations containing two unknowns, x, y, he chose two axes of reference mutually perpendicular, and measured x along the horizontal axis and y along the vertical. Then by the methods described in the article GEOMETRY: *Analytical*, he showed that—(1) a linear equation represents a straight line, and (2) a quadratic represents a conic. If the equation be homogeneous or break up into factors, it represents a number of straight lines in the first case, and the loci corresponding to the factors in the second. The solution of simultaneous equations is easily seen to be the values of x, y corresponding to the intersections of the loci. It follows that there is only one value of x, y which satisfies two linear equations, since two lines intersect in one point only; two values which satisfy a linear and quadratic, since a line intersects a conic in two points; and four values which satisfy two quadratics, since two conics intersect in four points. It may happen that the curves do not actually intersect in the theoretical maximum number of points; the principle of continuity (see GEOMETRICAL CONTINUITY) shows us that in such cases some of the roots are imaginary. To represent equations involving three unknowns x, y, z, a third axis is introduced, the z-axis, perpendicular to the plane xy and passing through the intersection of the lines x, y. In this notation a linear equation represents a plane, and two linear simultaneous equations represent a line, *i.e.* the intersection of two planes; a quadratic equation represents a surface of the second degree. In order to graphically consider equations containing only one unknown, it is convenient to equate the terms to y; *i.e.* if the equation be $f(x)=0$, we take $y=f(x)$ and construct this curve on rectangular Cartesian co-ordinates by determining the values of y which correspond to chosen values of x, and describing a curve through the points so obtained. The intersections of the curve with the axis of x gives the real roots of the equation; imaginary roots are obviously not represented.

In this article we shall treat of: (1) Simultaneous equations, (2) indeterminate equations, (3) cubic equations, (4) biquadratic equations, (5) theory of equations. Simple, linear simultaneous and quadratic equations are treated in the article ALGEBRA; for differential equations see DIFFERENTIAL EQUATIONS.

I. *Simultaneous Equations.*

Simultaneous equations which involve the second and higher powers of the unknown may be impossible of solution. No general rules can be given, and the solution of any particular problem will largely depend upon the student's ingenuity. Here we shall only give a few typical examples.

1. *Equations which may be reduced to linear equations.—Ex.* To solve $x(x-a)=yz$, $y(y-b)=zx$, $z(z-c)=xy$. Multiply the equations by y, z and x respectively, and divide the sum by xyz; then

$$\frac{a}{z}+\frac{b}{x}+\frac{c}{y}=0 \quad . \quad . \quad . \quad . \quad (1)$$

Multiply by z, x and y, and divide the sum by xyz; then

$$\frac{a}{y}+\frac{b}{z}+\frac{c}{x}=0 \quad . \quad . \quad . \quad . \quad (2).$$

From (1) and (2) by cross multiplication we obtain

$$\frac{1}{y(b^2-ac)}=\frac{1}{z(c^2-ab)}=\frac{1}{x(a^2-bc)}=\frac{1}{\lambda}\text{ (suppose) } (3).$$

Substituting for x, y and z in $x(x-a)=yz$ we obtain

$$\frac{1}{\lambda}=\frac{3abc-(a^3+b^3+c^3)}{(a^2-bc)(b^2-ac)(c^2-ab)};$$

and therefore x, y and z are known from (3). The same artifice solves the equations $x^2-yz=a$, $y^2-xz=b$, $z^2-xy=c$.

2. *Equations which are homogeneous and of the same degree.*—These equations can be solved by substituting $y=mx$. We proceed to explain the method by an example.

Ex. To solve $3x^2+xy+y^2=15$, $31xy-3x^2-5y^2=45$. Substituting $y=mx$ in both these equations, and then dividing, we obtain $31m-3-5m^2=3(3+m+m^2)$ or $8m^2-28m+12=0$. The roots of this quadratic are $m=\frac{1}{2}$ or 3, and therefore $2y=x$, or $y=3x$.

Taking $2y=x$ and substituting in $3x^2+xy+y^2=0$, we obtain $y^2(12+2+1)=15$; $\therefore y^2=1$, which gives $y=\pm1$, $x=\pm2$. Taking the second value, $y=3x$, and substituting for y, we obtain $x^2(3+3+9)=15$; $\therefore x^2=1$, which gives $x=\pm1$, $y=\pm3$. Therefore the solutions are $x=\pm2$, $y=\pm1$ and $x=\pm1$, $y=\pm3$. Other artifices have to be adopted to solve other forms of simultaneous equations, for which the reader is referred to J. J. Milne, *Companion to Weekly Problem Papers.*

II. *Indeterminate Equations.*

1. When the number of unknown quantities exceeds the number of equations, the equations will admit of innumerable solutions, and are therefore said to be *indeterminate.* Thus if it be required to find two numbers such that their sum be 10, we have two unknown quantities x and y, and only one equation, viz. $x+y=10$, which may evidently be satisfied by innumerable different values of x and y, if fractional solutions be admitted. It is, however, usual, in such questions as this, to restrict values of the numbers sought to positive integers, and therefore, in this case, we can have only these nine solutions,

$$x=1,\ 2,\ 3,\ 4,\ 5,\ 6,\ 7,\ 8,\ 9;$$
$$y=9,\ 8,\ 7,\ 6,\ 5,\ 4,\ 3,\ 2,\ 1;$$

which indeed may be reduced to five; for the first four become the same as the last four, by simply changing x into y, and the contrary. This branch of analysis was extensively studied by Diophantus, and is sometimes termed the Diophantine Analysis.

2. Indeterminate problems are of different orders, according to the dimensions of the equation which is obtained after all the unknown quantities but two have been eliminated by means of the given equations. Those of the first order lead always to equations of the form

$$ax\pm by=\pm c,$$

where a, b, c denote given whole numbers, and x, y two numbers to be found, so that both may be integers. That this condition may be fulfilled, it is necessary that the coefficients a, b have no common divisor which is not also a divisor of c; for if $a=md$ and $b=me$, then $ax+by=mdx+mey=c$, and $dx+ey=c/m$; but d, e, x, y are supposed to be whole numbers, therefore c/m is a whole number; hence m must be a divisor of c.

Of the four forms expressed by the equation $ax\pm by=\pm c$, it is obvious that $ax+by=-c$ can have no positive integral solutions. Also $ax-by=-c$ is equivalent to $by-ax=c$, and so we have only to consider the forms $ax\pm by=c$. Before proceeding to the general solution of these equations we will give a numerical example.

To solve $2x+3y=25$ in positive integers. From the given equation we have $x=(25-3y)/2=12-y-(y-1)/2$. Now, since x must be a whole number, it follows that $(y-1)/2$ must be a whole number. Let us assume $(y-1)/2=s$, then $y=1+2s$; and $x=11-3s$, where s might be any whole number whatever, if there were no limitation as to the signs of x and y. But since these quantities are required to be positive, it is evident, from the value of y, that s must be either 0 or positive, and from the value of x, that it must be less than 4; hence s may have these four values, 0, 1, 2, 3.

$$\begin{array}{lllll} \text{If} & s=0, & s=1, & s=2, & s=3; \\ \text{Then} & \begin{cases} x=11, \\ y=1, \end{cases} & \begin{matrix} x=8, \\ y=3, \end{matrix} & \begin{matrix} x=5, \\ y=5, \end{matrix} & \begin{matrix} x=2, \\ y=7. \end{matrix} \end{array}$$

3. We shall now give the solution of the equation $ax-by=c$ in positive integers.

Convert a/b into a continued fraction, and let p/q be the convergent immediately preceding a/b, then $aq-bp=\pm 1$ (see CONTINUED FRACTION).

(α) If $aq-bp=1$, the given equation may be written

$$ax-by=c(aq-bp);$$
$$\therefore a(x-cq)=b(y-cp).$$

Since a and b are prime to one another, then $x-cq$ must be divisible by b and $y-cp$ by a; hence

$$(x-cq)/b=(y-cq)/a=t.$$

That is, $x=bt+cq$ and $y=at+cp$.

Positive integral solutions, unlimited in number, are obtained by giving t any positive integral value, and any negative integral value, so long as it is numerically less than the smaller of the quantities cq/b, cp/a; t may also be zero.

(β) If $aq-bp=-1$, we obtain $x=bt-cq$, $y=at-cp$, from which positive integral solutions, again unlimited in number, are obtained by giving t any positive integral value which exceeds the greater of the two quantities cq/b, cp/a.

If a or b is unity, a/b cannot be converted into a continued fraction with unit numerators, and the above method fails. In this case the solutions can be derived directly, for if b is unity, the equation may be written $y=ax-c$, and solutions are obtained by giving x positive integral values greater than c/a.

4. To solve $ax+by=c$ in positive integers. Converting a/b into a continued fraction and proceeding as before, we obtain, in the case of $aq-bp=1$,

$$x=cq-bt,\ y=at-cp.$$

Positive integral solutions are obtained by giving t positive integral values not less than cp/a and not greater than cq/b.

In this case the number of solutions is limited. If $aq-bp=-1$ we obtain the general solution $x=bt-cq$, $y=cp-at$, which is of the same form as in the preceding case. For the determination of the number of solutions the reader is referred to H. S. Hall and S. R. Knight's *Higher Algebra*, G. Chrystal's *Algebra*, and other text-books.

5. If an equation were proposed involving three unknown quantities, as $ax+by+cz=d$, by transposition we have $ax+by=d-cz$, and, putting $d-cz=c'$, $ax+by=c'$. From this last equation we may find values of x and y of this form,

$$x=mr+nc',\ y=mr+n'c',$$
$$\text{or } x=mr+n(d-cz),\ y=m'r+n'(d-cz);$$

where z and r may be taken at pleasure, except in so far as the values of x, y, z may be required to be all positive; for from such restriction the values of z and r may be confined within certain limits to be determined from the given equation. For more advanced treatment of linear indeterminate equations see COMBINATORIAL ANALYSIS.

6. We proceed to indeterminate problems of the second degree: limiting ourselves to the consideration of the formula $y^2=a+bx+cx^2$, where x is to be found, so that y may be a rational quantity. The possibility of rendering the proposed formula a square depends altogether upon the coefficients a, b, c; and there are four cases of the problem, the solution of each of which is connected with some peculiarity in its nature.

Case 1. Let a be a square number; then, putting g^2 for a, we have $y^2=g^2+bx+cx^2$. Suppose $\sqrt{(g^2+bx+cx^2)}=g+mx$; then $g^2+bx+cx^2=g^2+2gmx+m^2x^2$, or $bx+cx^2=2gmx+m^2x^2$, that is, $b+cx=2gm+m^2x$; hence

$$x=\frac{2gm-b}{c-m^2},\ y=\sqrt{(g^2+bx+cx^2)}=\frac{cg-bm+gm^2}{c-m^2}.$$

Case 2. Let c be a square number $=g^2$; then, putting $\sqrt{(a+bx+g^2x^2)}=m+gx$, we find $a+bx+g^2x^2=m^2+2mgx+g^2x^2$, or $a+bx=m^2+2mgx$; hence we find

$$x=\frac{m^2-a}{b-2mg},\ y=\sqrt{(a+bx+g^2x^2)}=\frac{bm-gm^2-ag}{b-2mg}.$$

Case 3. When neither a nor c is a square number, yet if the expression $a+bx+cx^2$ can be resolved into two simple factors, as $f+gx$ and $h+kx$, the irrationality may be taken away as follows:—

Assume $\sqrt{(a+bx+cx^2)}=\sqrt{\{(f+gx)\ (h+kx)\}}=m(f+gx)$, then $(f+gx)\ (h+kx)=m^2(f+gx)^2$, or $h+kx=m^2(f+gx)$; hence we find

$$x=\frac{fm^2-h}{k-gm^2},\ y=\sqrt{\{(f+gx)(h+kx)\}}=\frac{(fk-gh)m}{k-gm^2};$$

and in all these formulae m may be taken at pleasure.

Case 4. The expression $a+bx+cx^2$ may be transformed into a square as often as it can be resolved into two parts, one of which is a complete square, and the other a product of two simple factors; for then it has this form, p^2+qr, where p, q and r are quantities which contain no power of x higher than the first. Let us assume $\sqrt{(p^2+qr)}=p+mq$; thus we have $p^2+qr=p^2+2mpq+m^2q^2$ and $r=2mp+m^2q$, and as this equation involves only the first power of x, we may by proper reduction obtain from it rational values of x and y, as in the three foregoing cases.

The application of the preceding general methods of resolution to any particular case is very easy; we shall therefore conclude with a single example.

Ex. It is required to find two square numbers whose sum is a given square number.

Let a^2 be the given square number, and x^2, y^2 the numbers required; then, by the question, $x^2+y^2=a^2$, and $y=\sqrt{(a^2-x^2)}$. This equation is evidently of such a form as to be resolvable by the method employed in case 1. Accordingly, by comparing $\sqrt{(a^2-x^2)}$ with the general expression $\sqrt{(g^2+bx+cx^2)}$, we have $g=a$, $b=0$, $c=-1$, and substituting these values in the formulae, and also $-n$ for $+m$, we find

$$x=\frac{2an}{n^2+1},\ y=\frac{a(n^2-1)}{n^2+1}.$$

If $a=n^2+1$, there results $x=2n$, $y=n^2-1$, $a=n^2+1$. Hence if r be an even number, the three sides of a rational right-angled triangle are r, $(\tfrac{1}{2}r)^2-1$, $(\tfrac{1}{2}r)^2+1$. If r be an odd number, they become (dividing by 2) r, $\tfrac{1}{2}(r^2-1)$, $\tfrac{1}{2}(r^2+1)$.

For example, if $r=4$, 4, $4-1$, $4+1$, or 4, 3, 5, are the sides of a right-angled triangle; if $r=7$, 7, 24, 25 are the sides of a right-angled triangle.

III. *Cubic Equations.*

1. Cubic equations, like all equations above the first degree, are divided into two classes: they are said to be *pure* when they contain only one power of the unknown quantity; and *adfected* when they contain two or more powers of that quantity.

Pure cubic equations are therefore of the form $x^3=r$; and hence it appears that a value of the simple power of the unknown quantity may always be found without difficulty, by extracting the cube root of each side of the equation. Let us consider the equation $x^3-c^3=0$ more fully. This is decomposable into the factors $x-c=0$ and $x^2+cx+c^2=0$. The roots of this quadratic equation are $\tfrac{1}{2}(-1\pm\sqrt{-3})c$, and we see that the equation $x^3=c^3$ has three roots, namely, one real root c, and two imaginary roots $\tfrac{1}{2}(-1\pm\sqrt{-3})c$. By making c equal to unity, we observe that $\tfrac{1}{2}(-1\pm\sqrt{-3})$ are the imaginary cube roots of unity, which are generally denoted by ω and ω^2, for it is easy to show that $(\tfrac{1}{2}(-1-\sqrt{-3}))^2=\tfrac{1}{2}(-1+\sqrt{-3})$.

2. Let us now consider such cubic equations as have all their terms, and which are therefore of this form,

$$x^3+\mathrm{A}x^2+\mathrm{B}x+\mathrm{C}=0,$$

where A, B and C denote known quantities, either positive or negative.

This equation may be transformed into another in which the second term is wanting by the substitution $x=y-\mathrm{A}/3$. This transformation is a particular case of a general theorem. Let $x^n+\mathrm{A}x^{n-1}+Bx^{n-2}\ldots=0$. Substitute $x=y+h$; then $(y+h)^n+\mathrm{A}(y+h)^{n-1}\ldots=0$. Expand each term by the binomial theorem, and let us fix our attention on the coefficient of y^{n-1}. By this process we obtain $0=y^n+y^{n-1}(\mathrm{A}+nh)+$ terms involving lower powers of y.

Now h can have any value, and if we choose it so that $\mathrm{A}+nh=0$, then the second term of our derived equation vanishes.

Resuming, therefore, the equation $y^3+qy+r=0$, let us suppose $y=v+z$; we then have $y^3=v^3+z^3+3vz(v+z)=v^3+z^3+3vzy$, and the original equation becomes $v^3+z^3+(3vz+q)y+r=0$. Now v and z are any two quantities subject to the relation $y=v+z$, and if we suppose $3vz+q=0$, they are completely determined. This leads to $v^3+z^3+r=0$ and $3vz+q=0$. Therefore v^3 and z^3 are the roots of the quadratic $t^2+rt-q^3/27=0$. Therefore

$$v^3=-\tfrac{1}{2}r+\sqrt{(\tfrac{1}{27}q^3+\tfrac{1}{4}r^2)};\ z^3=-\tfrac{1}{2}r-\sqrt{(\tfrac{1}{27}q^3+\tfrac{1}{4}r^2)};$$
$$v=\sqrt[3]{\{-\tfrac{1}{2}r+\sqrt{(\tfrac{1}{27}q^3+\tfrac{1}{4}r^2)}\}};\ z=\sqrt[3]{\{-\tfrac{1}{2}r-\sqrt{(\tfrac{1}{27}q^3+\tfrac{1}{4}r^2)}\}};$$
$$\text{and } y=v+z=\sqrt[3]{\{-\tfrac{1}{2}r+\sqrt{(\tfrac{1}{27}q^3+\tfrac{1}{4}r^2)}\}}+\sqrt[3]{\{-\tfrac{1}{2}r-\sqrt{(\tfrac{1}{27}q^3+\tfrac{1}{4}r^2)}\}}.$$

Thus we have obtained a value of the unknown quantity y, in terms of the known quantities q and r; therefore the equation is resolved.

3. But this is only one of three values which y may have. Let us, for the sake of brevity, put

$$\mathrm{A}=-\tfrac{1}{2}r+\sqrt{(\tfrac{1}{27}q^3+\tfrac{1}{4}r^2)},\ \mathrm{B}=-\tfrac{1}{2}r-\sqrt{(\tfrac{1}{27}q^3+\tfrac{1}{4}r^2)},$$
$$\text{and put } \begin{cases} \alpha=\tfrac{1}{2}(-1+\sqrt{-3}), \\ \beta=\tfrac{1}{2}(-1-\sqrt{-3}). \end{cases}$$

Then, from what has been shown (§ 1), it is evident that v and z have each these three values,

$$v=\sqrt[3]{\mathrm{A}},\ v=\alpha\sqrt[3]{\mathrm{A}},\ v=\beta\sqrt[3]{\mathrm{A}};$$
$$z=\sqrt[3]{\mathrm{B}},\ z=\alpha\sqrt[3]{\mathrm{B}},\ z=\beta\sqrt[3]{\mathrm{B}}.$$

To determine the corresponding values of v and z, we must consider that $vz=-\tfrac{1}{3}q=\sqrt[3]{(\mathrm{AB})}$. Now if we observe that $\alpha\beta=1$, it will immediately appear that $v+z$ has these three values,

$$v+z=\sqrt[3]{\mathrm{A}}+\sqrt[3]{\mathrm{B}},$$
$$v+z=\alpha\sqrt[3]{\mathrm{A}}+\beta\sqrt[3]{\mathrm{B}},$$
$$v+z=\beta\sqrt[3]{\mathrm{A}}+\alpha\sqrt[3]{\mathrm{B}},$$

which are therefore the three values of y.

The first of these formulae is commonly known by the name of Cardan's rule (see ALGEBRA: *History*).

The formulae given above for the roots of a cubic equation may be put under a different form, better adapted to the purposes of arithmetical calculation, as follows:—Because $vz=-\frac{1}{3}q$, therefore $z=-\frac{1}{3}q\times 1/v=-\frac{1}{3}q/\sqrt[3]{A}$; hence $v+z=\sqrt[3]{A}-\frac{1}{3}q/\sqrt[3]{A}$: thus it appears that the three values of y may also be expressed thus:

$$y=\sqrt[3]{A}-\tfrac{1}{3}q/\sqrt[3]{A}$$
$$y=\alpha\sqrt[3]{A}-\tfrac{1}{3}q\beta/\sqrt[3]{A}$$
$$y=\beta\sqrt[3]{A}-\tfrac{1}{3}q\alpha/\sqrt[3]{A}.$$

See below, *Theory of Equations*, §§ 16 et seq.

IV. *Biquadratic Equations.*

1. When a biquadratic equation contains all its terms, it has this form,

$$x^4+Ax^3+Bx^2+Cx+D=0,$$

where A, B, C, D denote known quantities.

We shall first consider pure biquadratics, or such as contain only the first and last terms, and therefore are of this form, $x^4=b^4$. In this case it is evident that x may be readily had by two extractions of the square root; by the first we find $x^2=b^2$, and by the second $x=b$. This, however, is only one of the values which x may have; for since $x^4=b^4$, therefore $x^4-b^4=0$; but x^4-b^4 may be resolved into two factors x^2-b^2 and x^2+b^2, each of which admits of a similar resolution; for $x^2-b^2=(x-b)(x+b)$ and $x^2+b^2=(x-b\sqrt{-1})(x+b\sqrt{-1})$. Hence it appears that the equation $x^4-b^4=0$ may also be expressed thus,

$$(x-b)(x+b)(x-b\sqrt{-1})(x+b\sqrt{-1})=0;$$

so that x may have these four values,

$$+b,\qquad -b,\qquad +b\sqrt{-1},\qquad -b\sqrt{-1},$$

two of which are real, and the others imaginary.

2. Next to pure biquadratic equations, in respect of easiness of resolution, are such as want the second and fourth terms, and therefore have this form,

$$x^4+qx^2+s=0.$$

These may be resolved in the manner of quadratic equations; for if we put $y=x^2$, we have

$$y^2+qy+s=0,$$

from which we find $y=\frac{1}{2}\{-q\pm\sqrt{(q^2-4s)}\}$, and therefore

$$x=\pm\sqrt{\tfrac{1}{2}\{-q\pm\sqrt{(q^2-4s)}\}}.$$

3. When a biquadratic equation has all its terms, its resolution may be always reduced to that of a cubic equation. There are various methods by which such a reduction may be effected. The following was first given by Leonhard Euler in the *Petersburg Commentaries*, and afterwards explained more fully in his *Elements of Algebra*.

We have already explained how an equation which is complete in its terms may be transformed into another of the same degree, but which wants the second term; therefore any biquadratic equation may be reduced to this form,

$$y^4+py^2+qy+r=0,$$

where the second term is wanting, and where p, q, r denote any known quantities whatever.

That we may form an equation similar to the above, let us assume $y=\sqrt{a}+\sqrt{b}+\sqrt{c}$, and also suppose that the letters a, b, c denote the roots of the cubic equation

$$z^3+Pz^2+Qz-R=0;$$

then, from the theory of equations we have

$$a+b+c=-P,\qquad ab+ac+bc=Q,\qquad abc=R.$$

We square the assumed formula

$$y=\sqrt{a}+\sqrt{b}+\sqrt{c},$$

and obtain $\quad y^2=a+b+c+2(\sqrt{ab}+\sqrt{ac}+\sqrt{bc});$

or, substituting $-P$ for $a+b+c$, and transposing,

$$y^2+P=2(\sqrt{ab}+\sqrt{ac}+\sqrt{bc}).$$

Let this equation be also squared, and we have

$$y^4+2Py^2+P^2=4(ab+ac+bc)+8(\sqrt{a^2bc}+\sqrt{ab^2c}+\sqrt{abc^2});$$

and since $\quad ab+ac+bc=Q,$

and $\quad \sqrt{a^2bc}+\sqrt{ab^2c}+\sqrt{abc^2}=\sqrt{abc}(\sqrt{a}+\sqrt{b}+\sqrt{c})=\sqrt{R}.y,$

the same equation may be expressed thus:

$$y^4+2Py^2+P^2=4Q+8\sqrt{R}.y.$$

Thus we have the biquadratic equation

$$y^4+2Py^2-8\sqrt{R}.y+P^2-4Q=0,$$

one of the roots of which is $y=\sqrt{a}+\sqrt{b}+\sqrt{c}$, while a, b, c are the roots of the cubic equation $z^3+Pz^2+Qz-R=0$.

4. In order to apply this resolution to the proposed equation $y^4+py^2+qy+r=0$, we must express the assumed coefficients P, Q, R by means of p, q, r, the coefficients of that equation. For this purpose let us compare the equations

$$y^4+py^2+qy+r=0,$$
$$y^4+2Py^2-8\sqrt{R}y+P^2-4Q=0,$$

and it immediately appears that

$$2P=p\qquad -8\sqrt{R}=q,\qquad P^2-4Q=r;$$

and from these equations we find

$$P=\tfrac{1}{2}p,\quad Q=\tfrac{1}{16}(p^2-4r),\quad R=\tfrac{1}{64}q^2.$$

Hence it follows that the roots of the proposed equation are generally expressed by the formula

$$y=\sqrt{a}+\sqrt{b}+\sqrt{c};$$

where a, b, c denote the roots of this cubic equation,

$$z^3+\frac{p}{2}z^2+\frac{p^2-4r}{16}z-\frac{q^2}{64}=0.$$

But to find each particular root, we must consider, that as the square root of a number may be either positive or negative, so each of the quantities $\sqrt{a}$, $\sqrt{b}$, $\sqrt{c}$ may have either the sign + or − prefixed to it; and hence our formula will give eight different expressions for the root. It is, however, to be observed, that as the product of the three quantities $\sqrt{a}$, $\sqrt{b}$, $\sqrt{c}$ must be equal to $\sqrt{R}$ or to $-\frac{1}{8}q$; when q is positive, their product must be a negative quantity, and this can only be effected by making either one or three of them negative; again, when q is negative, their product must be a positive quantity; so that in this case they must either be all positive, or two of them must be negative. These considerations enable us to determine that four of the eight expressions for the root belong to the case in which q is positive, and the other four to that in which it is negative.

5. We shall now give the result of the preceding investigation in the form of a practical rule; and as the coefficients of the cubic equation which has been found involve fractions, we shall transform it into another, in which the coefficients are integers, by supposing $z=\frac{1}{4}v$. Thus the equation

$$z^3+\frac{p}{2}z^2+\frac{p^2-4r}{16}z-\frac{q^2}{64}=0$$

becomes, after reduction,

$$v^3+2pv^2+(p^2-4r)v-q^2=0;$$

it also follows, that if the roots of the latter equation are a, b, c, the roots of the former are $\frac{1}{4}a$, $\frac{1}{4}b$, $\frac{1}{4}c$, so that our rule may now be expressed thus:

Let $y^4+py^2+qy+r=0$ be any biquadratic equation wanting its second term. Form this cubic equation

$$v^3+2pv^2+(p^2-4r)v-q^2=0,$$

and find its roots, which let us denote by a, b, c.

Then the roots of the proposed biquadratic equation are,

when q is negative,	when q is positive,
$y=\frac{1}{2}(\sqrt{a}+\sqrt{b}+\sqrt{c})$,	$y=\frac{1}{2}(-\sqrt{a}-\sqrt{b}-\sqrt{c})$,
$y=\frac{1}{2}(\sqrt{a}-\sqrt{b}-\sqrt{c})$,	$y=\frac{1}{2}(-\sqrt{a}+\sqrt{b}+\sqrt{c})$,
$y=\frac{1}{2}(-\sqrt{a}+\sqrt{b}-\sqrt{c})$,	$y=\frac{1}{2}(\sqrt{a}-\sqrt{b}+\sqrt{c})$,
$y=\frac{1}{2}(-\sqrt{a}-\sqrt{b}+\sqrt{c})$.	$y=\frac{1}{2}(\sqrt{a}+\sqrt{b}-\sqrt{c})$.

See also below, *Theory of Equations*, § 17 et seq. (X.)

V. *Theory of Equations.*

1. In the subject "Theory of Equations" the term *equation* is used to denote an equation of the form $x^n-p_1x^{n-1}\ldots\pm p_n=0$, where $p_1, p_2\ldots p_n$ are regarded as known, and x as a quantity to be determined; for shortness the equation is written $f(x)=0$.

The equation may be *numerical*; that is, the coefficients $p_1, p_2, \ldots p_n$ are then numbers—understanding by number a quantity of the form $\alpha+\beta i$ (α and β having any positive or negative real values whatever, or say each of these is regarded as susceptible of continuous variation from an indefinitely large negative to an indefinitely large positive value), and i denoting $\sqrt{-1}$.

Or the equation may be *algebraical*; that is, the coefficients are not then restricted to denote, or are not explicitly considered as denoting, numbers.

1. We consider first numerical equations. (Real theory, 2-6; Imaginary theory, 7-10.)

Real Theory.

2. Postponing all consideration of imaginaries, we take in the first instance the coefficients to be real, and attend only to the real roots (if any); that is, $p_1, p_2, \ldots p_n$ are real positive or negative quantities, and a root a, if it exists, is a positive or negative quantity such that $a^n-p_1a^{n-1}\ldots\pm p_n=0$, or say, $f(a)=0$.

It is very useful to consider the curve $y=f(x)$,—or, what would come to the same, the curve $Ay=f(x)$,—but it is better to retain the first-mentioned form of equation, drawing, if need be, the ordinate y on a reduced scale. For instance, if the given equation be $x^3-6x^2+11x-6{\cdot}06=0$,[1] then the curve

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[1] The coefficients were selected so that the roots might be nearly 1, 2, 3.

$y=x^3-6x^2+11x-6{\cdot}06$ is as shown in fig. 1, without any reduction of scale for the ordinate.

It is clear that, in general, y is a continuous one-valued function of x, finite for every finite value of x, but becoming infinite when x is infinite; *i.e.*, assuming throughout that the coefficient of x^n is $+1$, then when $x=\infty$, $y=+\infty$; but when $x=-\infty$, then $y=+\infty$ or $-\infty$, according as n is even or odd; the curve cuts any line whatever, and in particular it cuts the axis (of x) in at most n points; and the value of x, at any point of intersection with the axis, is a root of the equation $f(x)=0$.

If β, α are any two values of x ($\alpha>\beta$, that is, α nearer $+\infty$), then if $f(\beta)$, $f(\alpha)$ have opposite signs, the curve cuts the axis an odd number of times, and therefore at least once, between the points $x=\beta$, $x=\alpha$; but if $f(\beta)$, $f(\alpha)$ have the same sign, then between these points the curve cuts the axis an even number of times, or it may be not at all. That is, $f(\beta)$, $f(\alpha)$ having opposite signs, there are between the limits β, α an odd number of real roots, and therefore at least one real root; but $f(\beta)$, $f(\alpha)$ having the same sign, there are between these limits an even number of real roots, or it may be there is no real root. In particular, by giving to β, α the values $-\infty$, $+\infty$ (or, what is the same thing, any two values sufficiently near to these values respectively) it appears that an equation of an odd order has always an odd number of real roots, and therefore at least one real root; but that an equation of an even order has an even number of real roots, or it may be no real root.

If α be such that for $x=$ or $>\alpha$ (that is, x nearer to $+\infty$) $f(x)$ is always $+$, and β be such that for $x=$or $<\beta$ (that is, x nearer to $-\infty$) $f(x)$ is always $-$, then the real roots (if any) lie between these limits $x=\beta$, $x=\alpha$; and it is easy to find by trial such two limits including between them all the real roots (if any).

3. Suppose that the positive value δ is an inferior limit to the difference between two real roots of the equation; or rather (since the foregoing expression would imply the existence of real roots) suppose that there are not two real roots such that their difference taken positively is $=$ or $<\delta$; then, γ being any value whatever, there is clearly at most one real root between the limits γ and $\gamma+\delta$; and by what precedes there is such real root or there is not such real root, according as $f(\gamma)$, $f(\gamma+\delta)$ have opposite signs or have the same sign. And by dividing in this manner the interval β to α into intervals each of which is $=$ or $<\delta$, we should not only ascertain the number of the real roots (if any), but we should also *separate* the real roots, that is, find for each of them limits γ, $\gamma+\delta$ between which there lies this one, and only this one, real root.

In particular cases it is frequently possible to ascertain the number of the real roots, and to effect their separation by trial or otherwise, without much difficulty; but the foregoing was the general process as employed by Joseph Louis Lagrange even in the second edition (1808) of the *Traité de la résolution des équations numériques*;[1] the determination of the limit δ had to be effected by means of the "equation of differences" or equation of the order $\tfrac{1}{2}n(n-1)$, the roots of which are the squares of the differences of the roots of the given equation, and the process is a cumbrous and unsatisfactory one.

4. The great step was effected by the theorem of J. C. F. Sturm (1835)—viz. here starting from the function $f(x)$, and its first derived function $f'(x)$, we have (by a process which is a slight modification of that for obtaining the greatest common measure of these two functions) to form a series of functions

$$f(x), f'(x), f_2(x)\ \ldots\ f_n(x)$$

of the degrees n, $n-1$, $n-2$ . . . 0 respectively,—the last term $f_n(x)$ being thus an absolute constant. These lead to the immediate determination of the number of real roots (if any) between any two given limits β, α; viz. supposing $\alpha>\beta$ (that is, α nearer to $+\infty$), then substituting successively these two values in the series of functions, and attending only to the signs of the resulting values, the number of the changes of sign lost in passing from β to α is the required number of real roots between the two limits. In particular, taking β, $\alpha=-\infty$, $+\infty$ respectively, the signs of the several functions depend merely on the signs of the terms which contain the highest powers of x, and are seen by inspection, and the theorem thus gives at once the whole number of real roots.

And although theoretically, in order to complete by a finite number of operations the separation of the real roots, we still need to know the value of the before-mentioned limit δ; yet in any given case the separation may be effected by a limited number of repetitions of the process. The practical difficulty is when two or more roots are very near to each other. Suppose, for instance, that the theorem shows that there are two roots between 0 and 10; by giving to x the values 1, 2, 3, . . . successively, it might appear that the two roots were between 5 and 6; then again that they were between 5·3 and 5·4, then between 5·34 and 5·35, and so on until we arrive at a separation; say it appears that between 5·346 and 5·347 there is one root, and between 5·348 and 5·349 the other root. But in the case in question δ would have a very small value, such as ·002, and even supposing this value known, the direct application of the first-mentioned process would be still more laborious.

5. Supposing the separation once effected, the determination of the single real root which lies between the two given limits may be effected to any required degree of approximation either by the processes of W. G. Horner and Lagrange (which are in principle a carrying out of the method of Sturm's theorem), or by the process of Sir Isaac Newton, as perfected by Joseph Fourier (which requires to be separately considered).

First as to Horner and Lagrange. We know that between the limits β, α there lies one, and only one, real root of the equation; $f(\beta)$ and $f(\alpha)$ have therefore opposite signs. Suppose any intermediate value is θ; in order to determine by Sturm's theorem whether the root lies between β, θ, or between θ, α, it would be quite unnecessary to calculate the signs of $f(\theta)$, $f'(\theta)$, $f_2(\theta)$ . . .; only the sign of $f(\theta)$ is required; for, if this has the same sign as $f(\beta)$, then the root is between β, θ; if the same sign as $f(\alpha)$, then the root is between θ, α. We want to make θ increase from the inferior limit β, at which $f(\theta)$ has the sign of $f(\beta)$, so long as $f(\theta)$ retains this sign, and then to a value for which it assumes the opposite sign; we have thus two nearer limits of the required root, and the process may be repeated indefinitely.

Horner's method (1819) gives the root as a decimal, figure by figure; thus if the equation be known to have one real root between 0 and 10, it is in effect shown say that 5 is too small (that is, the root is between 5 and 6); next that 5·4 is too small (that is, the root is between 5·4 and 5·5); and so on to any number of decimals. Each figure is obtained, *not* by the successive trial of all the figures which precede it, but (as in the ordinary process of the extraction of a square root, which is in fact Horner's process applied to this particular case) it is given presumptively as the first figure of a quotient; such value may be too large, and then the next inferior integer must be tried instead of it, or it may require to be further diminished. And it is to be remarked that the process not only gives the approximate value α of the root, but (as in the extraction of a square root) it includes the calculation of the function $f(\alpha)$, which should be, and approximately is, $=0$. The arrangement of the calculations is very elegant, and forms an integral part of the actual method. It is to be observed that after a certain number of decimal places have been obtained, a good many more can be found by a mere division. It is in the progress tacitly assumed that the roots have been first separated.

Lagrange's method (1767) gives the root as a continued fraction $a+\frac{1}{b+}\frac{1}{c+}\cdots$, where a is a positive or negative integer (which may be $=0$), but b, c, . . . are positive integers. Suppose the roots have been separated; then (by trial if need be of consecutive integer values) the limits may be made to be consecutive integer numbers: say they are a, $a+1$; the value of x is therefore $=a+1/y$, where y is positive and greater than 1; from the given equation for x, writing therein $x=a+1/y$, we form an equation of the same order for y, and this equation will have one, and only one, positive root greater than 1; hence finding for it the limits b, $b+1$ (where b is $=$ or >1), we have $y=b+1/z$, where z is positive and greater than 1; and so on—that is, we thus obtain the successive denominators b, c, d . . . of the continued fraction. The method is theoretically very elegant, but the disadvantage is that it gives the result in the form of a continued fraction, which for the most part must ultimately be converted into a decimal. There is one advantage in the method, that a commensurable root (that is, a root equal to a rational fraction) is found accurately, since, when such root exists, the continued fraction terminates.

6. Newton's method (1711), as perfected by Fourier (1831), may be

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[1] The third edition (1826) is a reproduction of that of 1808; the first edition has the date 1798, but a large part of the contents is taken from memoirs of 1767–1768 and 1770–1771.

roughly stated as follows. If $x=\gamma$ be an approximate value of any root, and $\gamma+h$ the correct value, then $f(\gamma+h)=0$, that is,

$$f(\gamma)+\frac{h}{1}f'(\gamma)+\frac{h^2}{1\cdot 2}f''(\gamma)+\ldots=0;$$

and then, if h be so small that the terms after the second may be neglected, $f(\gamma)+hf'(\gamma)=0$, that is, $h=-f(\gamma)/f'(\gamma)$, or the new approximate value is $x=\gamma-f(\gamma)/f'(\gamma)$; and so on, as often as we please. It will be observed that so far nothing has been assumed as to the separation of the roots, or even as to the existence of a real root; γ has been taken as the approximate value of a root, but no precise meaning has been attached to this expression. The question arises, What are the conditions to be satisfied by γ in order that the process may by successive repetitions actually lead to a certain real root of the equation; or that, γ being an approximate value of a certain real root, the new value $\gamma-f(\gamma)/f'(\gamma)$ may be a more approximate value.

Referring to fig. 1, it is easy to see that if OC represent the assumed value γ, then, drawing the ordinate CP to meet the curve in P, and the tangent PC′ to meet the axis in C′, we shall have OC′ as the new approximate value of the root. But observe that there is here a real root OX, and that the curve beyond X is convex to the axis; under these conditions the point C′ is nearer to X than was C; and, starting with C′ instead of C, and proceeding in like manner to draw a new ordinate and tangent, and so on as often as we please, we approximate continually, and that with great rapidity, to the true value OX. But if C had been taken on the other side of X, where the curve is concave to the axis, the new point C′ might or might not be nearer to X than was the point C; and in this case the method, if it succeeds at all, does so by accident only, *i.e.* it may happen that C′ or some subsequent point comes to be a point C, such that CO is a *proper* approximate value of the root, and then the subsequent approximations proceed in the same manner as if this value had been assumed in the first instance, all the preceding work being wasted.

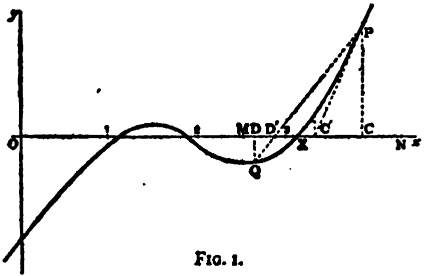

FIG. 1.

It thus appears that for the proper application of the method we require *more* than the mere separation of the roots. In order to be able to approximate to a certain root a, $=$OX, we require to know that, between OX and some value ON, the curve is always convex to the axis (analytically, between the two values, $f(x)$ and $f''(x)$ must have always the same sign). When this is so, the point C may be taken anywhere on the proper side of X, and within the portion XN of the axis; and the process is then the one already explained. The approximation is in general a very rapid one. If we know for the required root OX the two limits OM, ON such that from M to X the curve is always *concave* to the axis, while from X to N it is always convex to the axis,—then, taking D anywhere in the portion MX and (as before) C in the portion XN, drawing the ordinates DQ, CP, and joining the points P, Q by a line which meets the axis in D′, also constructing the point C′ by means of the tangent at P as before, we have for the required root the new limits OD′, OC′; and proceeding in like manner with the points D′, C′, and so on as often as we please, we obtain at each step two limits approximating more and more nearly to the required root OX. The process as to the point D′, translated into analysis, is the ordinate process of interpolation. Suppose OD$=\beta$, OC$=a$, we have approximately $f(\beta+h)=f(\beta)+\frac{h\{f(a)-f(\beta)\}}{a-\beta}$, whence if the root is $\beta+h$ then $h=-\frac{(a-\beta)f(\beta)}{f(a)-f(\beta)}$.

Returning for a moment to Horner's method, it may be remarked that the correction h, to an approximate value a, is therein found as a quotient the same or such as the quotient $f(a)+f'(a)$ which presents itself in Newton's method. The difference is that with Horner the integer part of this quotient is taken as the presumptive value of h, and the figure is verified at each step. With Newton the quotient itself, developed to the proper number of decimal places, is taken as the value of h; if too many decimals are taken, there would be a waste of work; but the error would correct itself at the next step. Of course the calculation should be conducted without any such waste of work.

Imaginary Theory.

7. It will be recollected that the expression *number* and the correlative epithet *numerical* were at the outset used in a wide sense, as extending to imaginaries. This extension arises out of the theory of equations by a process analogous to that by which number, in its original most restricted sense of positive integer number, was extended to have the meaning of a real positive or negative magnitude susceptible of continuous variation.

If for a moment number is understood in its most restricted sense as meaning positive integer number, the solution of a simple equation leads to an extension; $ax-b=0$ gives $x=b/a$, a positive fraction, and we can in this manner represent, not accurately, but as nearly as we please, any positive magnitude whatever; so an equation $ax+b=0$ gives $x=-b/a$, which (approximately as before) represents any negative magnitude. We thus arrive at the extended signification of number as a continuously varying positive or negative magnitude. Such numbers may be added or subtracted, multiplied or divided one by another, and the result is always a number. Now from a quadric equation we derive, in like manner, the notion of a complex or imaginary number such as is spoken of above. The equation $x^2+1=0$ is not (in the foregoing sense, number $=$ real number) satisfied by any numerical value whatever of x; but we assume that there is a number which we call i, satisfying the equation $i^2+1=0$, and then taking a and b any real numbers, we form an expression such as $a+bi$, and use the expression number in this extended sense: any two such numbers may be added or subtracted, multiplied or divided one by the other, and the result is always a number. And if we consider first a quadric equation $x^2+px+q=0$ where p and q are real numbers, and next the like equation, where p and q are any numbers whatever, it can be shown that there exists for x a numerical value which satisfies the equation; or, in other words, it can be shown that the equation has a numerical root. The like theorem, in fact, holds good for an equation of any order whatever; but suppose for a moment that this was not the case; say that there was a cubic equation $x^3+px^2+qx+r=0$, with numerical coefficients, not satisfied by any numerical value of x, we should have to establish a new imaginary j satisfying some such equation, and should then have to consider numbers of the form $a+bj$, or perhaps $a+bj+cj^2$ (a, b, c numbers $\alpha+\beta i$ of the kind heretofore considered),—first we should be thrown back on the quadric equation $x^2+px+q=0$, p and q being now numbers of the last-mentioned extended form—*non constat* that every such equation has a numerical root—and if not, we might be led to *other* imaginaries k, l, &c., and so on *ad infinitum* in inextricable confusion.

But in fact a numerical equation of any order whatever has always a numerical root, and thus numbers (in the foregoing sense, number $=$ quantity of the form $\alpha+\beta i$) form (*what real numbers do not*) a universe complete in itself, such that starting in it we are never led out of it. There may very well be, and perhaps are, numbers in a more general sense of the term (quaternions are not a case in point, as the ordinary laws of combination are not adhered to), but in order to have to do with such numbers (if any) we must start with them.

8. The capital theorem as regards numerical equations thus is, every numerical equation has a numerical root; or for shortness (the meaning being as before), every equation has a root. Of course the theorem is the reverse of self-evident, and it requires proof; but provisionally assuming it as true, we derive from it the general theory of numerical equations. As the term root was introduced in the course of an explanation, it will be convenient to give here the formal definition.

A number a such that substituted for x it makes the function $x_1{}^n-p_1x^{n-1}\ldots\pm p_n$ to be $=0$, or say such that it satisfies the equation $f(x)=0$, is said to be a root of the equation; that is, a being a root, we have

$$a^n-p_1a^{n-1}\ \ldots\ \pm p_n=0, \text{ or say } f(a)=0;$$

and it is then easily shown that $x-a$ is a factor of the function $f(x)$, viz. that we have $f(x)=(x-a)f_1(x)$, where $f_1(x)$ is a function $x^{n-1}-q_1x^{n-2}\ldots\pm q_{n-1}$ of the order $n-1$, with numerical coefficients $q_1, q_2\ldots q_{n-1}$.

In general a is not a root of the equation $f_1(x)=0$, but it may be so—*i.e.* $f_1(x)$ may contain the factor $x-a$; when this is so, $f(x)$ will contain the factor $(x-a)^2$; writing then $f(x)=(x-a)^2f_2(x)$, and assuming that a is not a root of the equation $f_2(x)=0$, $x=a$ is then said to be a double root of the equation $f(x)=0$; and similarly $f(x)$ may contain the factor $(x-a)^3$ and no higher power, and $x=a$ is then a triple root; and so on.

Supposing in general that $f(x)=(x-a)^{\alpha}F(x)$ (α being a positive integer which may be $=1$, $(x-a)^{\alpha}$ the highest power of $x-a$ which divides $f(x)$, and $F(x)$ being of course of the order $n-\alpha$), then the equation $F(x)=0$ will have a root b which will be different from a; $x-b$ will be a factor, in general a simple one, but it may be a multiple one, of $F(x)$, and $f(x)$ will in this case be $=(x-a)^{\alpha}(x-b)^{\beta}\Phi(x)$ (β a positive integer which may be $=1$, $(x-b)^{\beta}$ the highest power of $x-b$ in $F(x)$ or $f(x)$, and $\Phi(x)$ being of course of the order $n-\alpha-\beta$). The original equation $f(x)=0$ is in this case said to have α roots each $=a$, β roots each $=b$; and so on for any other factors $(x-c)^{\gamma}$, &c.

We have thus the *theorem*—A numerical equation of the order n has in every case n roots, viz. there exist n numbers, $a, b, \ldots$ (in general all distinct, but which may arrange themselves in any sets of equal values), such that $f(x)=(x-a)(x-b)(x-c)\ldots$ identically.

If the equation has equal roots, these can in general be determined, and the case is at any rate a special one which may be in the first instance excluded from consideration. It is, therefore, in general assumed that the equation $f(x)=0$ has all its roots unequal.

If the coefficients $p_1, p_2, \ldots$ are all or any one or more of them imaginary, then the equation $f(x)=0$, separating the real and imaginary parts thereof, may be written $F(x)+i\Phi(x)=0$, where $F(x)$, $\Phi(x)$ are each of them a function with real coefficients; and it thus appears that the equation $f(x)=0$, with imaginary coefficients, has not in general any real root; supposing it to have a real root a, this must be at once a root of each of the equations $F(x)=0$ and $\Phi(x)=0$.

But an equation with real coefficients may have as well imaginary as real roots, and we have further the *theorem* that for any such equation the imaginary roots enter in pairs, viz. $\alpha+\beta i$ being a root, then $\alpha-\beta i$ will be also a root. It follows that if the order be odd, there is always an odd number of real roots, and therefore at least one real root.

9. In the case of an equation with real coefficients, the question of the existence of real roots, and of their separation, has been already considered. In the general case of an equation with imaginary (it may be real) coefficients, the like question arises as to the situation of the (real or imaginary) roots; thus, if for facility of conception we regard the constituents α, β of a root $\alpha+\beta i$ as the co-ordinates of a point *in plano*, and accordingly represent the root by such point, then drawing in the plane any closed curve or "contour," the question is how many roots lie within such contour.

This is solved theoretically by means of a theorem of A. L. Cauchy (1837), viz. writing in the original equation $x+iy$ in place of x, the function $f(x+iy)$ becomes $=P+iQ$, where P and Q are each of them a rational and integral function (with real coefficients) of (x, y). Imagining the point (x, y) to travel along the contour, and considering the number of changes of sign from $-$ to $+$ and from $+$ to $-$ of the fraction corresponding to passages of the fraction through zero (that is, to values for which P becomes $=0$, disregarding those for which Q becomes $=0$), the difference of these numbers gives the number of roots within the contour.

It is important to remark that the demonstration does not presuppose the existence of any root; the contour may be the infinity of the plane (such infinity regarded as a contour, or closed curve), and in this case it can be shown (and that very easily) that the difference of the numbers of changes of sign is $=n$; that is, there are within the infinite contour, or (what is the same thing) there are in all n roots; thus Cauchy's theorem contains really the proof of the fundamental theorem that a numerical equation of the nth order (not only has a numerical root, but) has precisely n roots. It would appear that this proof of the fundamental theorem in its most complete form is in principle identical with the last proof of K. F. Gauss (1849) of the theorem, in the form—A numerical equation of the nth order has always a root.[1]

But in the case of a finite contour, the actual determination of the difference which gives the number of real roots can be effected only in the case of a rectangular contour, by applying to each of its sides separately a method such as that of Sturm's theorem; and thus the actual determination ultimately depends on a method such as that of Sturm's theorem.

Very little has been done in regard to the calculation of the imaginary roots of an equation by approximation; and the question is not here considered.

10. A class of numerical equations which needs to be considered is that of the binomial equations $x^n-a=0$ ($a=\alpha+\beta i$, a complex number). The foregoing conclusions apply, viz. there are always n roots, which, it may be shown, are all unequal. And these can be found numerically by the extraction of the square root, and of an nth root, of *real* numbers, and by the aid of a table of natural sines and cosines.[2] For writing

$$\alpha+\beta i=\sqrt{(\alpha^2+\beta^2)}\left\{\frac{\alpha}{\sqrt{(\alpha^2+\beta^2)}}+\frac{\beta}{\sqrt{(\alpha^2+\beta^2)}}i\right\}.$$

there is always a real angle λ (positive and less than 2π), such that its cosine and sine are $=\frac{\alpha}{\sqrt{(\alpha^2+\beta^2)}}$ and $\frac{\beta}{\sqrt{(\alpha^2+\beta^2)}}$ respectively; that is, writing for shortness $\sqrt{(\alpha^2+\beta^2)}=\rho$, we have $\alpha+\beta i=\rho(\cos\lambda+i\sin\lambda)$, or the equation is $x^n=\rho(\cos\lambda+i\sin\lambda)$; hence observing that $\left(\cos\frac{\lambda}{n}+i\sin\frac{\lambda}{n}\right)^n=\cos\lambda+i\sin\lambda$, a value of x is $=\sqrt[n]{\rho}\left(\cos\frac{\lambda}{n}+i\sin\frac{\lambda}{n}\right)$. The formula really gives all the roots, for instead of λ we may write $\lambda+2s\pi$, s a positive or negative integer, and then we have

$$x=\sqrt[n]{\rho}\left(\cos\frac{\lambda+2s\pi}{n}+i\sin\frac{\lambda+2s\pi}{n}\right),$$

which has the n values obtained by giving to s the values $0, 1, 2 \ldots n-1$ in succession; the roots are, it is clear, represented by points lying at equal intervals on a circle. But it is more convenient to proceed somewhat differently; taking one of the roots to be θ, so that $\theta^n=a$, then assuming $x=\theta y$, the equation becomes $y^n-1=0$, which equation, like the original equation, has precisely n roots (one of them being of course $=1$). And the original equation $x^n-a=0$ is thus reduced to the more simple equation $x^n-1=0$; and although the theory of this equation is included in the preceding one, yet it is proper to state it separately.

The equation $x^n-1=0$ has its several roots expressed in the form $1, \omega, \omega^2, \ldots \omega^{n-1}$, where ω may be taken $=\cos\frac{2\pi}{n}+i\sin\frac{2\pi}{n}$; in fact, ω having this value, any integer power ω^k is $=\cos\frac{2\pi k}{n}+i\sin\frac{2\pi k}{n}$, and we thence have $(\omega^k)^n=\cos 2\pi k+i\sin 2\pi k, =1$, that is, ω^k is a root of the equation. The theory will be resumed further on.

By what precedes, we are led to the notion (a numerical) of the radical $a^{1/n}$ regarded as an n-valued function; any one of these being denoted by $\sqrt[n]{a}$, then the series of values is $\sqrt[n]{a}, \omega\sqrt[n]{a}, \ldots \omega^{n-1}\sqrt[n]{a}$; or we may, if we please, use $\sqrt[n]{a}$ instead of $a^{1/n}$ as a symbol to denote the n-valued function.

As the coefficients of an algebraical equation may be numerical, all which follows in regard to algebraical equations is (with, it may be, some few modifications) applicable to numerical equations; and hence, concluding for the present this subject, it will be convenient to pass on to algebraical equations.

Algebraical Equations.

11. The equation is

$$x^n-p_1x^{n-1}+\ldots\pm p_n=0,$$

and we here *assume* the existence of roots, viz. we assume that there are n quantities $a, b, c \ldots$ (in general all of them different, but which in particular cases may become equal in sets in any manner), such that

$$x^n-p_1x^{n-1}+\ldots\pm p_n=0;$$

or looking at the question in a different point of view, and starting with the roots $a, b, c \ldots$ as given, we express the product of the n factors $x-a$, $x-b$, $\ldots$ in the foregoing form, and thus arrive at an equation of the order n having the n roots $a, b, c \ldots$ In either case we have

$$p_1=\Sigma a,\ p_2=\Sigma ab, \ldots p_n=abc\ldots;$$

i.e. regarding the coefficients $p_1, p_2 \ldots p_n$ as given, then we assume the existence of roots $a, b, c, \ldots$ such that $p_1=\Sigma a$, &c.; or, regarding the roots as given, then we write p_1, p_2, &c., to denote the functions Σa, Σab, &c.

As already explained, the epithet algebraical is not used in opposition to numerical; an algebraical equation is merely an equation wherein the coefficients are not restricted to denote, or are not explicitly considered as denoting, numbers. That the abstraction is legitimate, appears by the simplest example; in saying that the equation $x^2-px+q=0$ has a root $x=\frac{1}{2}\{p+\sqrt{(p^2-4q)}\}$, we mean that writing this value for x the equation becomes an identity, $[\frac{1}{2}\{p+\sqrt{(p^2-4q)}\}]^2-p[\frac{1}{2}\{p+\sqrt{(p^2-4q)}\}]+q=0$; and the verification of this identity in nowise depends upon p and q meaning numbers. But if it be asked what there is beyond numerical equations included in the term algebraical equation, or, again, what is the full extent of the meaning attributed to the term—the latter question at any rate it would be very difficult to answer; as to the former one, it may be said that the coefficients may, for instance, be symbols of operation. As regards such equations, there is certainly no proof that every equation has a root, or that an equation of the nth order has n roots; nor is it in any wise clear what the precise signification of the statement is. But it is found that the assumption of the existence of the n roots can be made without contradictory results; conclusions derived from it, if they involve the roots, rest on the same ground as the original assumption; but the conclusion may be independent of the roots altogether, and in this case it is undoubtedly valid; the reasoning, although actually conducted by aid of the assumption (and, it may be, most easily and elegantly in this manner), is really independent of the assumption. In illustration, we observe that it is allowable to express a function of p and q as follows,—that is, by means of a rational symmetrical function of a and b, this can, as a fact, be expressed as a rational function of $a+b$ and ab; and if we prescribe that $a+b$ and ab shall then be changed into p and q respectively, we have the required function of p, q. That is, we have $F(a, \beta)$ as a representation of $f(p, q)$, obtained as if we had $p=a+b$, $q=ab$, but without in any wise assuming the existence of the a, b of these equations.

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[1] The earlier demonstrations by Euler, Lagrange, &c., relate to the case of a numerical equation with real coefficients; and they consist in showing that such equation has always a real quadratic divisor, furnishing two roots, which are either real or else conjugate imaginaries $\alpha+\beta i$ (see Lagrange's *Équations numériques*).

[2] The square root of $\alpha+\beta i$ can be determined by the extraction of square roots of positive real numbers, without the trigonometrical tables.

12. Starting from the equation

$$x^n-p_1x^{n-1}+\ldots=x-a\,.\,x-b\,.\ \&c.$$

or the equivalent equations $p_1=\Sigma a$, &c., we find

$$\begin{array}{l} a^n-p_1a^{n-1}+\ldots=0,\\ b^n-p_1b^{n-1}+\ldots=0;\\ \vdots\qquad\vdots\qquad\qquad\vdots \end{array}$$

(it is as satisfying these equations that $a, b\ldots$ are said to be the roots of $x^n-p_1x^{n-1}+\ldots=0$); and conversely from the last-mentioned equations, assuming that $a, b\ldots$ are all different, we deduce

$$p_1=\Sigma a,\ p_2=\Sigma ab,\ \&c.$$

and

$$x^n-p_1x^{n-1}+\ldots=x-a\,.\,x-b\,.\ \&c.$$

Observe that if, for instance, $a=b$, then the equations $a^n-p_1a^{n-1}+\ldots=0$, $b^n-p_1b^{n-1}+\ldots=0$ would reduce themselves to a single relation, which would not of itself express that a was a double root,—that is, that $(x-a)^2$ was a factor of $x^n-p_1x^{n-1}+$, &c.; but by considering b as the limit of $a+h$, h indefinitely small, we obtain a second equation

$$na^{n-1}-(n-1)p_1a^{n-2}+\ldots=0,$$

which, with the first, expresses that a is a double root; and then the whole system of equations leads as before to the equations $p_1=\Sigma a$, &c. But the existence of a double root implies a certain relation between the coefficients; the general case is when the roots are all unequal.

We have then the *theorem* that every rational symmetrical function of the roots is a rational function of the coefficients. This is an easy consequence from the less general theorem, every rational and integral symmetrical function of the roots is a rational and integral function of the coefficients.

In particular, the sums of the powers Σa^2, Σa^3, &c.; are rational and integral functions of the coefficients.

The process originally employed for the expression of other functions $\Sigma a^\alpha b^\beta$, &c., in terms of the coefficients is to make them depend upon the sums of powers: for instance, $\Sigma a^\alpha b^\beta=\Sigma a^\alpha\Sigma a^\beta-\Sigma a^{\alpha+\beta}$; but this is very objectionable; the true theory consists in showing that we have systems of equations

$$\begin{array}{lll} p_1 & =\Sigma a, & \\ \left\{\begin{array}{l} p_2 \\ p_1^2 \end{array}\right. & \begin{array}{l} = \\ =\Sigma a^2+2\Sigma ab, \end{array} & \begin{array}{l} \Sigma ab \\ \end{array} \\ \left\{\begin{array}{l} p_3 \\ p_1p_2 \\ p_1^3 \end{array}\right. & \begin{array}{l} = \\ = \\ =\Sigma a^3+3\Sigma a^2b+6\Sigma abc, \end{array} & \begin{array}{l} \Sigma abc, \\ \Sigma a^2b+3\Sigma abc, \\ \end{array} \end{array}$$

where in each system there are precisely as many equations as there are root-functions on the right-hand side—*e.g.* 3 equations and 3 functions Σabc, Σa^2b, Σa^3. Hence in each system the root-functions can be determined linearly in terms of the powers and products of the coefficients.

$$\begin{array}{l} \left\{\begin{array}{ll} \Sigma ab & =\qquad p_2, \\ \Sigma a^2 & =p_1^2-2p_2, \end{array}\right. \\ \left\{\begin{array}{ll} \Sigma abc & =\qquad\qquad p_3, \\ \Sigma a^2b & =\qquad p_1p_2-3p_3, \\ \Sigma a^3 & =p_1^3-3p_1p_2+3p_3, \end{array}\right. \end{array}$$

and so on. The other process, if applied consistently, would derive the originally assumed value $\Sigma ab, =p_2$, from the two equations $\Sigma a=p$, $\Sigma a^2=p_1^2-2p_2$; *i.e.* we have $2\Sigma ab=\Sigma a\,.\,\Sigma a-\Sigma a^2, =p_1^2-(p_1^2-2p_2), =2p_2$.

13. It is convenient to mention here the theorem that, x being determined as above by an equation of the order n, any rational and integral function whatever of x, or more generally any rational function which does not become infinite in virtue of the equation itself, can be expressed as a rational and integral function of x, of the order $n-1$, the coefficients being rational functions of the coefficients of the equation. Thus the equation gives x^n a function of the form in question; multiplying each side by x, and on the right-hand side writing for x^n its foregoing value, we have x^{n+1}, a function of the form in question; and the like for any higher power of x, and therefore also for any rational and integral function of x. The proof in the case of a rational non-integral function is somewhat more complicated. The final result is of the form $\phi(x)/\psi(x)=\mathrm{I}(x)$, or say $\phi(x)-\psi(x)\mathrm{I}(x)=0$, where ϕ, ψ, I are rational and integral functions; in other words, this equation, being true if only $f(x)=0$, can only be so by reason that the left-hand side contains $f(x)$ as a factor, or we must have identically $\phi(x)-\psi(x)\mathrm{I}(x)=\mathrm{M}(x)f(x)$. And it is, moreover, clear that the equation $\phi(x)/\psi(x)=\mathrm{I}(x)$, being satisfied if only $f(x)=0$, must be satisfied by each root of the equation.

From the theorem that a rational symmetrical function of the roots is expressible in terms of the coefficients, it at once follows that it is possible to determine an equation (of an assignable order) having for its roots the several values of any given (unsymmetrical) function of the roots of the given equation. For example, in the case of a quartic equation, roots (a, b, c, d), it is possible to find an equation having the roots ab, ac, ad, bc, bd, cd (being therefore a sextic equation): viz. in the product

$$(y-ab)(y-ac)(y-ad)(y-bc)(y-bd)(y-cd)$$

the coefficients of the several powers of y will be symmetrical functions of a, b, c, d and therefore rational and integral functions of the coefficients of the quartic equation; hence, supposing the product so expressed, and equating it to zero, we have the required sextic equation. In the same manner can be found the sextic equation having the roots $(a-b)^2$, $(a-c)^2$, $(a-d)^2$, $b-c)^2$, $(b-d)^2$, $(c-d)^2$, which is the equation of differences previously referred to; and similarly we obtain the equation of differences for a given equation of any order. Again, the equation sought for may be that having for its n roots the given rational functions $\phi(a), \phi(b), \ldots$ of the several roots of the given equation. Any such rational function can (as was shown) be expressed as a rational and integral function of the order $n-1$; and, retaining x in place of any one of the roots, the problem is to find y from the equations $x^n-p_1x^{n-1}\ldots=0$, and $y=\mathrm{M}_0x^{n-1}+\mathrm{M}_1x^{n-2}+\ldots$, or, what is the same thing, from these two equations to eliminate x. This is in fact E. W. Tschirnhausen's transformation (1683).

14. In connexion with what precedes, the question arises as to the number of values (obtained by permutations of the roots) of given unsymmetrical functions of the roots, or say of a given set of letters: for instance, with roots or letters (a, b, c, d) as before, how many values are there of the function $ab+cd$, or better, how many functions are there of this form? The answer is 3, viz. $ab+cd$, $ac+bd$, $ad+bc$; or again we may ask whether, in the case of a given number of letters, there exist functions with a given number of values, 3-valued, 4-valued functions, &c.

It is at once seen that for any given number of letters there exist 2-valued functions; the product of the differences of the letters is such a function; however the letters are interchanged, it alters only its sign; or say the two values are Δ and $-\Delta$. And if P, Q are symmetrical functions of the letters, then the general form of such a function is $\mathrm{P}+\mathrm{Q}\Delta$; this has only the two values $\mathrm{P}+\mathrm{Q}\Delta$, $\mathrm{P}-\mathrm{Q}\Delta$.

In the case of 4 letters there exist (as appears above) 3-valued functions: but in the case of 5 letters there does not exist any 3-valued or 4-valued function; and the only 5-valued functions are those which are symmetrical in regard to four of the letters, and can thus be expressed in terms of one letter and of symmetrical functions of all the letters. These last theorems present themselves in the demonstration of the non-existence of a solution of a quintic equation by radicals.

The theory is an extensive and important one, depending on the notions of *substitutions* and of *groups* (*q.v.*).

15. Returning to equations, we have the very important theorem that, given the value of any unsymmetrical function of the roots, *e.g.* in the case of a quartic equation, the function $ab+cd$, it is in general possible to determine rationally the value of any similar function, such as $(a+b)^3+(c+d)^3$.

The *a priori* ground of this theorem may be illustrated by means of a numerical equation. Suppose that the roots of a quartic equation are 1, 2, 3, 4, then if it is given that $ab+cd=14$, this in effect determines a, b to be 1, 2 and c, d to be 3, 4 (viz. $a=1, b=2$, or $a=2, b=1$, and $c=3$, $d=4$ or $c=3$, $d=4$) or else a, b to be 3, 4 and c, d to be 1, 2; and it therefore in effect determines $(a+b)^2+(c+d)^2$ to be $=370$, and not any other value; that is, $(a+b)^2+(c+d)^2$, as having a single value, must be determinable rationally. And we can in the same way account for cases of failure as regards particular equations; thus, the roots being 1, 2, 3, 4 as before, $a^2b=2$ determines a to be $=1$ and b to be $=2$, but if the roots had been 1, 2, 4, 16 then $a^2b=16$ does not uniquely determine a,b but only makes them to be 1,16 or 2,4 respectively.

As to the *a posteriori* proof, assume, for instance,

$$\begin{aligned} t_1&=ab+cd, & y_1&=(a+b)^2+(c+d)^2,\\ t_2&=ac+bd, & y_2&=(a+c)^2+(b+d)^2,\\ t_3&=ad+bc, & y_3&=(a+d)^2+(b+c)^2: \end{aligned}$$

then $y_1+y_2+y_3$, $t_1y_1+t_2y_2+t_3y_3$, $t_1^2y_1+t_2^2y_2+t_3^2y_3$ will be respectively symmetrical functions of the roots of the quartic, and therefore rational and integral functions of the coefficients; that is, they will be known.

Suppose for a moment that t_1, t_2, t_3 are *all* known; then the equations being linear in y_1, y_2, y_3 these can be expressed rationally in terms of the coefficients and of t_1, t_2, t_3; that is, y_1, y_2, y_3 will be known. But observe further that y_1 is obtained as a function of t_1, t_2, t_3 symmetrical as regards t_2, t_3; it can therefore be expressed as a rational function of t_1 and of t_2+t_3, t_2t_3, and thence as a rational function of t_1 and of $t_1+t_2+t_3$, $t_1t_2+t_1t_3+t_2t_3$, $t_1t_2t_3$; but these last are symmetrical functions of the roots, and as such they are expressible rationally in terms of the coefficients; that is, y_1 will be expressed as a rational function of t_1 and of the coefficients; or t_1 (alone, not t_2 or t_3) being known, y_1 will be rationally determined.

16. We now consider the question of the algebraical solution of equations, or, more accurately, that of the *solution of equations by radicals.*

In the case of a quadric equation $x^2-px+q=0$, we can by the assistance of the sign $\surd(\ )$ or $(\ )^{\frac{1}{2}}$ find an expression for x as a 2-valued function of the coefficients p, q such that substituting this value in the equation, the equation is thereby identically satisfied; it has been found that this expression is

$$x=\tfrac{1}{2}\{p\pm\surd(p^2-4q)\},$$

and the equation is on this account said to be algebraically solvable, or more accurately solvable by radicals. Or we may by writing $x=-\frac{1}{2}p+z$ reduce the equation to $z^2=\frac{1}{4}(p^2-4q)$, viz. to an equation of the form $x^2=a$; and in virtue of its being thus reducible we say that the original equation is solvable by radicals. And the question for an equation of any higher order, say of the order n, is, can we by means of radicals (that is, by aid of the sign $\sqrt[m]{\ }(\ )$ or $(\ )^{1/m}$, using as many as we please of such signs and with any values of m) find an n-valued function (or any function) of the coefficients which substituted for x in the equation shall satisfy it identically?

It will be observed that the coefficients p, q ... are not explicitly considered as numbers, but even if they do denote numbers, the question whether a numerical equation admits of solution by radicals is wholly unconnected with the before-mentioned theorem of the existence of the n roots of such an equation. It does not even follow that in the case of a numerical equation solvable by radicals the algebraical solution gives the numerical solution, but this requires explanation. Consider first a numerical quadric equation with imaginary coefficients. In the formula $x=\frac{1}{2}\{p\pm\surd(p^2-4q)\}$, substituting for p, q their given numerical values, we obtain for x an expression of the form $x=\alpha+\beta i\pm\surd(\gamma+\delta i)$, where α, β, γ, δ are real numbers. This expression substituted for x in the quadric equation would satisfy it identically, and it is thus an algebraical solution; but there is no obvious *a priori* reason why $\surd(\gamma+\delta i)$ should have a value $=c+di$, where c and d are real numbers calculable by the extraction of a root or roots of real numbers; however the case is (what there was no *a priori* right to expect) that $\surd(\gamma+\delta i)$ has such a value calculable by means of the radical expressions $\surd\{\surd(\gamma^2+\delta^2)\pm\gamma\}$: and hence the algebraical solution of a numerical quadric equation does in every case give the numerical solution. The case of a numerical cubic equation will be considered presently.

17. A cubic equation can be solved by radicals.

Taking for greater simplicity the cubic in the reduced form $x^3+qx-r=0$, and assuming $x=a+b$, this will be a solution if only $3ab=q$ and $a^3+b^3=r$, equations which give $(a^3-b^3)^2=r^2-\frac{4}{27}q^3$, a quadric equation solvable by radicals, and giving $a^3-b^3=\surd(r^2-\frac{4}{27}q^3)$, a 2-valued function of the coefficients: combining this with $a^3+b^3=r$, we have $a^3=\frac{1}{2}\{r+\surd(r^2-\frac{4}{27}q^3)\}$, a 2-valued function: we then have a by means of a cube root, viz.

$$a=\sqrt[3]{[\tfrac{1}{2}\{r+\surd(r^2-\tfrac{4}{27}q^3)\}]},$$

a 6-valued function of the coefficients; but then, writing $q=b/3a$, we have, as may be shown, $a+b$ a 3-valued function of the coefficients; and $x=a+b$ is the required solution by radicals. It would have been wrong to complete the solution by writing

$$b=\sqrt[3]{[\tfrac{1}{2}\{r-\surd(r^2-\tfrac{4}{27}q^3)\}]},$$

for then $a+b$ would have been given as a 9-valued function having only 3 of its values roots, and the other 6 values being irrelevant. Observe that in this last process we make no use of the equation $3ab=q$, in its original form, but use only the derived equation $27a^3b^3=q^3$, implied in, but not implying, the original form.

An interesting variation of the solution is to write $x=ab(a+b)$, giving $a^3b^3(a^3+b^3)=r$ and $3a^3b^3=q$, or say $a^3+b^3=\frac{3r}{q}$, $a^3b^3=\frac{1}{3}q$; and consequently

$$a^3=\tfrac{3}{2q}\{r+\surd(r^2-\tfrac{4}{27}q^3)\},\quad b^3=\tfrac{3}{2q}\{r-\surd(r^2-\tfrac{4}{27}q^3)\},$$

i.e. here a^3, b^3 are each of them a 2-valued function, but as the only effect of altering the sign of the quadric radical is to interchange a^3, b^3, they may be regarded as each of them 1-valued; a and b are each of them 3-valued (for observe that here only a^3b^3, not ab, is given); and $ab(a+b)$ thus is in appearance a 9-valued function; but it can easily be shown that it is (as it ought to be) only 3-valued.

In the case of a numerical cubic, even when the coefficients are real, substituting their values in the expression

$$x=\sqrt[3]{[\tfrac{1}{2}\{r+\surd(r^2-\tfrac{4}{27}q^3)\}]}+\tfrac{1}{3}q+\sqrt[3]{[\tfrac{1}{2}\{r+\surd(r^2-\tfrac{4}{27}q^3)\}]},$$

this may depend on an expression of the form $\sqrt[3]{(\gamma+\delta i)}$ where γ and δ are real numbers (it will do so if $r^2-\frac{4}{27}q^3$ is a negative number), and then we *cannot* by the extraction of any root or roots of real positive numbers reduce $\sqrt[3]{(\gamma+\delta i)}$ to the form $c+di$, c and d real numbers; hence here the algebraical solution does *not* give the numerical solution, and we have here the so-called "irreducible case" of a cubic equation. By what precedes there is nothing in this that might not have been expected; the algebraical solution makes the solution depend on the extraction of the cube root of a number, and there was no reason for expecting this to be a real number. It is well known that the case in question is that wherein the three roots of the numerical cubic equation are all real; if the roots are two imaginary, one real, then contrariwise the quantity under the cube root is real; and the algebraical solution gives the numerical one.

The irreducible case is solvable by a trigonometrical formula, but this is not a solution by radicals: it consists in effect in reducing the given numerical cubic (not to a cubic of the form $z^3=a$, solvable by the extraction of a cube root, but) to a cubic of the form $4x^3-3x=a$, corresponding to the equation $4\cos^3\theta-3\cos\theta=\cos 3\theta$ which serves to determine $\cos\theta$ when $\cos 3\theta$ is known. The theory is applicable to an algebraical cubic equation; say that such an equation, if it can be reduced to the form $4x^3-3x=a$, is solvable by "trisection," —then the general cubic equation is solvable by trisection.

18. A quartic equation is solvable by radicals: and it is to be remarked that the existence of such a solution depends on the existence of 3-valued functions such as $ab+cd$ of the four roots (a, b, c, d): by what precedes $ab+cd$ is the root of a cubic equation, which equation is solvable by radicals: hence $ab+cd$ can be found by radicals; and since $abcd$ is a given function, ab and cd can then be found by radicals. But by what precedes, if ab be known then any similar function, say $a+b$, is obtainable rationally; and then from the values of $a+b$ and ab we may by radicals obtain the value of a or b, that is, an expression for the root of the given quartic equation: the expression ultimately obtained is 4-valued, corresponding to the different values of the several radicals which enter therein, and we have thus the expression by radicals of each of the four roots of the quartic equation. But when the quartic is numerical the same thing happens as in the cubic, and the algebraical solution does not in every case give the numerical one.

It will be understood from the foregoing explanation as to the quartic how in the next following case, that of the quintic, the question of the solvability by radicals depends on the existence or non-existence of k-valued functions of the five roots (a, b, c, d, e); the fundamental theorem is the one already stated, a rational function of five letters, if it has less than 5, cannot have more than 2 values, that is, there are no 3-valued or 4-valued functions of 5 letters: and by reasoning depending in part upon this theorem, N. H. Abel (1824) showed that a general quintic equation is not solvable by radicals; and *a fortiori* the general equation of any order higher than 5 is not solvable by radicals.

19. The general theory of the solvability of an equation by radicals depends fundamentally on A. T. Vandermonde's remark (1770) that, supposing an equation is solvable by radicals, and that we have therefore an algebraical expression of x in terms of the coefficients, then substituting for the coefficients their values in terms of the roots, the resulting expression must reduce itself to any one at pleasure of the roots a, b, c . . . ; thus in the case of the quadric equation, in the expression $x=\frac{1}{2}\{p+\surd(p^2-4q)\}$, substituting for p and q their values, and observing that $(a+b)^2-4ab=(a-b)^2$, this becomes $x=\frac{1}{2}\{a+b+\surd(a-b)^2\}$, the value being a or b according as the radical is taken to be $+(a-b)$ or $-(a-b)$.

So in the cubic equation $x^3-px^2+qx-r=0$, if the roots are a, b, c, and if ω is used to denote an imaginary cube root of unity, $\omega^2+\omega+1=0$, then writing for shortness $p=a+b+c$, $\mathrm{L}=a+\omega b+\omega^2c$, $\mathrm{M}=a+\omega^2b+\omega c$, it is at once seen that LM, $\mathrm{L}^3+\mathrm{M}^3$, and therefore also

$(L^3-M^3)^2$ are symmetrical functions of the roots, and consequently rational functions of the coefficients: hence

$$\tfrac{1}{2}\{L^3+M^3+\sqrt{(L^3-M^3)^2}\}$$

is a rational function of the coefficients, which when these are replaced by their values as functions of the roots becomes, according to the sign given to the quadric radical, $=L^3$ or M^3, taking it $=L^3$, the cube root of the expression has the three values $L, \omega L, \omega^2 L$; and LM divided by the same cube root has therefore the values $M, \omega^2 M, \omega M$; whence finally the expression

$$\tfrac{1}{3}[p+\sqrt[3]{\{\tfrac{1}{2}(L^3+M^3+\sqrt{(L^3-M^3)^2})\}}+LM\div\sqrt[3]{\{\tfrac{1}{2}(L^3+M^3+\sqrt{(L^3-M^3)^2})\}}]$$

has the three values

$$\tfrac{1}{3}(p+L+M),\ \tfrac{1}{3}(p+\omega L+\omega^2 M),\ \tfrac{1}{3}(p+\omega^2 L+\omega M);$$

that is, these are $=a, b, c$ respectively. If the value M^3 had been taken instead of L^3, then the expression would have had the same three values a, b, c. Comparing the solution given for the cubic $x^3+qx-r=0$, it will readily be seen that the two solutions are identical, and that the function $r^2-\frac{4}{27}q^3$ under the radical sign must (by aid of the relation $p=0$ which subsists in this case) reduce itself to $(L^3-M^3)^2$; it is only by each radical being equal to a rational function of the roots that the final expression *can* become equal to the roots a, b, c respectively.

20. The formulae for the cubic were obtained by J. L. Lagrange (1770–1771) from a different point of view. Upon examining and comparing the principal known methods for the solution of algebraical equations, he found that they all ultimately depended upon finding a "resolvent" equation of which the root is $a+\omega b+\omega^2 c+\omega^3 d+\ldots$, ω being an imaginary root of unity, of the same order as the equation; *e.g.* for the cubic the root is $a+\omega b+\omega^2 c$, ω an imaginary cube root of unity. Evidently the method gives for L^3 a quadric equation, which is the "resolvent" equation in this particular case.

For a quartic the formulae present themselves in a somewhat different form, by reason that 4 is not a prime number. Attempting to apply it to a quintic, we seek for the equation of which the root is $(a+\omega b+\omega^2 c+\omega^3 d+\omega^4 e)$, ω an imaginary fifth root of unity, or rather the fifth power thereof $(a+\omega b+\omega^2 c+\omega^3 d+\omega^4 e)^5$; this is a 24-valued function, but if we consider the four values corresponding to the roots of unity $\omega, \omega^2, \omega^3, \omega^4$, viz. the values

$$\begin{gathered}(a+\omega b+\omega^2 c+\omega^3 d+\omega^4 e)^5,\\ (a+\omega^2 b+\omega^4 c+\omega d+\omega^3 e)^5,\\ (a+\omega^3 b+\omega c+\omega^4 d+\omega^2 e)^5,\\ (a+\omega^4 b+\omega^3 c+\omega^2 d+\omega e)^5,\end{gathered}$$

any symmetrical function of these, for instance their sum, is a 6-valued function of the roots, and may therefore be determined by means of a sextic equation, the coefficients whereof are rational functions of the coefficients of the original quintic equation; the conclusion being that the solution of an equation of the fifth order is made to depend upon that of an equation of the sixth order. This is, of course, useless for the solution of the quintic equation, which, as already mentioned, does not admit of solution by radicals; but the equation of the sixth order, Lagrange's resolvent sextic, is very important, and is intimately connected with all the later investigations in the theory.

21. It is to be remarked, in regard to the question of solvability by radicals, that not only the coefficients are taken to be arbitrary, but it is assumed that they are represented each by a single letter, or say rather that they are not so expressed in terms of other arbitrary quantities as to make a solution possible. If the coefficients are not all arbitrary, for instance, if some of them are zero, a sextic equation might be of the form $x^6+bx^4+cx^2+d=0$, and so be solvable as a cubic; or if the coefficients of the sextic are given functions of the six arbitrary quantities a, b, c, d, e, f, such that the sextic is really of the form $(x^2+ax+b)(x^4+cx^3+dx^2+ex+f)=0$, then it breaks up into the equations $x^2+ax+b=0$, $x^4+cx^3+dx^2+ex+f=0$, and is consequently solvable by radicals; so also if the form is $(x-a)(x-b)(x-c)(x-d)(x-e)(x-f)=0$, then the equation is solvable by radicals,—in this extreme case rationally. Such cases of solvability are self-evident; but they are enough to show that the general theorem of the non-solvability by radicals of an equation of the fifth or any higher order does not in any wise exclude for such orders the existence of particular equations solvable by radicals, and there are, in fact, extensive classes of equations which are thus solvable; the binomial equations $x^n-1=0$ present an instance.

22. It has already been shown how the several roots of the equation $x^n-1=0$ can be expressed in the form $\cos\frac{2s\pi}{n}+i\sin\frac{2s\pi}{n}$, but the question is now that of the algebraical solution (or solution by radicals) of this equation. There is always a root $=1$; if ω be any other root, then obviously $\omega, \omega^2, \ldots \omega^{n-1}$ are all of them roots; x^n-1 contains the factor $x-1$, and it thus appears that $\omega, \omega^2, \ldots \omega^{n-1}$ are the $n-1$ roots of the equation

$$x^{n-1}+x^{n-2}+\ldots+x+1=0;$$

we have, of course, $\omega^{n-1}+\omega^{n-2}+\ldots+\omega+1=0$.

It is proper to distinguish the cases n prime and n composite; and in the latter case there is a distinction according as the prime factors of n are simple or multiple. By way of illustration, suppose successively $n=15$ and $n=9$; in the former case, if α be an imaginary root of $x^3-1=0$ (or root of $x^2+x+1=0$), and β an imaginary root of $x^5-1=0$ (or root of $x^4+x^3+x^2+x+1=0$), then ω may be taken $=\alpha\beta$; the successive powers thereof, $\alpha\beta$, $\alpha^2\beta^2$, β^3, $\alpha\beta^4$, α^2, β, $\alpha\beta^2$, $\alpha^2\beta^3$, β^4, α, $\alpha^2\beta$, β^2, $\alpha\beta^3$, $\alpha^2\beta^4$, are the roots of $x^{14}+x^{13}+\ldots+x+1=0$; the solution thus depends on the solution of the equations $x^3-1=0$ and $x^5-1=0$. In the latter case, if α be an imaginary root of $x^3-1=0$ (or root of $x^2+x+1=0$), then the equation $x^9-1=0$ gives $x^3=1, \alpha$, or α^2; $x^3=1$ gives $x=1, \alpha$, or α^2; and the solution thus depends on the solution of the equations $x^3-1=0$, $x^3-\alpha=0$, $x^3-\alpha^2=0$. The first equation has the roots $1, \alpha, \alpha^2$; if β be a root of either of the others, say if $\beta^3=\alpha$, then assuming $\omega=\beta$, the successive powers are β, β^2, α, $\alpha\beta$, $\alpha\beta^2$, α^2, $\alpha^2\beta$, $\alpha^2\beta^2$, which are the roots of the equation $x^8+x^7+\ldots+x+1=0$.

It thus appears that the only case which need be considered is that of n a prime number, and writing (as is more usual) r in place of ω, we have $r, r^2, r^3, \ldots r^{n-1}$ as the $(n-1)$ roots of the reduced equation

$$x^{n-1}+x^{n-2}+\ldots+x+1=0;$$

then not only $r^n-1=0$, but also $r^{n-1}+r^{n-2}+\ldots+r+1=0$.

23. The process of solution due to Karl Friedrich Gauss (1801) depends essentially on the arrangement of the roots in a certain order, viz. not as above, with the indices of r in arithmetical progression, but with their indices in geometrical progression; the prime number n has a certain number of prime roots g, which are such that g^{n-1} is the lowest power of g, which is $\equiv 1$ to the modulus n; or, what is the same thing, that the series of powers $1, g, g^2, \ldots g^{n-2}$, each divided by n, leave (in a different order) the remainders $1, 2, 3, \ldots n-1$; hence giving to r in succession the indices $1, g, g^2, \ldots g^{n-2}$, we have, in a different order, the whole series of roots $r, r^2, r^3, \ldots r^{n-1}$.

In the most simple case, $n=5$, the equation to be solved is $x^4+x^3+x^2+x+1=0$; here 2 is a prime root of 5, and the order of the roots is r, r^2, r^4, r^3. The Gaussian process consists in forming an equation for determining the periods $P_1, P_2, =r+r^4$ and r^2+r^3 respectively,—these being such that the symmetrical functions P_1+P_2, P_1P_2 are rationally determinable: in fact $P_1+P_2=-1$, $P_1P_2=(r+r^4)(r^2+r^3)$, $=r^3+r^4+r^6+r^7$, $=r^3+r^4+r+r^2$, $=-1$. P_1, P_2 are thus the roots of $u^2+u-1=0$; and taking them to be known, they are themselves broken up into subperiods, in the present case single terms, r and r^4 for P_1, r^2 and r^3 for P_2; the symmetrical functions of these are then rationally determined in terms of P_1 and P_2; thus $r+r^4=P_1$, $r.r^4=1$, or r, r^4 are the roots of $u^2-P_1u+1=0$. The mode of division is more clearly seen for a larger value of n; thus, for $n=7$ a prime root is $=3$, and the arrangement of the roots is $r, r^3, r^2, r^6, r^4, r^5$. We may form either 3 periods each of 2 terms, $P_1, P_2, P_3=r+r^6, r^3+r^4, r^2+r^5$ respectively; or else 2 periods each of 3 terms, $P_1, P_2=r+r^2+r^4, r^3+r^6+r^5$ respectively; in each case the symmetrical functions of the periods are rationally determinable: thus in the case of the two periods $P_1+P_2=-1$, $P_1P_2=3+r+r^2+r^3+r^4+r^5+r^6$, $=2$; and the periods being known the symmetrical functions of the several terms of each period are rationally determined in terms of the periods, thus $r+r^2+r^4=P_1$, $r.r^2+r.r^4+r^2.r^4=P_2$, $r.r^2.r^4=1$.

The theory was further developed by Lagrange (1808), who, applying his general process to the equation in question, $x^{n-1}+x^{n-2}+\ldots+x+1=0$ (the roots $a, b, c\ldots$ being the several powers of r, the indices in geometrical progression as above), showed that the function $(a+\omega b+\omega^2 c+\ldots)^{n-1}$ was in this case a given function of ω with integer coefficients.

Reverting to the before-mentioned particular equation $x^4+x^3+x^2+x+1=0$, it is very interesting to compare the process of solution with that for the solution of the general quartic the roots whereof are a, b, c, d.

Take ω, a root of the equation $\omega^4-1=0$ (whence ω is $=1, -1, i$, or $-i$, at pleasure), and consider the expression

$$(a+\omega b+\omega^2 c+\omega^3 d)^4,$$

the developed value of this is

$$\begin{aligned}=\ & a^4+b^4+c^4+d^4+6(a^2c^2+b^2d^2)+12(a^2bd+b^2ca+c^2db+d^2ac)\\ +\omega\ & \{4(a^3b+b^3c+c^3d+d^3a)+12(a^2cd+b^2da+c^2ab+d^2bc)\}\\ +\omega^2\ & \{6(a^2b^2+b^2c^2+c^2d^2+d^2a^2)+4(a^3c+b^3d+c^3a+d^3b)+24abcd\}\\ +\omega^3\ & \{4(a^3d+b^3a+c^3b+d^3c)+12(a^2bc+b^2cd+c^2da+d^2ab)\}\end{aligned}$$

that is, this is a 6-valued function of a, b, c, d, the root of a sextic (which is, in fact, solvable by radicals; but this is not here material).

If, however, a, b, c, d denote the roots r, r^3, r^4, r^2 of the special equation, then the expression becomes

$$\begin{aligned}&r^4+r^2+r+r^3+6(1+1)+12(r^2+r^4+r^3+r)\\&+\omega\{4(1+1+1+1)+12(r^4+r^3+r+r^2)\}\\&+\omega^2\{6(r+r^2+r^4+r^3)+4(r^2+r^4+r^3+r)\}\\&+\omega^3\{4(r+r^2+r^4+r^3)+12(r^3+r+r^2+r^4)\}\end{aligned}$$

viz. this is

$$=-1+4\omega+14\omega^2-16\omega^3,$$

a completely determined value. That is, we have

$$(r+\omega r^3+\omega^2r^4+\omega^3r^2)^4=-1+4\omega+14\omega^2-16\omega^3,$$

which result contains the solution of the equation. If $\omega=1$, we have $(r+r^3+r^4+r^2)^4=1$, which is right; if $\omega=-1$, then $(r+r^4-r^3-r^2)^4=25$; if $\omega=i$, then we have $\{r-r^4+i(r^3-r^2)\}^4=-15+20i$; and if $\omega=-i$, then $\{r-r^4-i(r^3-r^2)\}^4=-15-20i$; the solution may be completed without difficulty.

The result is perfectly general, thus:—n being a prime number, r a root of the equation $x^{n-1}+x^{n-2}+\dots+x+1=0$, ω a root of $\omega^{n-1}-1=0$, and g a prime root of $g^{n-1}\equiv1$ (mod. n), then

$$(r+\omega r^g+\dots+\omega^{n-2}r^{g^{n-2}})^{n-1}$$

is a given function $M_0+M_1\omega\dots+M_{n-2}\omega^{n-2}$ with integer coefficients, and by the extraction of $(n-1)$th roots of this and similar expressions we ultimately obtain r in terms of ω, which is taken to be known; the equation $x^n-1=0$, n a prime number, is thus solvable by radicals. In particular, if $n-1$ be a power of 2, the solution (by either process) requires the extraction of square roots only; and it was thus that Gauss discovered that it was possible to construct geometrically the regular polygons of 17 sides and 257 sides respectively. Some interesting developments in regard to the theory were obtained by C. G. J. Jacobi (1837); see the memoir "Ueber die Kreistheilung, u.s.w.," *Crelle*, t. xxx. (1846).

The equation $x^{n-1}+\dots+x+1=0$ has been considered for its own sake, but it also serves as a specimen of a class of equations solvable by radicals, considered by N. H. Abel (1828), and since called Abelian equations, viz. for the Abelian equation of the order n, if x be any root, the roots are $x, \theta x, \theta^2x, \dots \theta^{n-1}x$ (θx being a rational function of x, and $\theta^n x=x$); the theory is, in fact, very analogous to that of the above particular case.

A more general theorem obtained by Abel is as follows:—If the roots of an equation of any order are connected together in such wise that *all* the roots can be expressed rationally in terms of any one of them, say x; if, moreover, $\theta x, \theta_1x$ being any two of the roots, we have $\theta\theta_1x=\theta_1\theta x$, the equation will be solvable algebraically. It is proper to refer also to Abel's definition of an *irreducible* equation:—an equation $\phi x=0$, the coefficients of which are rational functions of a certain number of known quantities $a, b, c\dots$, is called irreducible when it is impossible to express its roots by an equation of an inferior degree, the coefficients of which are also rational functions of $a, b, c\dots$ (or, what is the same thing, when ϕx does not break up into factors which are rational functions of $a, b, c\dots$). Abel applied his theory to the equations which present themselves in the division of the elliptic functions, but not to the modular equations.

24. But the theory of the algebraical solution of equations in its most complete form was established by Evariste Galois (born October 1811, killed in a duel May 1832; see his collected works, *Liouville*, t. xi., 1846). The definition of an irreducible equation resembles Abel's,—an equation is reducible when it admits of a rational divisor, irreducible in the contrary case; only the word *rational* is used in this extended sense that, in connexion with the coefficients of the given equation, or with the irrational quantities (if any) whereof these are composed, he considers any number of other irrational quantities called "adjoint radicals," and he terms rational any rational function of the coefficients (or the irrationals whereof they are composed) and of these adjoint radicals; the epithet irreducible is thus taken either absolutely or in a relative sense, according to the system of adjoint radicals which are taken into account. For instance, the equation $x^4+x^3+x^2+x+1=0$; the left hand side has here no rational divisor, and the equation is irreducible; but this function is $=(x^2+\frac{1}{2}x+1)^2-\frac{5}{4}x^2$, and it has thus the irrational divisors $x^2+\frac{1}{2}(1+\sqrt{5})x+1$, $x^2+\frac{1}{2}(1-\sqrt{5})x+1$; and these, if we *adjoin* the radical $\sqrt{5}$, are rational, and the equation is no longer irreducible. In the case of a given equation, assumed to be irreducible, the problem to solve the equation is, in fact, that of finding radicals by the adjunction of which the equation becomes reducible; for instance, the general quadric equation $x^2+px+q=0$ is irreducible, but it becomes reducible, breaking up into rational linear factors, when we adjoin the radical $\sqrt{(\frac{1}{4}p^2-q)}$.

The fundamental theorem is the Proposition I. of the "Mémoire sur les conditions de résolubilité des équations par radicaux"; viz. given an equation of which $a, b, c\dots$ are the m roots, there is always a group of permutations of the letters $a, b, c,\dots$ possessed of the following properties:—

1. Every function of the roots invariable by the substitutions of the group is rationally known.

2. Reciprocally every rationally determinable function of the roots is invariable by the substitutions of the group.

Here by an invariable function is meant not only a function of which the form is invariable by the substitutions of the group, but further, one of which the value is invariable by these substitutions: for instance, if the equation be $\phi(x)=0$, then $\phi(x)$ is a function of the roots invariable by any substitution whatever. And in saying that a function is rationally known, it is meant that its value is expressible rationally in terms of the coefficients and of the adjoint quantities.

For instance in the case of a general equation, the group is simply the system of the $1.2.3\dots n$ permutations of all the roots, since, in this case, the only rationally determinable functions are the symmetric functions of the roots.

In the case of the equation $x^{n-1}\dots+x+1=0$, n a prime number, $a, b, c\dots k=r, r^g, r^{g^2}\dots r^{g^{n-2}}$, where g is a prime root of n, then the group is the cyclical group $abc\dots k$, $bc\dots ka$, $\dots kab\dots j$, that is, in this particular case the number of the permutations of the group is equal to the order of the equation.

This notion of the group of the original equation, or of the group of the equation as varied by the adjunction of a series of radicals, seems to be the fundamental one in Galois's theory. But the problem of solution by radicals, instead of being the sole object of the theory, appears as the first link of a long chain of questions relating to the transformation and classification of irrationals.

Returning to the question of solution by radicals, it will be readily understood that by the adjunction of a radical the group may be diminished; for instance, in the case of the general cubic, where the group is that of the six permutations, by the adjunction of the square root which enters into the solution, the group is reduced to abc, bca, cab; that is, it becomes possible to express rationally, in terms of the coefficients and of the adjoint square root, any function such as $a^2b+b^2c+c^2a$ which is not altered by the cyclical substitution a into b, b into c, c into a. And hence, to determine whether an equation of a given form is solvable by radicals, the course of investigation is to inquire whether, by the successive adjunction of radicals, it is possible to reduce the original group of the equation so as to make it ultimately consist of a single permutation.

The condition in order that an equation of a given prime order n may be solvable by radicals was in this way obtained—in the first instance in the form (scarcely intelligible without further explanation) that every function of the roots $x_1, x_2\dots x_n$, invariable by the substitutions x_{az+b} for x_z, must be rationally known; and then in the equivalent form that the resolvent equation of the order $1.2\dots(n-2)$ must have a rational root. In particular, the condition in order that a quintic equation may be solvable is that Lagrange's resolvent of the order 6 may have a rational factor, a result obtained from a direct investigation in a valuable memoir by E. Luther, *Crelle*, t. xxxiv. (1847).

Among other results demonstrated or announced by Galois may be mentioned those relating to the modular equations in the theory of elliptic functions; for the transformations of the orders 5, 7, 11, the modular equations of the orders 6, 8, 12 are depressible to the orders 5, 7, 11 respectively; but for the transformation, n a prime number greater than 11, the depression is impossible.

The general theory of Galois in regard to the solution of equations was completed, and some of the demonstrations supplied by E. Betti (1852). See also J. A. Serret's *Cours d'algèbre supérieure*, 2nd ed. (1854); 4th ed. (1877–1878).

25. Returning to quintic equations, George Birch Jerrard (1835) established the theorem that the general quintic equation is by the extraction of only square and cubic roots reducible to the form $x^5+ax+b=0$, or what is the same thing, to $x^5+x+b=0$. The actual reduction by means of Tschirnhausen's theorem was effected by Charles Hermite in connexion with his elliptic-function solution of the quintic equation (1858) in a very elegant manner. It was shown by Sir James Cockle and Robert Harley (1858–1859) in connexion with the Jerrardian form, and by Arthur Cayley (1861), that Lagrange's resolvent equation of the sixth order can be replaced by a more simple sextic equation occupying a like place in the theory.

The theory of the modular equations, more particularly for the case $n=5$, has been studied by C. Hermite, L. Kronecker and F. Brioschi. In the case $n=5$, the modular equation of the order 6 depends, as already mentioned, on an equation of the order 5; and conversely the general quintic equation may be made to depend upon this modular equation of the order 6; that is, assuming the solution of this modular equation, we can solve (not by radicals) the general quintic equation; this is Hermite's solution of the general quintic equation by elliptic functions (1858); it is analogous to the before-mentioned trigonometrical solution of the cubic equation. The theory is reproduced and developed in Brioschi's memoir, "Über die Auflösung der Gleichungen vom fünften Grade," *Math. Annalen*, t. xiii. (1877–1878).

26. The modern work, reproducing the theories of Galois, and exhibiting the theory of algebraic equations as a whole, is C. Jordan's *Traité des substitutions et des équations algébriques* (Paris, 1870). The work is divided into four books—book i., preliminary, relating to the theory of congruences; book ii. is in two chapters, the first relating to substitutions in general, the second to substitutions defined analytically, and chiefly to linear substitutions; book iii. has four chapters, the first discussing the principles of the general theory, the other three containing applications to algebra, geometry, and the theory of transcendents; lastly, book iv., divided into seven chapters, contains a determination of the general types of equations solvable by radicals, and a complete system of classification of these types. A glance through the index will show the vast extent which the theory has assumed, and the form of general conclusions arrived at; thus, in book iii., the algebraical applications comprise Abelian equations, equations of Galois; the geometrical ones comprise O. Hesse's equation, R. F. A. Clebsch's equations, lines on a quartic surface having a nodal line, singular points of E. E. Kummer's surface, lines on a cubic surface, problems of contact; the applications to the theory of transcendents comprise circular functions, elliptic functions (including division and the modular equation), hyperelliptic functions, solution of equations by transcendents. And on this last subject, solution of equations by transcendents, we may quote the result—"the solution of the general equation of an order superior to five cannot be made to depend upon that of the equations for the division of the circular or elliptic functions"; and again (but with a reference to a possible case of exception), "the general equation cannot be solved by aid of the equations which give the division of the hyperelliptic functions into an odd number of parts." (See also Groups, Theory of.) (A. Ca.)

Bibliography.—For the general theory see W. S. Burnside and A. W. Panton, *The Theory of Equations* (4th ed., 1899–1901); the Galoisian theory is treated in G. B. Matthews, *Algebraic Equations* (1907). See also the *Ency. d. math. Wiss.* vol. ii.

EQUATION OF THE CENTRE, in astronomy, the angular distance, measured around the centre of motion, by which a planet moving in an ellipse deviates from the mean position which it would occupy if it moved uniformly. Its amount is the correction which must be applied positively or negatively to the mean anomaly in order to obtain the true anomaly. It arises from the ellipticity of the orbit, is zero at pericentre and apocentre, and reaches its greatest amount nearly midway between these points. (See Anomaly and Orbit.)

EQUATION OF TIME, the difference between apparent time, determined by the meridian passage of the real sun, and mean time, determined by the passage of the mean sun. It goes through a double period in the course of a year. Its amount varies a fraction of a minute for the same date, from year to year and from one longitude to another, on the same day. The following table shows an average value for any date and for the Greenwich meridian for a number of years, from which the actual value will seldom deviate more than 20 seconds until after 1950. The + sign indicates that the real sun reaches the meridian *after* mean noon; the − sign *before* mean noon.

Table of the Equation of Time.

		m.	s.			m.	s.			m.	s.
Jan.	1	+ 3	26	Mar.	1	+12	39	May	1	−2	55
	6	5	45		6	11	35		6	−3	27
	11	7	51		11	10	20		11	−3	46
	16	9	43		16	8	58		16	−3	51
	21	11	19		21	7	30		21	−3	40
	26	12	36		26	5	59		26	−3	16
Feb.	1	+13	42	Apr.	1	+ 4	9	June	1	−2	32
	6	14	14		6	2	40		6	−1	44
	11	14	25		11	+ 1	15		11	−0	48
	16	14	17		16	− 0	3		16	+0	14
	21	13	52		21	− 1	12		21	1	19
	26	13	11		26	− 2	10		26	2	24
July	1	+3	26	Sept.	1	+ 0	9	Nov.	1	−16	18
	6	4	21		6	− 1	28		6	−16	19
	11	5	8		11	− 3	10		11	−15	58
	16	5	44		16	− 4	55		16	−15	15
	21	6	8		21	− 6	41		21	−14	12
	26	6	18		26	− 8	25		26	−12	49
Aug.	1	+6	10	Oct.	1	−10	5	Dec.	1	−11	7
	6	5	47		6	−11	38		6	− 9	9
	11	5	9		11	−13	2		11	− 6	57
	16	4	17		16	−14	14		16	− 4	35
	21	3	12		21	−15	11		21	− 2	7
	26	1	55		26	−15	52		26	+ 0	23

EQUATOR (Late Lat. *aequator*, from *aequare*, to make equal), in geography, that great circle of the earth, equidistant from the two poles, which divides the northern from the southern hemisphere and lies in a plane perpendicular to the axis of the earth; this is termed the "geographical" or "terrestrial equator." In astronomy, the "celestial equator" is the name given to the great circle in which the plane of the terrestrial equator intersects the celestial sphere; it is consequently equidistant from the celestial poles. The "magnetic equator" is an imaginary line encircling the earth, along which the vertical component of the earth's magnetic force is zero; it nearly coincides with the terrestrial equator.

EQUERRY (from the Fr. *écurie*, a stable, through its older form *escurie*, from the Med. Lat. *scuria*, a word of Teutonic origin for a stable or shed, cf. Ger. *Scheuer*; the modern spelling has confused the word with the Lat. *equus*, a horse), a contracted form of "gentleman of the equerry," an officer in charge of the stables of a royal household. At the British court, equerries are officers attached to the department of the master of the horse, the first of whom is called chief equerry (see Household, Royal).

EQUIDAE, the family of perissodactyle ungulate mammals typified by the horse (*Equus caballus*); see Horse. According to the older classification this family was taken to include only the forms with tall-crowned teeth, more or less closely allied to the typical genus *Equus*. There is, however, such an almost complete graduation from the former to earlier and more primitive mammals with short-crowned cheek-teeth, at one time included in the family *Lophiodontidae* (see Perissodactyla), that it has now become a very general practice to include the whole "phylum" in the family *Equidae*. The *Equidae*, in this extended sense, together with the extinct *Palaeotheriidae*, are indeed now regarded as forming one of four main groups into which the Perissodactyla are divided, the other groups being the Tapiroidea, Rhinocerotoidea and Titanotheriide. For the horse-group the name Hippoidea is employed. All four groups were closely connected in the Lower Eocene, so that exact definition is almost impossible.

In the Hippoidea there is generally the full series of 44 teeth, but the first premolar is often deciduous or wanting in the lower or in both jaws. The incisors are chisel-shaped, and the canines tend to become isolated so as in the now specialized forms to occupy nearly the middle of a longer or shorter gap between the incisors and premolars. In the upper molars the two outer columns of the primitive tubercular molar coalesce to form an outer wall, from which proceed two crescentic transverse crests; the connexion between the crests and the wall being imperfect or slight, and the crests themselves sometimes tubercular. Each of the lower molars carries two crescentic ridges. The number of toes ranges from four to one in the fore-foot, and from three to one in the hind-foot. The paroccipital, postglenoid and post-tympanic processes of the skull are large, and the latter always distinct. Normally there are no traces of horn-cores. The calcaneum lacks the facet for the fibula found in the Titanotheroidea.

In the earlier *Equidae* the teeth were short-crowned, with the premolars simpler than the molars; but there is a gradual tendency to an increase in the height of the crowns of the teeth, accompanied by increasing complexity of structure and the filling up of the hollows with cement. Similarly the gap on each side of the canine tooth in each jaw continues to increase in length; while in all the later forms the orbit is surrounded by a ring of bone. A third modification is the increasing length of limb (as well as in general bodily size), accompanied by a gradual reduction in the number of toes from three or four to one.

All the existing members of the family, such as the domesticated horse (*Equus caballus*) and its wild or half-wild relatives, the asses and the zebras, are included in the typical genus. In all these the crowns of the cheek-teeth are very tall (fig. 1, *b*) and only develop roots late in life; while their grinding-surfaces (fig. 2, *b* and *c*) are very complicated and have all the hollows filled with cement. The summits of the incisors are infolded, producing, when partially worn, the "mark." In the skull the orbit is surrounded by bone, and there is no distinct depression in front of the same. Each limb terminates in one large toe; the lateral digits being represented by the splint-bones, corresponding to the lateral metacarpals and metatarsals of *Hipparion*. Not unfrequently, however, the lower ends of the splint-bones carry a small expansion, representing the phalanges.

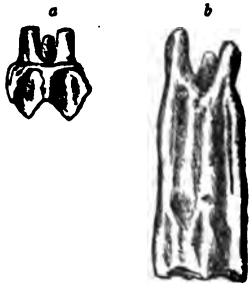


FIG. 1.—*a*, Side view of second upper molar tooth of *Anchitherium* (brachyodont form); *b*, corresponding tooth of horse (hypsidont form).

Remains of horses indistinguishable from *E. caballus* occur in the Pleistocene deposits of Europe and Asia; and it is from them that the dun-coloured small horses of northern Europe and Asia are probably derived. The ancestor of these Pleistocene horses is probably *E. stenonis*, of the Upper Pliocene of Europe, which has a small depression in front of the orbit, while the skull is relatively larger, the feet are rather shorter, and the splint-bones somewhat more developed. In India a nearly allied species (*E. sivalensis*), occurs in the Lower Pliocene, and may have been the ancestor of the Arab stock, which shows traces of the depression in front of the orbit characteristic of the earlier forms. In North America species of *Equus* occur in the Pleistocene and from that continent others reached South America during the same epoch. In the latter country occurs *Hippidium*, in which the cheek-teeth are shorter and simpler, and the nasal bones very long and slender, with elongated slits at the side. The limbs, especially the cannon-bones, are relatively short, and the splint-bones large. The allied Argentine *Onohippidium*, which is also Pleistocene, has still longer nasal bones and slits, and a deep double cavity in front of the orbit, part of which probably contained a gland. *Onohippidium* is certainly off the direct line of descent of the modern horses, and, on account of the length of the nasals and their slits, the same probably holds good for *Hippidium*.

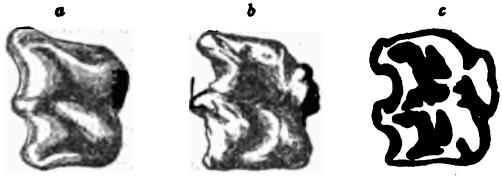


FIG. 2.—*a*, Grinding surface of unworn right upper molar tooth of *Anchitherium*; *b*, corresponding surface of unworn molar of young horse; *c*, the same tooth after it has been some time in use. The uncoloured portions are the dentine or ivory, the shaded parts the cement filling the cavities and surrounding the exterior. The black line separating these two structures is the enamel or hardest constituent of the tooth.

Species from the Pliocene of Texas and the Upper Miocene (Loup Fork) of Oregon were at one time assigned to *Hippidium*, but this is incorrect, that genus being exclusively South American. The name *Pliohippus* has been applied to species from the same two formations on the supposition that the foot-structure was similar to that of *Hippidium*, but Mr J. W. Gidley is of opinion that the lateral digits may have been fully developed.

Apparently there is here some gap in the line of descent of the horse, and it may be suggested that the evolution took place, not as commonly supposed, in North America, but in eastern central Asia, of which the palaeontology is practically unknown; some support is given to this theory by the fact that the earliest species with which we are acquainted occur in northern India.

Be this as it may, the next North American representatives of the family constitute the genera *Protohippus* and *Merychippus* of the Miocene, in both of which the lateral digits are fully developed and terminate in small though perfect hoofs. In both the cheek-teeth have moderately tall crowns, and in the first named of the two those of the milk-series are nearly similar to their permanent successors. In *Merychippus*, on the other hand, the milk-molars have short crowns, without any cement in the hollows, thus resembling the permanent molars of the under-mentioned genus *Anchitherium*. From the well-known *Hipporion*, or *Hippotherium*, typically from the Lower Pliocene of Europe, but also occurring in the corresponding formation in North Africa, Persia, India and China, and represented in the Upper Miocene Loup Fork beds of the United States by species which it has been proposed to separate generically as *Neohipparion*, we reach small horses which are now generally regarded as a lateral offshoot from the *Merychippus* type. The cheek-teeth, which have crowns of moderate height, differ from those of all the foregoing in that the postero-internal pillar (the projection on the right-hand top corner of *c* in fig. 2) is isolated in place of being attached by a narrow neck to the adjacent crescent. The skull, which is relatively short, has a large depression in front of the orbit, commonly supposed to have contained a gland, but this may be doubtful. In the typical, and also in the North American forms these were complete, although small, lateral toes in both feet (fig. 3, *d*), but it is possible that in *H. antilopinum* of India the lateral toes had disappeared. If this be so, we have the development of a monodactyle foot in this genus independently of *Equus*.

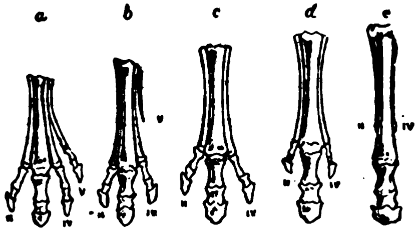


FIG. 3.—Successive stages of modification of the left fore-feet of extinct forms of horse-like animals, showing gradual reduction of the outer and enlargement of the middle toe (III).

a, *Hyracotherium* (Eocene).
b, *Mesohippus* (Oligocene).
c, *Anchitherium* (Miocene).
d, *Hipparion* (Pliocene).
e, *Equus* (Pleistocene).

The foregoing genera constitute the subfamily *Equinae*, or the *Equidae* as restricted by the older writers. In all the dentition is of the hypsodont type, with the hollows of the cheek-teeth filled by cement, the premolars molariform, and the first small and generally deciduous. The orbit is surrounded by a bony ring; the ulna and radius in the fore, and the tibia and fibula in the hind-limb are united, and the feet are of the types described above. Between this subfamily and the second subfamily, *Hyracotheriinae*, a partial connexion is formed by the North American Upper Miocene genera *Desmatippus* and *Anchippus* or *Parahippus*. The characteristics of the group will be gathered from the remarks on the leading genera; but it may be mentioned that the orbit is open behind, the cheek-teeth are short-crowned and without cement (fig. 1, *a*), the gap between the canine and the outermost incisor is short, the bones of the middle part of the leg are separate, and there are at least three toes to each foot.

The longest-known genus and the one containing the largest species is *Anchitherium*, typically from the Middle Miocene of Europe, but also represented by one species from the Upper Miocene of North America. The European *A. aurelianense* was of the size of an ordinary donkey. The cheek-teeth are of the type shown in *a* of figs. 1 and 2; the premolars, with the exception of the small first one, being molar-like; and the lateral toes (fig. 3, *c*) were to some extent functional. The summits of the incisors were infolded to a small extent. Nearly allied is the American *Mesohippus*, ranging from the Lower Miocene to the Lower Oligocene of the United States, of which the earliest species stood only about 18 in. at the shoulder. The incisors were scarcely, if at all, infolded, and there is a rudiment of the fifth metacarpal (fig. 3, *b*). By some writers all the species of *Mesohippus* are included in the genus *Miohippus*, but others consider that the two genera are distinct.

Mesohippus and *Miohippus* are connected with the earliest and most primitive mammal which it is possible to include in the family *Equidae* by means of *Epihippus* of the Uinta or Upper Eocene of North America, and *Pachynolophus*, or *Orohippus*, of the Middle and Lower Eocene of both halves of the northern hemisphere. The final stage, or rather the initial stage, in the series is presented by *Hyracotherium* (*Protorohippus*), a mammal no larger than a fox, common to the Lower Eocene of Europe and North America. The general characteristics of this progenitor of the horses are those given above as distinctive of the group. The cheek-teeth are, however, much simpler than those of *Anchitherium*; the transverse crests of the upper molars not being fully connected with the outer wall, while the premolars in the upper jaw are triangular, and thus unlike the molars. The incisors are small and the canines scarcely enlarged; the latter having a gap on each side in the lower, but only one on their hinder aspect in the upper jaw. The fore-feet have four complete toes (fig. 3, *a*), but there are only three hind-toes, with a rudiment of the fifth metatarsal. The vertebrae are simpler in structure than in *Equus*. From *Hyracotherium*, which is closely related to the Eocene representatives of the ancestral stocks of the other three branches of the Perissodactyla, the transition is easy to *Phenacodus*, the representative of the common ancestor of all the Ungulata.

See also H. F. Osborn, "New Oligocene Horses," *Bull. Amer. Mus.* vol. xx. p. 167 (1904); J. W. Gidley, *Proper Generic Names of Miocene Horses*, p. 191; and the article PALAEONTOLOGY. (R. L.*)

EQUILIBRIUM (from the Lat. *aequus*, equal, and *libra*, a balance), a condition of equal balance between opposite or counteracting forces. By the "sense of equilibrium" is meant the sense, or sensations, by which we have a feeling of security in standing, walking, and indeed in all the movements by which the body is carried through space. Such a feeling of security is necessary both for maintaining any posture, such as standing, or for performing any movement. If this feeling is absent or uncertain, or if there are contradictory sensations, then definite muscular movements are inefficiently or irregularly performed, and the body may stagger or fall. When we stand erect on a firm surface, like a floor, there is a feeling of resistance, due to nervous impulses reaching the brain from the soles of the feet and from the muscles of the limbs and trunk. In walking or running, these feelings of resistance seem to precede and guide the muscular movements necessary for the next step. If these are absent or perverted or deficient, as is the case in the disease known as locomotor ataxia, then, although there is no loss of the power of voluntary movement, the patient staggers in walking, especially if he is not allowed to look at his feet, or if he is blindfolded. He misses the guiding sensations that come from the limbs; and with a feeling that he is walking on a soft substance, offering little or no resistance, he staggers, and his muscular movements become irregular. Such a condition may be artificially brought about by washing the soles of the feet with chloroform or ether. And it has been observed to exist partially after extensive destruction of the skin of the soles of the feet by burns or scalds. This shows that tactile impulses from the skin take a share in generating the guiding sensation. In the disease above mentioned, however, tactile impressions may be nearly normal, but the guiding sensation is weak and inefficient, owing to the absence of impulses from the muscles. The disease is known to depend on morbid changes in the posterior columns of the spinal cord, by which impulses are not freely transmitted upwards to the brain. These facts point to the existence of impulses coming from the muscles and tendons. It is now known that there exist peculiar spindles, in muscle, and rosettes or coils or loops of nerve fibres in close proximity to tendons. These are the end organs of the sense. The transmission of impulses gives rise to the *muscular sense*, and the guiding sensation which precedes co-ordinated muscular movements depends on these impulses. Thus from the limbs streams of nervous impulses pass to the sensorium from the skin and from muscles and tendons; these may or may not arouse consciousness, but they guide or evoke muscular movements of a co-ordinated character, more especially of the limbs.

In animals whose limbs are not adapted for delicate touch nor for the performance of complicated movements, such as some mammals and birds and fishes, the guiding sensations depend largely on the sense of vision. This sense in man, instead of assisting, sometimes disturbs the guiding sensation. It is true that in locomotor ataxia visual sensations may take the place of the tactile and muscular sensations that are inefficient, and the man can walk without staggering if he is allowed to look at the floor, and especially if he is guided by transverse straight lines. On the other hand, the acrobat on the wire-rope dare not trust his visual sensations in the maintenance of his equilibrium. He keeps his eyes fixed on one point instead of allowing them to wander to objects below him, and his muscular movements are regulated by the impulses that come from the skin and muscles of his limbs. The feeling of insecurity probably arises from a conception of height, and also from the knowledge that by no muscular movements can a man avoid a catastrophe if he should fall. A bird, on the other hand, depends largely on visual impressions, and it knows by experience that if launched into the air from a height it can fly. Here, probably, is an explanation of the large size of the eyes of birds. Cover the head, as in hooding a falcon, and the bird seems to be deprived of the power of voluntary movement. Little effect will be produced if we attempt to restrain the movements of a cat by covering its eyes. A fish also is deprived of the power of motion if its eyes are covered. But both in the bird and in the fish tactile and muscular impressions, especially the latter, come into play in the mechanism of equilibrium. In flight the large-winged birds, especially in soaring, can feel the most delicate wind-pressures, both as regards direction and force, and they adapt the position of their body so as to catch the pressure at the most efficient angle. The same is true of the fish, especially of the flat-fishes. In mammals the sense of equilibrium depends, then, on streams of tactile, muscular and visual impressions pouring in on the sensorium, and calling forth appropriate muscular movements. It has also been suggested that impulses coming from the abdominal viscera may take part in the mechanism. The presence in the mesentery of felines (cats, &c.) of large numbers of Pacinian corpuscles, which are believed to be modified tactile bodies, favours this supposition. Such animals are remarkable for the delicacy of such muscular movements, as balancing and leaping.

There is another channel by which nervous impulses reach the sensorium and play their part in the sense of equilibrium, namely, from the semicircular canals, a portion of the internal ear. It is pointed out in the article HEARING that the appreciation of sound is in reality an appreciation of variations of pressure. The labyrinth consists of the vestibule, the cochlea and the semicircular canals. The cochlea receives the sound-waves (variations of pressure) that constitute musical tones. This it accomplishes by the structures in the ductus cochlearis. In the vestibule we find two sacs, the saccule next to and communicating with the ductus cochlearis, and the utricle communicating with the semicircular canals. The base of the stapes communicates pressures to the utricle. The membranous portion of the semicircular canals consists of a tube, dilated at one end into a swelling or pouch, termed the ampulla, and each end communicates freely with the utricle. On the posterior wall of both the saccule and of the utricle there is a ridge, termed in each case the macula acustica, bearing a highly specialized epithelium. A similar structure exists in each ampulla. This would suggest that all three structures have to do with hearing; but, on the other hand, there is experimental evidence that the utricle and the canals may transmit impressions that have to do with equilibrium. Pressure of the base of the stapes is exerted on the utricle. This will compress the fluid in that cavity, and tend to drive the fluid into the semicircular canals that communicate with that cavity by five openings. Each canal is surrounded by a thin layer of perilymph, so that it may yield a little to this pressure, and exert a pull or pressure on the nerve-endings in each ampulla. Thus impulses may be generated in the nerves of the ampullae.

The three semicircular canals lie in the three directions in space, and it has been suggested that they have to do with our appreciation of the direction of sound. But our appreciation of sound is very inaccurate: we look with the eyes for the source of a sound, and instinctively direct the ears or the head, or both, in the direction from which the sound appears to proceed. But the relationship of the canals on the two sides must have a physiological significance. Thus (1) the six canals are parallel, two and two; or (2) the two horizontal canals are in the same plane, while the superior canal on one side is nearly parallel with the posterior canal of the other. These facts point to the two sets of canals and ampullae acting as one organ, in a manner analogous to the action of two retinae for single vision.

We have next to consider how the canals may possibly act in connexion with the sense of equilibrium. In 1820 J. Purkinje studied the vertigo that follows rapid rotation of the body in the erect position on a vertical axis. On stopping the rotation there is a sense of rotation in the opposite direction, and this may occur even when the eyes are closed. Purkinje noticed that the position of the imaginary axis of rotation depends on the axis around which the head revolves. In 1828 M. J. P. Flourens discovered that injury to the canals causes disturbance to the equilibrium and loss of co-ordination, and that sections of the canals produce a rotatory movement of a kind corresponding to the canal that had been divided. Thus division of a membranous canal causes rotatory movements round an axis at right angles to the plane of the divided canal. The body of the animal always moves in the direction of the cut canal. Many other observers have corroborated these experiments. F. Goltz was the first who formulated the conditions necessary for equilibration. He put the matter thus:—(1) A central co-ordinating organ—in the brain; (2) centripetal fibres, with their peripheral terminations—in the ampullae; and (3) centrifugal fibres, with their terminal organs—in the muscular mechanisms. A lesion of any one of these portions of the mechanism causes loss or impairment of balancing. Cyon also investigated the subject, and concluded:—(1) To maintain equilibrium, we must have an accurate notion of the position of the head in space; (2) the function of the semicircular canals is to communicate impressions that give a representation of this position—each canal having a relation to one of the dimensions of space; (3) disturbance of equilibrium follows section; (4) involuntary movements following section are due to abnormal excitations; (5) abnormal movements occurring a few days after the operation are caused by irritation of the cerebellum.

On theoretical considerations of a physical character, E. Mach, Crum-Brown and Breuer have advanced theories based on the idea of the canals being organs for sensations of acceleration of movement, or for the sense of rotation. Mach first pointed out that Purkinje's phenomena, already alluded to, were in all probability related to the semicircular canals. "He showed that when the body is moved in space, in a straight line, we are not conscious of the velocity of motion, but of variations in this velocity. Similarly, if a body is rotated round a vertical axis, we perceive only angular acceleration and not angular velocity. The sensations produced by angular acceleration last longer than the acceleration itself, and the position of the head during the movements enables us to determine direction." Both Mach and Goltz state that varying pressures of the fluid in the canals produced by angular rotation produce sensations of movement (always in a direction opposite to the rotation of the body), and that these, in turn, cause the vertigo of Purkinje and the phenomena of Flourens. Mach, Crum-Brown and Breuer advance hydrodynamical theories in which they assume that the fluids move in the canals. Goltz, on the other hand, supports a hydrostatical theory in which he assumes that the phenomena can be accounted for by varying pressures. Crum-Brown differs from Mach and Breuer as follows:—(1) In attributing movement or variation of pressure not merely to the endolymph, but also to the walls of the membranous canals and to the surrounding perilymph; and (2) in regarding the two labyrinths as one organ, all the six canals being required to form a true conception of the rotating motion of the head. He sums up the matter thus: "We have two ways in which a relative motion can occur between the endolymph and the walls of the cavity containing it—(1) When the head begins to move, here the walls leave the fluid behind; (2) when the head stops, here the fluid flows on. In both cases the sensation of rotation is felt. In the first this sensation corresponds to a real rotation, in the second it does not, but in both it corresponds to a real acceleration (positive or negative) of rotation, using the word acceleration in its technical kinematical sense."

Cyon states that the semicircular canals only indirectly assist in giving a notion of spatial relations. "He holds that knowledge of the position of bodies in space depends on nervous impulses coming from the contracting ocular muscles; that the oculomotor centres are in intimate physiological relationship with the centres receiving impulses from the nerves of the semicircular canals; and that the oculomotor centres, thus excited, produce the movements of the eyeballs, which then determine our notions of spatial relations." These views are supported by experiments of Lee on dog-fish. When the fish is rotated round different axes there are compensating movements of the eyes and fins. "It was observed that if the fish were rotated in the plane of one of the canals, exactly the same movements of the eyes and fins occurred as were produced by experimental operation and stimulation of the ampulla of that canal." Sewall, in 1883, carried out experiments on young sharks and skates with negative results. Lee returned to the subject in 1894, and, after numerous experiments on dog-fish, in which the canals or the auditory nerves were divided, obtained evidence that the ampullae contain sense-organs connected with the sense of equilibrium.

It has been found by physicians and aurists that disease or injury of the canals, occurring rapidly, produces giddiness, staggering, nystagmus (a peculiar twitching movement of the muscles of the eyeballs), vomiting, noises in the ear and more or less deafness. It is said, however, that if pathological changes come on slowly, so that the canals and vestibule are converted into a solid mass, none of these symptoms may occur. On the whole, the evidence is in favour of the view that from the semicircular canals nervous impulses are transmitted, which, coordinated with impulses coming from the visual organs, from the muscles and from the skin, form the bases of these guiding sensations on which the sense of equilibrium depends. These impulses may not reach the level of consciousness, but they call into action co-ordinated mechanisms by which complicated muscular movements are effected.

Full bibliographical references are given in the article on "The Ear" by J. G. McKendrick, in Schäfer's *Textbook of Physiology*, vol. ii. p. 1194. (J. G. M.)

EQUINOX (from the Lat. *aequus*, equal, and *nox*, night), a term used to express either the moment at which, or the point at which, the sun apparently crosses the celestial equator. Since the sun moves in the ecliptic, it is in the last-named sense the point of intersection of the ecliptic and the celestial equator. This is the usual meaning of the term in astronomy. There are two such points, opposite each other, at one of which the sun crosses the equator toward the north and at the other toward the south. They are called vernal and autumnal respectively, from the relation of the corresponding times to the seasons of the northern hemisphere. The line of the equinoxes is the imaginary diameter of the celestial sphere which joins them.

The vernal equinox is the initial point from which the right ascensions and the longitudes of the heavenly bodies are measured (see ASTRONOMY: *Spherical*). It is affected by the motions of Precession and Nutation, of which the former has been known since the time of Hipparchus. The actual equinox is defined by first taking the conception of a fictitious point called the Mean Equinox, which moves at a nearly uniform rate, slow varying, however, from century to century. The true equinox then moves around the mean equinox in a period equal to that of the moon's nodes. These two motions are defined with greater detail in the articles PRECESSION OF THE EQUINOXES and NUTATION.

Equinoctial Gales.—At the time of the equinox it is commonly believed that strong gales may be expected. This popular idea has no foundation in fact, for continued observations have failed to show any unusual prevalence of gales at this season. In one case observations taken for fifty years show that during the five days from the 21st to the 25th of March and September, there were fewer gales and storms than during the preceding and succeeding five days.

EQUITES ("horsemen" or "knights," from *equus*, "horse"), in Roman history, originally a division of the army, but subsequently a distinct political order, which under the empire resumed its military character. According to the traditional account, Romulus instituted a cavalry corps, consisting of three *centuriae* ("hundreds"), called after the three tribes from which they were taken (Ramnes, Tities, Luceres), divided into ten *turmae* ("squadrons") of thirty men each. The collective name for the corps was *celeres* ("the swift," or possibly from κέλης, "a riding horse"); Livy, however, restricts the term to a special body-guard of Romulus. The statements in ancient authorities as to the changes in the number of the equites during the regal period are very confusing; but it is regarded as certain that Servius Tullius found six centuries in existence, to which he added twelve, making eighteen in all, a number which remained unchanged throughout the republican period. A proposal by M. Porcius Cato the elder to supplement the deficiency in the cavalry by the creation of four additional centuries was not adopted. The earlier centuries were called *sex suffragia* ("the six votes"), and at first consisted exclusively of patricians, while those of Servius Tullius were entirely or for the most part plebeian. Until the reform of the comitia centuriata (probably during the censorship of Gaius Flaminius in 220 B.C.; see COMITIA), the equites had voted first, but after that time this privilege was transferred to one century selected by lot from the centuries of the equites and the first class. The equites then voted with the first class, the distinction between the *sex suffragia* and the other centuries being abolished.

Although the equites were selected from the wealthiest citizens, service in the cavalry was so expensive that the state gave financial assistance. A sum of money (*aes equestre*) was given to each eques for the purchase of two horses (one for himself and one for his groom), and a further sum for their keep (*aes hordearium*); hence the name *equites equo publico*. In later times, pay was substituted for the *aes hordearium*, three times as much as that of the infantry. If competent, an eques could retain his horse and vote after the expiration of his ten years' service, and (till 129 B.C.) even after entry into the senate.

As the demands upon the services of the cavalry increased, it was decided to supplement the regulars by the enrolment of wealthy citizens who kept horses of their own. The origin of these *equites equo privato* dates back, according to Livy (v. 7), to the siege of Veii, when a number of young men came forward and offered their services. According to Mommsen, although the institution was not intended to be permanent, in later times vacancies in the ranks were filled in this manner, with the result that service in the cavalry, with either a public or a private horse, became obligatory upon all Roman citizens possessed of a certain income. These *equites equo privato* had no vote in the centuries, received pay in place of the *aes equestre*, and did not form a distinct corps.

Thus, at a comparatively early period, three classes of equites may be distinguished: (*a*) The patrician equites *equo publico* of the *sex suffragia*; (*b*) the plebeian equites in the twelve remaining centuries; (*c*) the equites *equo privato*, both patrician and plebeian.

The equites were originally chosen by the curiae, then in succession by the kings, the consuls, and (after 443 B.C.) by the censors, by whom they were reviewed every five years in the Forum. Each eques, as his name was called out, passed before the censors, leading his horse. Those whose physique and character were satisfactory, and who had taken care of their horses and equipments, were bidden to lead their horse on (*traducere equum*), those who failed to pass the scrutiny were ordered to sell it, in token of their expulsion from the corps. This inspection (*recognitio*) must not be confounded with the full-dress procession (*transvectio*) on the 15th of July from the temple of Mars or Honos to the Capitol, instituted in 304 B.C. by the censor Q. Fabius Maximus Rullianus to commemorate the miraculous intervention of Castor and Pollux at the battle of Lake Regillus. Both inspection and procession were discontinued before the end of the republic, but revived and in a manner combined by Augustus.

In theory, the twelve plebeian centuries were open to all freeborn youths of the age of seventeen, although in practice preference was given to the members of the older families. Other requirements were sound health, high moral character and an honourable calling. At the beginning of the republican period, senators were included in the equestrian centuries. The only definite information as to the amount of fortune necessary refers to later republican and early imperial times, when it is known to have been 400,000 sesterces (about £3500 to £4000). The insignia of the equites were, at first, distinctly military—such as the purple-edged, short military cloak (*trabea*) and decorations for service in the field.

With the extension of the Roman dominions, the equites lost their military character. Prolonged service abroad possessed little attraction for the pick of the Roman youth, and recruiting for the cavalry from the equestrian centuries was discontinued. The equites remained at home, or only went out as members of the general's staff, their places being taken by the *equites equo privato*, the cavalry of the allies and the most skilled horsemen of the subject populations. The first gradually disappeared, and Roman citizens were rarely found in the ranks of the effective cavalry. In these circumstances there grew up in Rome a class of wealthy men, whose sole occupation it was to amass large fortunes by speculation, and who found a most lucrative field of enterprise in state contracts and the farming of the public revenues. These tax-farmers (see PUBLICANI) were already in existence at the time of the Second Punic War; and their numbers and influence increased as the various provinces were added to the Roman dominions. The change of the equites into a body of financiers was further materially promoted (*a*) by the lex Claudia (218 B.C.), which prohibited senators from engaging in commercial pursuits, especially if (as seems probable) it included public contracts (cf. FLAMINIUS, GAIUS); (*b*) by the enactment in the time of Gaius Gracchus excluding members of the senate from the equestrian centuries. These two measures definitely marked off the aristocracy of birth from the aristocracy of wealth—the landed proprietor from the capitalist. The term equites, originally confined to the purely military equestrian centuries of Servius Tullius, now came to be applied to all who possessed the property qualification of 400,000 sesterces.

As the equites practically monopolized the farming of the taxes, they came to be regarded as identical with the *publicani*, not, as Pliny remarks, because any particular rank was necessary to obtain the farming of the taxes, but because such occupation was beyond the reach of all except those who were possessed of considerable means. Thus, at the time of the Gracchi, these *equites-publicani* formed a close financial corporation of about 30,000 members, holding an intermediate position between the nobility and the lower classes, keenly alive to their own interests, and ready to stand by one another when attacked. Although to some extent looked down upon by the senate as following a dishonourable occupation, they had as a rule sided with the latter, as being at least less hostile to them than the democratic party. To obtain the support of the capitalists, Gaius Gracchus conceived the plan of creating friction between them and the senate, which he carried out by handing over to them the control (*a*) of the jury-courts, and (*b*) of the revenues of Asia.

(*a*) Hitherto, the list of jurymen for service in the majority of processes, both civil and criminal, had been composed exclusively of senators. The result was that charges of corruption and extortion failed, when brought against members of that order, even in cases where there was little doubt of their guilt. The popular indignation at such scandalous miscarriages of justice rendered a change in the composition of the courts imperative. Apparently Gracchus at first proposed to create new senators from the equites and to select the jurymen from this mixed body, but this moderate proposal was rejected in favour of one more radical (see W. W. Fowler in *Classical Review*, July 1896). By the lex Sempronia (123 B.C.) the list was to be drawn from persons of free birth over thirty years of age, who must possess the equestrian census, and must not be senators. Although this measure was bound to set senators and equites at variance, it in no way improved the lot of those chiefly concerned. In fact, it increased the burden of the luckless provincials, whose only appeal lay to a body of men whose interests were identical with those of the *publicani*. Provided he left the tax-gatherer alone, the governor might squeeze what he could out of the people, while on the other hand, if he were humanely disposed, it was dangerous for him to remonstrate.

(*b*) The taxes of Asia had formerly been paid by the inhabitants themselves in the shape of a fixed sum. Gracchus ordered that the taxes, direct and indirect, should be increased, and that the farming of them should be put up to auction at Rome. By this arrangement the provincials were ignored, and everything was left in the hands of the capitalists.

From this time dates the existence of the equestrian order as an officially recognized political instrument. When the control of the courts passed into the hands of the property equites, all who were summoned to undertake the duties of judices were called equites; the *ordo judicum* (the official title) and the *ordo equester* were regarded as identical. It is probable that certain privileges of the equites were due to Gracchus; that of wearing the gold ring, hitherto reserved for senators; that of special seats in the theatre, subsequently withdrawn (probably by Sulla) and restored by the lex Othonis (67 B.C.); the narrow band of purple on the tunic as distinguished from the broad band worn by the senators.

Various attempts were made by the senate to regain control of the courts, but without success. The lex Livia of M. Livius Drusus (*q.v.*), passed with that object, but irregularly and by the aid of violence, was annulled by the senate itself. In 82 Sulla restored the right of serving as judices to the senate, to which he elevated 300 of the most influential equites, whose support he thus hoped to secure; at the same time he indirectly dealt a blow at the order generally, by abolishing the office of the censor (immediately revived), in whom was vested the right of bestowing the public horse. To this period Mommsen assigns the regulation, generally attributed to Augustus, that the sons of senators should be knights by right of birth. By the lex Aurelia (70 B.C.) the judices were to be chosen in equal numbers from senators, equites and tribuni aerarii (see AERARIUM), the last-named being closely connected with the equites), who thus practically commanded a majority. About this time the influence of the equestrian order reached its height, and Cicero's great object was to reconcile it with the senate. In this he was successful at the time of the Catilinarian conspiracy, in the suppression of which he was materially aided by the equites. But the union did not last long; shortly afterwards the majority ranged themselves on the side of Julius Caesar, who did away with the tribuni aerarii as judices, and replaced them by equites.

Augustus undertook the thorough reorganization of the equestrian order on a military basis. The *equites equo privato* were abolished (according to Herzog, not till the reign of Tiberius) and the term equites was officially limited to the *equites equo publico*, although all who possessed the property qualification were still considered to belong to the "equestrian order." For the *equites equo publico* high moral character, good health and the equestrian fortune were necessary. Although free birth was considered indispensable, the right of wearing the gold ring (*jus anuli aurei*) was frequently bestowed by the emperor upon freedmen, who thereby became *ingenui* and eligible as equites. Tiberius, however, insisted upon free birth on the father's side to the third generation. Extreme youth was no bar; the emperor Marcus Aurelius had been an eques at the age of six. The sons of senators were eligible by right of birth, and appear to have been known as *equites illustres*. The right of bestowing the *equus publicus* was vested in the emperor; once given, it was for life, and was only forfeitable through degradation for some offence or the loss of the equestrian fortune.

Augustus divided the equites into six *turmae* (regarded by Hirschfeld as a continuation of the *sex suffragia*). Each was under the command of a *sevir* (ἴλαρχος), who was appointed by the emperor and changed every year. During their term of command the *seviri* had to exhibit games (*ludi sevirales*). Under these officers the equites formed a kind of corporation, which, although not officially recognized, had the right of passing resolutions, chiefly such as embodied acts of homage to the imperial house. It is not known whether the *turmae* contained a fixed number of equites; there is no doubt that, in assigning the public horse, Augustus went far beyond the earlier figure of 1800. Thus, Dionysius of Halicarnassus mentions 5000 equites as taking part in a review at which he himself was present.

As before, the equites wore the narrow, purple-striped tunic, and the gold ring, the latter now being considered the distinctive badge of knighthood. The fourteen rows in the theatre were extended by Augustus to seats in the circus.

The old *recognitio* was replaced by the *probatio*, conducted by the emperor in his censorial capacity, assisted by an advisory board of specially selected senators. The ceremony was combined with a procession, which, like the earlier *transvectio*, took place on the 15th of July, and at such other times as the emperor pleased. As in earlier times, offenders were punished by expulsion.

In order to provide a supply of competent officers, each eques was required to fill certain subordinate posts, called *militiae equestres*. These were (1) the command of an auxiliary cohort; (2) the tribunate of a legion; (3) the command of an auxiliary cavalry squadron, this order being as a rule strictly adhered to. To these Septimius Severus added the centurionship. Nomination to the *militiae equestres* was in the hands of the emperor. After the completion of their preliminary military service, the equites were eligible for a number of civil posts, chiefly those with which the emperor himself was closely concerned. Such were various procuratorships; the prefectures of the corn supply, of the fleet, of the watch, of the praetorian guards; the governorships of recently acquired provinces (Egypt, Noricum), the others being reserved for senators. At the same time, the abolition of the indirect method of collecting the taxes in the provinces greatly reduced the political influence of the equites. Certain religious functions of minor importance were also reserved for them. In the jury courts, the equites, thanks to Julius Caesar, already formed two-thirds of the judices; Augustus, by excluding the senators altogether, virtually gave them the sole control of the tribunals. One of the chief objects of the emperors being to weaken the influence of the senate by the opposition of the equestrian order, the practice was adopted of elevating those equites who had reached a certain stage in their career to the rank of senator by *adlectio*. Certain official posts, of which it would have been inadvisable to deprive senators, could thus be bestowed upon the promoted equites.

The control of the imperial correspondence and purse was at first in the hands of freedmen and slaves. The emperor Claudius tentatively entrusted certain posts connected with these to the equites; in the time of Hadrian this became the regular custom. Thus a civil career was open to the equites without the obligation of preliminary military service, and the emperor was freed from the pernicious influence of freedmen. After the reign of Marcus Aurelius (according to Mommsen) the equites were divided into: (*a*) *viri eminentissimi*, the prefects of the praetorian guard; (*b*) *viri perfectissimi*, the other prefects and the heads of the financial and secretarial departments; (*c*) *viri egregii*, first mentioned in the reign of Antoninus Pius, a title by right of the procurators generally.

Under the empire the power of the equites was at its highest in the time of Diocletian; in consequence of the transference of the capital to Constantinople, they sank to the position of a mere city guard, under the control of the prefect of the watch. Their history may be said to end with the reign of Constantine the Great.

Mention may also be made of the *equites singulares Augusti*. The body-guard of Augustus, consisting of foreign soldiers (chiefly Germans and Batavians), abolished by Galba, was revived from the time of Trajan or Hadrian under the above title. It was chiefly recruited from the pick of the provincial cavalry, but contained some Roman citizens. It formed the imperial "Swiss guard," and never left the city except to accompany the emperor. In the time of Severus, these equites were divided into two corps, each of which had its separate quarters, and was commanded by a tribune under the orders of the prefect of the praetorian guard. They were subsequently replaced by the *protectores Augusti*.

See further article ROME: *History*; also T. Mommsen, *Römisches Staatsrecht*, iii.; J. N. Madvig, *Die Verfassung des römischen Staates*, i.; R. Cagnat in Daremberg and Saglio's *Dictionnaire des antiquités*, where full references to ancient authorities are given in the footnotes; A. S. Wilkins in Smith's *Dictionary of Greek and Roman Antiquities* (3rd ed., 1891); E. Belot, *Histoire des chevaliers romains* (1866–1873); H. O. Hirschfeld, *Untersuchungen auf dem Gebiete der römischen Verwaltungsgeschichte* (Berlin, 1877); E. Herzog, *Geschichte und System der römischen Staatsverfassung* (Leipzig, 1884–1891); A. H. Friedländer, *Sittengeschichte Roms*, i. (1901); A. H. J. Greenidge, *History of Rome*, i. (1904); J. B. Bury, *The Student's Roman Empire* (1893): T. M. Taylor, *Political and Constitutional History of Rome* (1899). For a concise summary of different views of the *sex suffragia* see A. Bouché-Leclercq's *Manuel des antiquités romaines*, quoted in Daremberg and Saglio; and on the *equites singulares*, T. Mommsen in *Hermes*, xvi. (1881), p. 458. (J. H. F.)

EQUITY (Lat. *aequitas*), a term which in its most general sense means equality or justice; in its most technical sense it means a system of law or a body of connected legal principles, which have superseded or supplemented the common law on the ground of their intrinsic superiority. Aristotle (*Ethics*, bk. v. c. 10) defines equity as a better sort of justice, which corrects legal justice where the latter errs through being expressed in a universal form and not taking account of particular cases. When the law speaks universally, and something happens which is not according to the common course of events, it is right that the law should be modified in its application to that particular case, as the lawgiver himself would have done, if the case had been present to his mind. Accordingly the equitable man (ἐπιεικής) is he who does not push the law to its extreme, but, having legal justice on his side, is disposed to make allowances. Equity as thus described would correspond rather to the judicial discretion which modifies the administration of the law than to the antagonistic system which claims to supersede the law.

The part played by equity in the development of law is admirably illustrated in the well-known work of Sir Henry Maine on *Ancient Law*. Positive law, at least in progressive societies, is constantly tending to fall behind public opinion, and the expedients adopted for bringing it into harmony therewith are three, viz. legal fictions, equity and statutory legislation. Equity here is defined to mean "any body of rules existing by the side of the original civil law, founded on distinct principles, and claiming incidentally to supersede the civil law in virtue of a superior sanctity inherent in those principles." It is thus different from legal fiction, by which a new rule is introduced surreptitiously, and under the pretence that no change has been made in the law, and from statutory legislation, in which the obligatory force of the rule is not supposed to depend upon its intrinsic fitness. The source of Roman equity was the fertile theory of natural law, or the law common to all nations. Even in the Institutes of Justinian the distinction is carefully drawn in the laws of a country between those which are peculiar to itself and those which natural reason appoints for all mankind. The connexion in Roman law between the ideas of equity, nature, natural law and the law common to all nations, and the influence of the Stoical philosophy on their development, are fully discussed in the third chapter of the work we have referred to. The agency by which these principles were introduced was the edicts of the praetor, an annual proclamation setting forth the manner in which the magistrate intended to administer the law during his year of office. Each successive praetor adopted the edict of his predecessor, and added new equitable rules of his own, until the further growth of the irregular code was stopped by the praetor Salvius Julianus in the reign of Hadrian.

The place of the praetor was occupied in English jurisprudence by the lord high chancellor. The real beginning of English equity is to be found in the custom of handing over to that officer, for adjudication, the complaints which were addressed to the king, praying for remedies beyond the reach of the common law. Over and above the authority delegated to the ordinary councils or courts, a reserve of judicial power was believed to reside in the king, which was invoked as of grace by the suitors who could not obtain relief from any inferior tribunal. To the chancellor, as already the head of the judicial system, these petitions were referred, although he was not at first the only officer through whom the prerogative of grace was administered. In the reign of Edward III. the equitable jurisdiction of the court appears to have been established. Its constitutional origin was analogous to that of the star chamber and the court of requests. The latter, in fact, was a minor court of equity attached to the lord privy seal as the court of chancery was to the chancellor. The successful assumption of extraordinary or equitable jurisdiction by the chancellor caused similar pretensions to be made by other officers and courts. "Not only the court of exchequer, whose functions were in a peculiar manner connected with royal authority, but the counties palatine of Chester, Lancaster and Durham, the court of great session in Wales, the universities, the city of London, the Cinque Ports and other places silently assumed extraordinary jurisdiction similar to that exercised in the court of chancery." Even private persons, lords and ladies, affected to establish in their honours courts of equity.

English equity has one marked historical peculiarity, viz. that it established itself in a set of independent tribunals which remained in standing contrast to the ordinary courts for many hundred years. In Roman law the judge gave the preference to the equitable rule; in English law the equitable rule was enforced by a distinct set of judges. One cause of this separation was the rigid adherence to precedent on the part of the common law courts. Another was the jealousy prevailing in England against the principles of the Roman law on which English equity to a large extent was founded.

When a case of prerogative was referred to the chancellor in the reign of Edward III., he was required to grant such remedy as should be consonant to honesty (*honestas*). And honesty, conscience and equity were said to be the fundamental principles of the court. The early chancellors were ecclesiastics, and under their influence not only moral principles, where these were not regarded by the common law, but also the equitable principles of the Roman law were introduced into English jurisprudence. Between this point and the time when equity became settled as a portion of the legal system, having fixed principles of its own, various views of its nature seem to have prevailed. For a long time it was thought that precedents could have no place in equity, inasmuch as it professed in each case to do that which was just; and we find this view maintained by common lawyers after it had been abandoned by the professors of equity themselves. G. Spence, in his book on the *Equitable Jurisdiction of* *the Court of Chancery*, quotes a case in the reign of Charles II., in which chief justice Vaughan said:

> "I wonder to hear of citing of precedents in matter of equity, for if there be equity in a case, that equity is an universal truth, and there can be no precedent in it; so that in any precedent that can be produced, if it be the same with this case, the reason and equity is the same in itself; and if the precedent be not the same case with this it is not to be cited."

But the lord keeper Bridgeman answered:

> "Certainly precedents are very necessary and useful to us, for in them we may find the reasons of the equity to guide us, and besides the authority of those who made them is much to be regarded. We shall suppose they did it upon great consideration and weighing of the matter, and it would be very strange and very ill if we should disturb and set aside what has been the course for a long series of times and ages."

Selden's description is well known: "Equity is a roguish thing. 'Tis all one as if they should make the standard for measure the chancellor's foot." Lord Nottingham in 1676 reconciled the ancient theory and the established practice by saying that the conscience which guided the court was not the natural conscience of the man, but the civil and political conscience of the judge. The same tendency of equity to settle into a system of law is seen in the recognition of its limits—in the fact that it did not attempt in all cases to give a remedy when the rule of the common law was contrary to justice. Cases of hardship, which the early chancellors would certainly have relieved, were passed over by later judges, simply because no precedent could be found for their interference. The point at which the introduction of new principles of equity finally stopped is fixed by Sir Henry Maine in the chancellorship of Lord Eldon, who held that the doctrines of the court ought to be as well settled and made as uniform almost as those of the common law. From that time certainly equity, like common law, has professed to take its principles wholly from recorded decisions and statute law. The view (traceable no doubt to the Aristotelian definition) that equity mitigates the hardships of the law where the law errs through being framed in universals, is to be found in some of the earlier writings. Thus in the *Doctor and Student* it is said:

> "Law makers take heed to such things as may often come, and not to every particular case, for they could not though they would; therefore, in some cases it is necessary to leave the words of the law and follow that reason and justice requireth, and to that intent equity is ordained, that is to say, to temper and mitigate the rigour of the law."

And Lord Ellesmere said:

> "The cause why there is a chancery is for that men's actions are so divers and infinite that it is impossible to make any general law which shall aptly meet with every particular act and not fail in some circumstances."

Modern equity, it need hardly be said, does not profess to soften the rigour of the law, or to correct the errors into which it falls by reason of its generality.

To give any account, even in outline, of the subject matter of equity within the necessary limits of this article would be impossible. It will be sufficient to say here that the classification generally adopted by text-writers is based upon the relations of equity to the common law, of which some explanation is given above. Thus equitable jurisdiction is said to be exclusive, concurrent or auxiliary. Equity has *exclusive* jurisdiction where it recognizes rights which are unknown to the common law. The most important example is trusts. Equity has *concurrent* jurisdiction in cases where the law recognized the right but did not give adequate relief, or did not give relief without circuity of action or some similar inconvenience. And equity has *auxiliary* jurisdiction when the machinery of the courts of law was unable to procure the necessary evidence.

"The evils of this double system of judicature," says the report of the judicature commission (1863–1867), "and the confusion and conflict of jurisdiction to which it has led, have been long known and acknowledged." A partial attempt to meet the difficulty was made by several acts of parliament (passed after the reports of commissions appointed in 1850 and 1851), which enabled courts of law and equity both to exercise certain powers formerly peculiar to one or other of them. A more complete remedy was introduced by the Judicature Act 1873, which consolidated the courts of law and equity, and ordered that law and equity should be administered concurrently according to the rules contained in the 26th section of the act. At the same time many matters of equitable jurisdiction are still left to the chancery division of the High Court in the first instance. (See Chancery.)

Authorities.—The principles of equity as set out by the following writers may be consulted: J. Story, J. W. Smith, H. A. Smith and W. Ashburner; and for the history see G. Spence, *The Equitable Jurisdiction of the Court of Chancery* (2 vols., 1846–1849); D. M. Kerly, *Historical Sketch of the Equitable Jurisdiction of the Court of Chancery* (1890).

EQUIVALENT, in chemistry, the proportion of an element which will combine with or replace unit weight of hydrogen. When multiplied by the valency it gives the atomic weight. The determination of equivalent weights is treated in the article Stoichiometry. (See also Chemistry.) In a more general sense the term "equivalent" is used to denote quantities of substances which neutralize one another, as for example $NaOH$, HCl, $\frac{1}{2}H_2SO_4$, $\frac{1}{2}Ba(OH)_2$.

ÉRARD, SÉBASTIEN (1752–1831), French manufacturer of musical instruments, distinguished especially for the improvements he made upon the harp and the pianoforte, was born at Strassburg on the 5th of April 1752. While a boy he showed great aptitude for practical geometry and architectural drawing, and in the workshop of his father, who was an upholsterer, he found opportunity for the early exercise of his mechanical ingenuity. When he was sixteen his father died, and he removed to Paris where he obtained employment with a harpsichord maker. Here his remarkable constructive skill, though it speedily excited the jealousy of his master and procured his dismissal, almost equally soon attracted the notice of musicians and musical instrument makers of eminence. Before he was twenty-five he set up in business for himself, his first workshop being a room in the hotel of the duchesse de Villeroi, who gave him warm encouragement. Here he constructed in 1780 his first pianoforte, which was also one of the first manufactured in France. It quickly secured for its maker such a reputation that he was soon overwhelmed with commissions, and finding assistance necessary, he sent for his brother, Jean Baptiste, in conjunction with whom he established in the rue de Bourbon, in the Faubourg St Germain, a piano manufactory, which in a few years became one of the most celebrated in Europe. On the outbreak of the Revolution he went to London where he established a factory. Returning to Paris in 1796, he soon afterwards introduced grand pianofortes, made in the English fashion, with improvements of his own. In 1808 he again visited London, where, two years later, he produced his first double-movement harp. He had previously made various improvements in the manufacture of harps, but the new instrument was an immense advance upon anything he had before produced, and obtained such a reputation that for some time he devoted himself exclusively to its manufacture. It has been said that in the year following his invention he made harps to the value of £25,000. In 1812 he returned to Paris, and continued to devote himself to the further perfecting of the two instruments with which his name is associated. In 1823 he crowned his work by producing his model grand pianoforte with the double escapement. Érard died at Passy, on the 5th of August 1831. (See also Harp and Pianoforte.)

ERASMUS, DESIDERIUS (1466–1536), Dutch scholar and theologian, was born on the night of the 27/28th of October, probably in 1466; but his statements about his age are conflicting, and in view of his own uncertainty (*Ep.* x. 29: 466) and the weakness of his memory for dates, the year of his birth cannot be definitely fixed. His father's name seems to have been Rogerius Gerardus. He himself was christened Herasmus; but in 1503, when becoming familiar with Greek, he assimilated the name to a fancied Greek original, which he had a few years before Latinized into Desyderius. A contemporary authority states that he was born at Gouda, his father's native town;

but he adopted the style *Rotterdammensis* or *Roterodamus*, in accordance with a story to which he himself gave credence. His first schooling was at Gouda under Peter Winckel, who was afterwards vice-pastor of the church. In the dull round of instruction in "grammar" he did not distinguish himself, and was surpassed by his early friend and companion, William Herman, who was Winckel's favourite pupil. From Gouda the two boys went to the school attached to St Lebuin's church at Deventer, which was one of the first in northern Europe to feel the influence of the Renaissance. Erasmus was at Deventer from 1475 to 1484, and when he left, had learnt from Johannes Sinthius (Syntheim) and Alexander Hegius, who had come as headmaster in 1483, the love of letters which was the ruling passion of his life. At some period, perhaps in an interval of his time at Deventer, he was a chorister at Utrecht under the famous organist of the cathedral, Jacob Obrecht.

About 1484 Erasmus' father died, leaving him and an elder brother Peter, both born out of wedlock, to the care of guardians, their mother having died shortly before. Erasmus was eager to go to a university, but the guardians, acting under a perhaps genuine enthusiasm for the religious life, sent the boys to another school at Hertogenbosch; and when they returned after two or three years, prevailed on them to enter monasteries. Peter went to Sion, near Delft; Erasmus after prolonged reluctance became an Augustinian canon in St Gregory's at Steyn, a house of the same Chapter near Gouda. There he found little religion and less refinement; but no serious difficulty seems to have been made about his reading the classics and the Fathers with his friends to his heart's content. The monastery once entered, there was no drawing back; and Erasmus passed through the various stages which culminated in his ordination as priest on the 25th of April 1492.

But his ardent spirit could not long be content with monastic life. He brought his attainments somehow to the notice of Henry of Bergen, bishop of Cambrai, the leading prelate at the court of Brussels; and about 1494 permission was obtained for him to leave Steyn and become Latin secretary to the bishop, who was then preparing for a visit to Rome. But the journey was abandoned, and after some months Erasmus found that even with occasional chances to read at Groenendael, the life of a court was hardly more favourable to study than that of Steyn. At the suggestion of a friend, James Batt, he applied to his patron for leave to go to Paris University. The bishop consented and promised a small pension; and in August 1495 Erasmus entered the "domus pauperum" of the college of Montaigu, which was then under the somewhat rigid rule of the reformer Jan Standonck. He at once introduced himself to the distinguished French historian and diplomatist Robert Gaguin (1425–1502) and published a small volume of poems; and he became intimate with Johann Mauburnus (Mombaer), the leader of a mission summoned from Windesheim in 1496 to reform the abbey of Château-Landon. But the life at Montaigu was too hard for him. Every Lent he fell ill and had to return to Holland to recover. He continued to read nevertheless for a degree in theology, and at some time completed the requirements for the B.D. After a year or two he left Montaigu and eked out his money from the bishop by taking pupils. One of these, a young Englishman, William Blount, 4th Baron Mountjoy (d. 1534), persuaded him to visit England in the spring of 1499.

Being without a benefice, he had no settled income to look to, and apart from the precarious profits of teaching and writing books, could only wait on the generosity of patrons to supply him with the leisure he craved. The faithful Batt had sought a pension for him from his own patroness, Anne of Borsselen, the Lady of Veere, who resided at the castle of Tournehem near Calais, and whose son Batt was now teaching. But as nothing promised at once, Erasmus accepted Mountjoy's offer, and thus a tie was formed which led Mountjoy then or a few years later to grant him a pension of £20 for life. Otherwise the visit to England gave no hope of preferment; and in the summer Erasmus prepared to leave. He was delayed, and used the interval to spend two or three months at Oxford, where he found John Colet lecturing on the Epistle to the Romans. Discussions between them on theological questions soon convinced Colet of Erasmus' worth, and he sought to persuade him to stay and teach at Oxford. But Erasmus could not be content with the Bible in Latin. Oxford could teach him no Greek, so away he must go.

In January 1500 he returned to Paris, which though it could offer no Greek teacher better than George Hermonymus, was at least a better centre for buying and for printing books. The next few years were spent still in preparation, supported by pupils' fees and the dedications of books; the *Collectanea adagiorum* in June 1500 to Mountjoy, and some devotional and moral compositions to Batt's patroness and her son. When the plague drove him from Paris, he went to Orleans or Tournehem or St Omer, as the way opened. From 1502 to 1504 he was at Louvain, still declining to teach publicly; among his friends being the future Pope Adrian VI. In January 1504 the archduke Philip gave him fifty livres for the Panegyric which "*ung religieux de l'ordre de St Augustin*" had composed on his Spanish journey; and in October, ten more, for the maintenance of his studies.

He had been working hard at Greek, of which he now felt himself master, at the Fathers (above all at Jerome), and at the Epistles of St Paul, fulfilling the promise made to Colet in Oxford, to give himself to sacred learning. But the bent of his reading is shown by the manuscript with which he returned to Paris at the close of 1504—Valla's *Annotations on the New Testament*, which Badius printed for him in 1505.

Shortly afterwards Lord Mountjoy invited him again to England, and this visit was more successful. He found in London a circle of learned friends through whom he was introduced to William Warham, archbishop of Canterbury, Richard Foxe, bishop of Winchester and other dignitaries. John Fisher (bishop of Rochester), who was then superintending the foundation of Christ's College for the Lady Margaret, took him down to Cambridge for the king's visit; and at length the opportunity came to fulfil his dream of seeing Italy. Baptista Boerio, the king's physician, engaged him to accompany his two sons thither as supervisor of their studies. In September 1506 he set foot on that sacred soil, and took his D.D. at Turin. For a year he remained with his pupils at Bologna, and then, his engagement completed, negotiated with Aldus Manutius for a new edition of his *Adagia* upon a very different scale. The volume of 1500 had been jejune, written when he knew nothing of Greek: 800 adages put together with scanty elucidations. In 1508 he had conceived a work on lines more to the taste of the learned world, full of apt and recondite learning, and now and again relieved by telling comments or lively anecdotes. Three thousand and more collected justified a new title—*Chiliades adagiorum*; and the author's reputation was now established. So secure in public favour did the book in time become, that the council of Trent, unable to suppress it and not daring to overlook it, ordered the preparation of a castrated edition.

To print the *Adagia* he had gone to Venice, where he lived with Andrea Torresano of Asola (Asulanus) and did the work of two men, writing and correcting proof at the same time. When it was finished, with an ample re-dedication to Mountjoy, a new pupil presented himself, Alexander Stewart, natural son of James IV. of Scotland—perhaps through a connexion formed in early days at Paris. They went together to Siena and Rome and then on to Campania, thirsty under the summer sun. When they returned to Rome, his pupil departed to Scotland, to fall a few years later by his father's side at Flodden; Erasmus also found a summons to call him northwards.

On the death of Henry VII. Lord Mountjoy, who had been companion to Prince Henry in his studies, had become a person of influence. He wrote to Erasmus of a land flowing with milk and honey under the "divine" young king, and with Warham sent him £10 for journey money. At first Erasmus hesitated. He had been disappointed in Italy, to find that he had not much to learn from its famed scholarship; but he had made many friends in Aldus's circle—Marcus Musurus, John Lascaris, Baptista Egnatius, Paul Bombasius, Scipio Carteromachus; and his reception had been flattering, especially in Rome, where cardinals had delighted to honour him. But to remain in Rome was to sell himself. He might have the leisure which was so indispensable, but at price of the freedom to read, think, write what he liked. He decided, therefore, to go, though with regrets; which returned upon him sometimes in after years, when the English hopes had not borne fruit.

In the autumn he reached London, and in Thomas More's house in Bucklersbury wrote the witty satire which Milton found "in every one's hands" at Cambridge in 1628, and which is read to this day. The *Moriae encomium* was a sign of his decision. In it kings and princes, bishops and popes alike are shown to be in bondage to Folly; and no class of men is spared. Its author was willing to be beholden to any one for leisure; but he would be no man's slave. For the next eighteen months he is entirely lost to view; when he reappears in April 1511, he is leaving More's house and taking the *Moria* to be printed privily in Paris. Wherever they were spent, these must have been months of hard work, as were the years that followed. His time was now come. The long preparation and training, bought by privation and uncongenial toil, was over, and he was ready to apply himself to the scientific study of sacred letters. His English patrons were liberal. Fisher sent him in August 1511 to teach in Cambridge; Warham gave him a benefice, Aldington in Kent, worth £33, 6s. 8d. a year, and in violation of his own rule commuted it for a pension of £20 charged on the living; and the dedications of his books were fruitful. In Cambridge he completed his work on the New Testament, the Letters of Jerome, and Seneca; and then in 1514, when there seemed no prospect of ampler preferment, he determined to transfer himself to Basel and give the results of his labours to the world.

The origin of Erasmus's connexion with Johann Froben is not clear. In 1511 he was preparing to reprint his *Adagia* with Jodocus Badius, who in the following year was to have also Seneca and Jerome. But in 1513 Froben, who had just reprinted the Aldine *Adagia*, acquired through a bookseller-agent Erasmus' amended copy which had been destined for Badius. That the agent was acting entirely on his own responsibility may be doubted; for within a few months Erasmus had decided to betake himself to Basel, bearing with him Seneca and Jerome, the latter to be incorporated in the great edition which Johannes Amerbach and Froben had had in hand since 1510. In Germany he was widely welcomed. The Strassburg Literary Society fêted him, and Johannes Sapidus, headmaster of the Latin school at Schlettstadt, rode with him into Basel. Froben received him with open arms, and the presses were soon busy with his books. Through the winter of 1514–1515 Erasmus worked with the strength of ten; and after a brief visit to England in the spring, the New Testament was set up. Around him was a circle of students, some young, some already distinguished—the three sons of Froben's partner, Johannes Amerbach, who was now dead, Beatus Rhenanus, Wilhelm Nesen, Ludwig Ber, Heinrich Glareanus, Nikolaus Gerbell, Johannes Oecolampadius—who looked to him as their head and were proud to do him service.

Though from this time forward Basel became the centre of occupation and interest for Erasmus, yet for the next few years he was mainly in the Netherlands. On the completion of the New Testament in 1516 he returned to his friends in England; but his appointment, then recent, as councillor to the young king Charles, brought him back to Brussels in the autumn. In the spring of 1517 he went for the last time to England, about a dispensation from wearing his canonical dress, obtained originally from Julius II. and recently confirmed by Leo X., and in May 1518 he journeyed to Basel for three months to set the second edition of the New Testament in progress. But with these exceptions he remained in proximity to the court, living much at Louvain, where he took great interest in the foundation of Hieronymus Busleiden's Collegium Trilingue. His circumstances had improved so much, by pensions, the presents which were showered upon him, and the sale of his books, that he was now in a position to refuse all proposals which would have interfered with his cherished independence. The general ardour for the restoration of the arts and of learning created an aristocratic public, of which Erasmus was supreme pontiff. Luther spoke to the people and the ignorant; Erasmus had the ear of the educated class. His friends and admirers were distributed over all the countries of Europe, and presents were continually arriving from small as well as great, from a donation of 200 florins, made by Pope Clement VII., down to sweetmeats and comfits contributed by the nuns of Cologne (*Ep.* 666). From England, in particular, he continued to receive supplies of money. In the last year of his life Thomas Cromwell sent him 20 angels, and Archbishop Cranmer 18. Though Erasmus led a very hard-working and far from luxurious life, and had no extravagant habits, yet he could not live upon little. The excessive delicacy of his constitution, not pampered appetite, exacted some unusual indulgences. He could not bear the stoves of Germany, and required an open fireplace in the room in which he worked. He was afflicted with the stone, and obliged to be particular as to what he drank. Beer he could not touch. The white wines of Baden or the Rhine did not suit him; he could only drink those of Burgundy or Franche-Comté. He could neither eat, nor bear the smell of, fish. "His heart," he said, "was Catholic, but his stomach was Lutheran." For his constant journeys he required two horses, one for himself and one for his attendant. And though he was almost always found in horse-flesh by his friends, the keep had to be paid for. For his literary labours and his extensive correspondence he required one or more amanuenses. He often had occasion, on his own business, or on that of Froben's press, to send special couriers to a distance, employing them by the way in collecting the free gifts of his tributaries.

Precarious as these means of subsistence seem, he preferred the independence thus obtained to an assured position which would have involved obligations to a patron or professional duties which his weak health would have made onerous. The duke of Bavaria offered to dispense with teaching, if he would only reside, and would have named him on these terms to a chair in his new university of Ingolstadt, with a salary of 200 ducats, and the reversion of one or more prebendal stalls. The archduke Ferdinand offered a pension of 400 florins, if he would only come to reside at Vienna. Adrian VI. offered him a deanery, but the offer seems to have been of a possible and not an actual deanery. Offers, flattering but equally vague, were made from France, on the part of the bishop of Bayeux, and even of Francis I. "Invitor amplissimis conditionibus; offeruntur dignitates et episcopatus; plane rex essem, si juvenis essem" (*Ep.* xix. 106; 735). Erasmus declined all, and in November 1521 settled permanently at Basel, in the capacity of general editor and literary adviser of Froben's press. As a subject of the emperor, and attached to his court by a pension, it would have been convenient to him to have fixed his residence in Louvain. But the bigotry of the Flemish clergy, and the monkish atmosphere of the university of Louvain, overrun with Dominicans and Franciscans, united for once in their enmity to the new classical learning, inclined Erasmus to seek a more congenial home in Basel. To Froben his arrival was the advent of the very man whom he had long wanted. Froben's enterprise, united with Erasmus's editorial skill, raised the press of Basel, for a time, to be the most important in Europe. The death of Froben in 1527, the final separation of Basel from the Empire, the wreck of learning in the religious disputes, and the cheap paper and scamped work of the Frankfort presses, gradually withdrew the trade from Basel. But during the years of Erasmus's co-operation the Froben press took the lead of all the presses in Europe, both in the standard value of the works published and in style of typographical execution. Like some other publishers who preferred reputation to returns in money, Froben died poor, and his impressions never reached the splendour afterwards attained by those of the Estiennes, or of Plantin. The series of the Fathers alone contains Jerome (1516), Cyprian (1520), Pseudo-Arnobius (1522), Hilarius (1523), Irenaeus (Latin, 1526), Ambrose (1527), Augustine (1528), Chrysostom

(Latin, 1530), Basil (Greek, 1532, the first Greek author printed in Germany), and Origen (Latin, 1536). In these editions, partly texts, partly translations, it is impossible to determine the respective shares of Erasmus and his many helpers. The prefaces and dedications are all written by him, and some of them, as that to the Hilarius, are of importance for the history as well of the times as of Erasmus himself. Of his most important edition, that of the Greek text of the New Testament, something will be said farther on.

In this "mill," as he calls it, Erasmus continued to grind incessantly for eight years. Besides his work as editor, he was always writing himself some book or pamphlet called for by the event of the day, some general fray in which he was compelled to mingle, or some personal assault which it was necessary to repel. But though painfully conscious how much his reputation as a writer was damaged by this extempore production, he was unable to resist the fatal facility of print. He was the object of those solicitations which always beset the author whose name upon the title page assures the sale of a book. He was besieged for dedications, and as every dedication meant a present proportioned to the circumstances of the dedicatee, there was a natural temptation to be lavish of them. Add to this a correspondence so extensive as to require him at times to write forty letters in one day. "I receive daily," he writes, "letters from remote parts, from kings, princes, prelates and men of learning, and even from persons of whose existence I was ignorant." His day was thus one of incessant mental activity; but hard work was so far from breeding a distaste for his occupation, that reading and writing grew ever more delightful to him (*literarum assiduitas non modo mihi fastidium non parit, sed voluptatem; crescit scribendo scribendi studium*).

Shortly after Froben's death the disturbances at Basel, occasioned by the zealots for the religious revolution which was in progress throughout Switzerland, began to make Erasmus desirous of changing his residence. He selected Freiburg in the Breisgau, as a city which was still in the dominion of the emperor, and was free from religious dissension. Thither he removed in April 1529. He was received with public marks of respect by the authorities, who granted him the use of an unfinished residence which had been begun to be built for the late emperor Maximilian. Erasmus proposed only to remain at Freiburg for a few months, but found the place so suited to his habits that he bought a house of his own, and remained there six years. A desire for change of air—he fancied Freiburg was damp—rumours of a new war with France, and the necessity of seeing his *Ecclesiastes* through the press, took him back to Basel in 1535. He lived now a very retired life, and saw only a small circle of intimate friends. A last attempt was made by the papal court to enlist him in some public way against the Reformation. On the election of Paul III. in 1534, he had, as usual, sent the new pope a congratulatory letter. After his arrival in Basel, he received a complimentary answer, together with the nomination to the deanery of Deventer, the income of which was reckoned at 600 ducats. This nomination was accompanied with an intimation that more was in store for him, and that steps would be taken to provide for him the income, viz., 3000 ducats, which was necessary to qualify for the cardinal's hat. But Erasmus was even less disposed now than he had been before to barter his reputation for honours. His health had been for some years gradually declining, and disease in the shape of gout gaining upon him. In the winter of 1535–1536 he was confined entirely to his chamber, many days to his bed. Though thus afflicted he never ceased his literary activity, dictating his tract *On the Purity of the Church*, and revising the sheets of a translation of Origen which was passing through the Froben press. His last letter is dated the 28th of June 1536, and subscribed "Eras. Rot aegra manu." "I have never been so ill in my life before as I am now,—for many days unable even to read." Dysentery setting in carried him off on the 12th of July 1536, in his 70th year.

By his will, made on the 12th of February 1536, he left what he had to leave, with the exception of some legacies, to Bonifazius Amerbach, partly for himself, partly in trust for the benefit of the aged and the infirm, or to be spent in portioning young girls, and in educating young men of promise. He left none of the usual legacies for masses or other clerical purposes, and was not attended by any priest or confessor in his last moments.

Erasmus's features are familiar to all, from Holbein's many portraits or their copies. Beatus Rhenanus "summus Erasmi observator," as he is called by de Thou, describes his person thus: "In stature not tall, but not noticeably short; in figure well built and graceful; of an extremely delicate constitution, sensitive to the slightest changes of climate, food or drink. After middle life he suffered from the stone, not to mention the common plague of studious men, an irritable mucous membrane. His complexion was fair; light blue eyes, and yellowish hair. Though his voice was weak, his enunciation was distinct; the expression of his face cheerful; his manner and conversation polished, affable, even charming." His highly nervous organization made his feelings acute, and his brain incessantly active. Through his ready sympathy with all forms of life and character, his attention was always alive. The active movement of his spirit spent itself, not in following out its own trains of thought, but in outward observation. No man was ever less introspective, and though he talks much of himself, his egotism is the genial egotism which takes the world into its confidence, not the selfish egotism which feels no interest but in its own woes. He says of himself, and justly, "that he was incapable of dissimulation" (*Ep.* xxvi. 19; 1152). There is nothing behind, no pose, no scenic effect. It may be said of his letters that in them "tota patet vita senis." His nature was flexible without being faultily weak. He has many moods and each mood imprints itself in turn on his words. Hence, on a superficial view, Erasmus is set down as the most inconsistent of men. Further acquaintance makes us feel a unity of character underlying this susceptibility to the impressions of the moment. His seeming inconsistencies are reconciled to apprehension, not by a formula of the intellect, but by the many-sidedness of a highly impressible nature. In the words of J. Nisard, Erasmus was one of those "dont la gloire a été de beaucoup comprendre et d'affirmer peu."

This equal openness to every vibration of his environment is the key to all Erasmus's acts and words, and among them to the middle attitude which he took up towards the great religious conflict of his time. The reproaches of party assailed him in his lifetime, and have continued to be heaped upon his memory. He was loudly accused by the Catholics of collusion with the enemies of the faith. His powerful friends, the pope, Wolsey, Henry VIII., the emperor, called upon him to declare against Luther. Theological historians from that time forward have perpetuated the indictment that Erasmus sided with neither party in the struggle for religious truth. The most moderate form of the censure presents him in the odious light of a trimmer; the vulgar and venomous assailant is sure that Erasmus was a Protestant at heart, but withheld the avowal that he might not forfeit the worldly advantages he enjoyed as a Catholic. When by study of his writings we come to know Erasmus intimately, there is revealed to us one of those natures to which partisanship is an impossibility. It was not timidity or weakness which kept Erasmus neutral, but the reasonableness of his nature. It was not only that his intellect revolted against the narrowness of party, his whole being repudiated its clamorous and vulgar excesses. As he loathed fish, so he loathed clerical fanaticism. Himself a Catholic priest—"the glory of the priesthood and the shame"—the tone of the orthodox clergy was distasteful to him; the ignorant hostility to classical learning which reigned in their colleges and convents disgusted him. In common with all the learned men of his age, he wished to see the power of the clergy broken, as that of an obscurantist army arrayed against light. He had employed all his resources of wit and satire against the priests and monks, and the superstitions in which they traded, long before Luther's name was heard of. The motto which was already current in his lifetime, "that Erasmus laid the egg and Luther hatched it," is so far true, and no more. Erasmus would have suppressed the monasteries, put an end to the domination of the clergy, and swept away scandalous and profitable abuses, but to attack the church or re-mould received theology was far from his thoughts. And when out of Luther's revolt there arose a new fanaticism—that of evangelism, Erasmus recoiled from the violence of the new preachers. "Is it for this," he writes to Melanchthon (*Ep.* xix. 113; 703), "that we have shaken off bishops and popes, that we may come under the yoke of such madmen as Otto and Farel?" Passages have been collected, and it is an easy task, from the writings of Erasmus to prove that he shared the doctrines of the Reformers. Passages equally strong might be culled to show that he repudiated them. The truth is that theological questions in themselves had no attraction for him. And when a theological position was emphasized by party passion it became odious to him. In the words of Drummond: "Erasmus was in his own age the apostle of common sense and of rational religion. He did not care for dogma, and accordingly the dogmas of Rome, which had the consent of the Christian world, were in his eyes preferable to the dogmas of Protestantism. . . . From the beginning to the end of his career he remained true to the purpose of his life, which was to fight the battle of sound learning and plain common sense against the powers of ignorance and superstition, and amid all the convulsions of that period he never once lost his mental balance."

Erasmus is accused of indifference. But he was far from indifferent to the progress of the revolution. He was keenly alive to its pernicious influence on the cherished interest of his life, the cause of learning. "I abhor the evangelics, because it is through them that literature is everywhere declining, and upon the point of perishing." He had been born with the hopes of the Renaissance, with its anticipation of a new Augustan age, and had seen this fair promise blighted by the irruption of a new horde of theological polemics, worse than the old scholastics, inasmuch as they were revolutionary instead of conservative. Erasmus never flouted at religion nor even at theology as such, but only at blind and intemperate theologians.

In the mind of Erasmus there was no metaphysical inclination; he was a man of letters, with a general tendency to rational views on every subject which came under his pen. His was not the mind to originate, like Calvin, a new scheme of Christian thought. He is at his weakest in defending free will against Luther, and indeed he can hardly be said to enter on the metaphysical question. He treats the dispute entirely from the outside. It is impossible in reading Erasmus not to be reminded of the rationalist of the 18th century. Erasmus has been called the "Voltaire of the Renaissance." But there is a vast difference in the relations in which they respectively stood to the church and to Christianity. Voltaire, though he did not originate, yet adopted a moral and religious scheme which he sought to substitute for the church tradition. He waged war, not only against the clergy, but against the church and its sovereigns. Erasmus drew the line at the first of these. He was not an anticipation of the 18th century; he was the man of his age, as Voltaire of his; though Erasmus did not intend it, he undoubtedly shook the ecclesiastical edifice in all its parts; and, as Melchior Adam says of him, "pontifici Romano plus nocuit jocando quam Lutherus stomachando."

But if Erasmus was unlike the 18th century rationalist in that he did not declare war against the church, but remained a Catholic and mourned the disruption, he was yet a true rationalist in principle. The principle that reason is the one only guide of life, the supreme arbiter of all questions, politics and religion included, has its earliest and most complete exemplar in Erasmus. He does not dogmatically denounce the rights of reason, but he practically exercises them. Along with the charm of style, the great attraction of the writings of Erasmus is this unconscious freedom by which they are pervaded.

It must excite our surprise that one who used his pen so freely should have escaped the pains and penalties which invariably overtook minor offenders in the same kind. For it was not only against the clergy and the monks that he kept up a ceaseless stream of satiric raillery; he treated nobles, princes and kings with equal freedom. No 18th century republican has used stronger language than has this pensioner of Charles V. "The people build cities, princes pull them down; the industry of the citizens creates wealth for rapacious lords to plunder; plebeian magistrates pass good laws for kings to violate; the people love peace, and their rulers stir up war." Such outbursts are frequent in the *Adagia*. These freedoms are part cause of Erasmus's popularity. He was here in sympathy with the secret sore of his age, and gave utterance to what all felt but none dared to whisper but he. It marks the difference between 1513 and 1669 that, in a reprint of the *Julius Exclusus* published in 1669 at Oxford, it was thought necessary to leave out a sentence in which the writer of that dialogue, supposed by the editor to be Erasmus, asserts the right of states to deprive and punish bad kings. It is difficult to say to what we are to ascribe his immunity from painful consequences. We have to remember that he was removed from the scene early in the reaction, before force was fully organized for the suppression of the revolution. And his popular works, the *Adagia*, and the *Colloquia* (1524), had established themselves as standard books in the more easy going age, when power, secure in its unchallenged strength, could afford to laugh with the laughers at itself. At the date of his death the Catholic revival, with its fell antipathy to art and letters, was only in its infancy; and when times became dangerous, Erasmus cautiously declined to venture out of the protection of the Empire, refusing repeated invitations to Italy and to France. "I had thought of going to Besançon," he said, "ne non essem in ditione Caesaris" (*Ep.* xxx. 74; 1299). In Italy a Bembo and a Sadoleto wrote a purer Latin than Erasmus, but contented themselves with pretty phrases, and were careful to touch no living chord of feeling. In France it was necessary for a Rabelais to hide his free-thinking under a disguise of revolting and unintelligible jargon. It was only in the Empire that such liberty of speech as Erasmus used was practicable, and in the Empire Erasmus passed for a moderate man. Upon the strength of an established character for moderation he enjoyed an exceptional licence for the utterance of unwelcome truths; and in spite of his flings at the rich and powerful, he remained through life a privileged person with them.

But though the men of the keys and the sword let him go his way unmolested, it was otherwise with his brethren of the pen. A man who is always launching opinions must expect to be retorted on. And when these judgments were winged by epigram, and weighted by the name of Erasmus, who stood at the head of letters, a widespread exasperation was the consequence. Disraeli has not noticed Erasmus in his *Quarrels of Authors*, perhaps because Erasmus's quarrels would require a volume to themselves. "So thin-skinned that a fly would draw blood," as the prince of Carpi expressed it, he could not himself restrain his pen from sarcasm. He forgot that though it is safe to lash the dunces, he could not with equal impunity sneer at those who, though they might not have the ear of the public as he had, could yet contradict and call names. And when literary jealousy was complicated with theological differences, as in the case of the free-thinkers, or with French vanity, as in that of Budaeus, the cause of the enemy was espoused by a party and a nation. The quarrel with Budaeus was strictly a national one. Cosmopolitan as Erasmus was, to the French literati he was still the Teuton. Étienne Dolet calls him "enemy of Cicero, and jealous detractor of the French name." The only contemporary name which could approach to a rivalry with his was that of Budaeus (Budé), who was exactly contemporary, having been born in the same year as Erasmus. Rivals in fame, they were unlike in accomplishment, each having the quality which the other wanted. Budaeus, though a Frenchman, knew Greek well; Erasmus, though a Dutchman, very imperfectly. But the Frenchman Budaeus wrote an execrable Latin style, unreadable then as now, while the Teuton Erasmus charmed the reading world with a style which, though far from good Latin, is the most delightful which the Renaissance has left us.

The style of Erasmus is, considered as Latin, incorrect, sometimes even barbarous, and far removed from any classical model. But it has qualities far above purity. The best Italian Latin is but an echo and an imitation, like the painted glass which we put in our churches, it is an anachronism. Bembo, Sadoleto and the rest write purely in a dead language. Erasmus's Latin was a living and spoken tongue. Though Erasmus had passed nearly all his life in England, France and Germany, his conversation was Latin; and the language in which he talked about common things he wrote. Hence the spontaneity and naturalness of his page, its flavour of life and not of books. He writes from himself, and not out of Cicero. Hence, too, he spoiled nothing by anxious revision in terror lest some phrase not of the golden age should escape from his pen. He confesses apologetically to Christopher Longolius (*Ep.* iii. 63; 402) that it was his habit to extemporize all he wrote, and that this habit was incorrigible; "effundo verius quam scribo omnia." He complains that much reading of the works of St Jerome had spoiled his Latin; but, as Scaliger says (*Scalig*^{a} 2^{a}), "Erasmus's language is better than St Jerome's." The same critic, however, thought Erasmus would have done better "if he had kept more closely to the classical models."

In the annals of classical learning Erasmus may be regarded as constituting an intermediate stage between the humanists of the Latin Renaissance and the learned men of the age of Greek scholarship, between Angelo Poliziano and Joseph Scaliger. Erasmus, though justly styled by Muretus (*Varr. Lect.* 7, 15) "eruditus sane vir, ac multae lectionis," was not a "learned" man in the special sense of the word—not an "érudit." He was more than this; he was the "man of letters"—the first who had appeared in Europe since the fall of the Roman empire. His acquirements were vast, and they were all brought to bear upon the life of his day. He did not make a study apart of antiquity for its own sake, but used it as an instrument of culture. He did not worship, imitate and reproduce the classics, like the Latin humanists who preceded him; he did not master them and reduce them to a special science, as did the French Hellenists who succeeded him. He edited many authors, it is true, but he had neither the means of forming a text, nor did he attempt to do so. In editing a father, or a classic, he had in view the practical utility of the general reader, not the accuracy required by the gild of scholars. "His Jerome," says J. Scaliger, "is full of sad blunders" (*Scalig*^{a} 2^{a}). Even Julien Garnier could discover that Erasmus "falls in his haste into grievous error in his Latin version of St Basil, though his Latinity is superior to that of the other translators" (Pref. in *Opp. St. Bas.*, 1721). It must be remembered that the commercial interests of Froben's press led to the introduction of Erasmus's name on many a title page when he had little to do with the book, *e.g.* the Latin *Josephus* of 1524 to which Erasmus only contributed one translation of 14 pages; or the *Aristotle* of 1531, of which Simon Grynaeus was the real editor. Where Erasmus excelled was in prefaces—not philological introductions to each author, but spirited appeals to the interest of the general reader, showing how an ancient book might be made to minister to modern spiritual demands.

Of Erasmus's works the Greek Testament is the most memorable. It has no title to be considered as a work of learning or scholarship, yet its influence upon opinion was profound and durable. It contributed more to the liberation of the human mind from the thraldom of the clergy than all the uproar and rage of Luther's many pamphlets. As an edition of the Greek Testament it has no critical value. But it was the first, and it revealed the fact that the Vulgate, the Bible of the church, was not only a second-hand document, but in places an erroneous document. A shock was thus given to the credit of the clergy in the province of literature, equal to that which was given in the province of science by the astronomical discoveries of the 17th century. Even if Erasmus had had at his disposal the MSS. subsidia for forming a text, he had not the critical skill required to use them. He had at hand a few late Basel MSS, one of which he sent straight to press, correcting them in places by collations of others which had been sent to him by Colet in England. In four reprints, 1519, 1522, 1527, 1535, Erasmus gradually weeded out many of the typographical errors of his first edition, but the text remained essentially such as he had first printed it. The Greek text indeed was only a part of his scheme. An important feature of the volume was the new Latin version, the original being placed alongside as a guarantee of the translator's good faith. This translation, with the justificatory notes which accompanied it, though not itself a work of critical scholarship, became the starting-point of modern exegetical science. Erasmus did nothing to solve the problem, but to him belongs the honour of having first propounded it.

Besides translating and editing the New Testament, Erasmus paraphrased the whole, except the Apocalypse, between 1517 and 1524. The paraphrases were received with great applause, even by those who had little appreciation for Erasmus. In England a translation of them made in 1548 was ordered to be placed in all parish churches beside the Bible. His correspondence is perhaps the part of his works which has the most permanent value; it comprises about 3000 letters, which form an important source for the history of that period. For the same purpose his *Colloquia* may be consulted. They are a series of dialogues, written first for pupils in the early Paris days as formulae of polite address, but afterwards expanded into lively conversations, in which many of the topics of the day are discussed. Later in the century they were read in schools, and some of Shakespeare's lines are direct reminiscences of Erasmus.

His complete works have been printed twice; by the Froben firm under the direction of his literary executors (9 vols., Basel, 1540); and by Leclerc at Leiden (11 vols., 1703–1706). For his life the chief contemporary sources are a *Compendium vitae* written by himself in 1524, and a sketch prefixed by Beatus Rhenanus to the Basel edition of 1540. Of his writings he gives an account in his *Catalogus lucubrationum*, composed first in January 1523 and enlarged in September 1524; and also in a letter to Hector Boece of Aberdeen, written in 1530. An elaborate bibliography, entitled *Bibliotheca Erasmiana*, was undertaken by the officials of the Ghent University Library; it is divided into three sections, for Erasmus's writings, the books he edited, and the literature about him. *Listes sommaires* were issued in 1893; and since 1897 the completed volumes have been appearing at intervals. There is an excellent sketch of Erasmus's life down to 1519 in F. Seebohm's *Oxford Reformers* (3rd ed., 1887); and of the many biographies those by S. Knight (1726), J. Jortin (2 vols., 1758–1760) and R. B. Drummond (2 vols., 1873) may be mentioned. There are also two volumes (1901–1904) of translations by F. M. Nichols from Erasmus's letters down to 1517, with an ample commentary which amounts almost to a biography; and an edition of the letters, in Latin, was begun by the Oxford University Press in 1906 (vol. ii., 1910). (M. P.; P. S. A.)

ERASTUS, THOMAS (1524–1583), German-Swiss theologian, whose surname was Lüber, Lieber, or Liebler, was born of poor parents on the 7th of September 1524, probably at Baden, canton of Aargau, Switzerland. In 1540 he was studying theology at Basel. The plague of 1544 drove him to Bologna and thence to Padua as student of philosophy and medicine. In 1553 he became physician to the count of Henneberg, Saxe-Meiningen, and in 1558 held the same post with the elector-palatine, Otto Heinrich, being at the same time professor of medicine at Heidelberg. His patron's successor, Frederick III., made him (1559) a privy councillor and member of the church consistory. In theology he followed Zwingli, and at the sacramentarian conferences of Heidelberg (1560) and Maulbronn (1564) he advocated by voice and pen the Zwinglian doctrine of the Lord's Supper, replying (1565) to the counter arguments of the Lutheran Johann Marbach, of Strassburg. He ineffectually resisted the efforts of the Calvinists, led by Caspar Olevianus, to introduce the Presbyterian polity and discipline, which were established at Heidelberg in 1570, on the Genevan model. One of the first acts of the new church system was to excommunicate Erastus on a charge of Socinianism, founded on his correspondence with Transylvania. The ban was not removed till 1575, Erastus declaring his firm adhesion to the doctrine of the Trinity. His position, however, was uncomfortable, and in 1580 he returned to Basel, where in 1583 he was made professor of ethics. He died on the 31st of December 1583. He published several pieces bearing on medicine, astrology and alchemy, and attacking the system of Paracelsus. His name is permanently associated with a posthumous publication, written in 1568. Its immediate occasion was the disputation at Heidelberg (1568) for the doctorate of theology by George Wither or Withers, an English Puritan (subsequently archdeacon of Colchester), silenced (1565) at Bury St Edmunds by Archbishop Parker. Withers had proposed a disputation against vestments, which the university would not allow; his thesis affirming the excommunicating power of the presbytery was sustained. Hence the treatise of Erastus. It was published (1589) by Giacomo Castelvetri, who had married his widow, with the title *Explicatio gravissimae quaestionis utrum excommunicatio, quatenus religionem intelligentes et amplexantes, a sacramentorum usu, propter admissum facinus arcet, mandato nitatur divino, an excogitata sit ab hominibus*. The work bears the imprint Pesclavii (*i.e.* Poschiavo in the Grisons) but was printed by John Wolfe in London, where Castelvetri was staying; the name of the alleged printer is an anagram of Jacobum Castelvetrum. In the Stationers' Register (June 20, 1589) the printing is said to have been "alowed" by Archbishop Whitgift. It consists of seventy-five *Theses*, followed by a *Confirmatio* in six books, and an appendix of letters to Erastus by Bullinger and Gualther, showing that his *Theses*, written in 1568, had been circulated in manuscript. An English translation of the *Theses*, with brief life of Erastus (based on Melchior Adam's account), was issued in 1659, entitled *The Nullity of Church Censures*; it was reprinted as *A Treatise of Excommunication* (1682), and, as revised by Robert Lee, D.D., in 1844. The aim of the work is to show, on Scriptural grounds, that sins of professing Christians are to be punished by civil authority, and not by withholding of sacraments on the part of the clergy. In the Westminster Assembly a party holding this view included Selden, Lightfoot, Coleman and Whitelocke, whose speech (1645) is appended to Lee's version of the *Theses*; but the opposite view, after much controversy, was carried, Lightfoot alone dissenting. The consequent chapter of the Westminster Confession ("Of Church Censures") was, however, not ratified by the English parliament. "Erastianism," as a by-word, is used to denote the doctrine of the supremacy of the state in ecclesiastical causes; but the problem of the relations between church and state is one on which Erastus nowhere enters. What is known as "Erastianism" would be better connected with the name of Grotius. The only direct reply made to the *Explicatio* was the *Tractatus de vera excommunicatione* (1590) by Theodore Beza, who found himself rather savagely attacked in the *Confirmatio thesium*; *e.g.* "Apostolum et Mosen adeoque Deum ipsum audes corrigere."

See A. Bonnard, *Thomas Éraste et la discipline ecclésiastique* (1894); Gass, in *Allgemeine deutsche Biog.* (1877); G. V. Lechler and R. Stähelin, in A. Hauck's *Realencyklop. für prot. Theol. u. Kirche* (1898). (A. Go.*)

ERATOSTHENES OF ALEXANDRIA (*c.* 276–*c.* 194 B.C.), Greek scientific writer, was born at Cyrene. He studied grammar under Callimachus at Alexandria, and philosophy under the Stoic Ariston and the Academic Arcesilaus at Athens. He returned to Alexandria at the summons of Ptolemy III. Euergetes, by whom he was appointed chief librarian in place of Callimachus. He is said to have died of voluntary starvation, being threatened with total blindness. Eratosthenes was one of the most learned men of antiquity, and wrote on a great number of subjects. He was the first to call himself Philologos (in the sense of the "friend of learning"), and the name Pentathlos was bestowed upon him in honour of his varied accomplishments. He was also called *Beta* as being second in all branches of learning, though not actually first in any. In mathematics he wrote two books *On means* (Περὶ μεσοτήτων) which are lost, but appear, from a remark of Pappus, to have dealt with "loci with reference to means." He devised a mechanical construction for two mean proportionals, reproduced by Pappus and Eutocius (Comm. on Archimedes). His *κόσκινον* or *sieve* (*cribrum Eratosthenis*) was a device for discovering all prime numbers. He laid the foundation of mathematical geography in his *Geographica*, in three books. His greatest achievement was his measurement of the earth. Being informed that at Syene (Assuan), on the day of the summer solstice at noon, a well was lit up through all its depth, so that Syene lay on the tropic, he measured, at the same hour, the zenith distance of the sun at Alexandria. He thus found the distance between Syene and Alexandria (known to be 5000 stadia) to correspond to $\frac{1}{50}$th of a great circle, and so arrived at 250,000 stadia (which he seems subsequently to have corrected to 252,000) as the circumference of the earth. He is credited by Ptolemy and his commentator Theon with having found the distance between the tropics to be $\frac{11}{83}$rds. of the meridian circle, which gives 23° 51′ 20″ for the obliquity of the ecliptic. His astronomical poem *Hermes* began apparently with the birth and exploits of Hermes, then passed to the legend of his having ordered the heavens, the zones and the stars, and gave a history of the latter. His *Erigone*, of which a few fragments are also preserved, is sometimes spoken of as a separate poem, but it may have belonged to the *Hermes*, which appears also to have been known by other names such as *Catalogi*. The still extant *Catasterismi*, containing the story of certain stars in prose, is probably not by Eratosthenes.

Eratosthenes was the founder of scientific chronology in his *χρονογραφία* in which he endeavoured to fix the dates of the chief literary and political events from the conquest of Troy. An important work was his treatise on the old comedy, dealing with theatres and theatrical apparatus generally, and discussing the works of the principal comic poets themselves. Works on moral philosophy, history, and a number of letters were also attributed to him.

There is a complete edition of the fragments of Eratosthenes by Bernhardy (1822); poetical fragments, Hiller (1872); geographical, Seidel (1799) and Berger (1880); *καταστερισμοί*, Schaubach (1795) and Robert (1878). See Sandys, *Hist. Class. Schol.* i. (1906). (T. L. H.)

ERBACH, a town of Germany, in the grand-duchy of Hesse-Darmstadt, on the Mumling, 22 m. S.E. of Darmstadt. It has cloth mills and ivory-turning, for which last branch it possesses a technical school. Wool and cattle fairs are held twice a year. Pop. 2800. The castle contains an interesting collection of weapons and pictures, and in the chapel are the coffins of Einhard, the friend and biographer of Charlemagne, and his wife, Emma.

Erbach has long been the residence of the counts of Erbach, who trace their descent back to the 12th century, and who held the office of cupbearer to the electors palatine of the Rhine until 1806. In 1532 the emperor Charles V. made the county a direct fief of the Empire, on account of the services rendered by Count Eberhard during the Peasants' War. Since 1717 the family has been divided into the three lines of Erbach-Fürstenau, Erbach-Erbach and Erbach-Schönberg, who rank for precedence, not according to the age of their descent, but according to the age of the chief of their line. In 1818 the counts of Erbach-Erbach inherited the county of Wartenberg-Roth, and in 1903 the count of Erbach-Schönberg was granted the title of prince. The county was mediatized in 1806, and is now incorporated with the duchy of Hesse-Darmstadt.

See Simon, *Die Geschichte der Dynasten und Grafen zu Erbach* (Frankfort, 1858).

ERBIUM (symbol, Er; atomic weight, 165-166), one of the metals of the rare earths. The first of the rare earth minerals was discovered in 1794 by J. Gadolin and was named gadolinite from its discoverer. In 1797 Ekeberg showed that gadolinite contained another rare earth, which was given the name yttria. Yttria is an exceedingly complex mixture, which has been decomposed, yielding as an intermediate product terbia. This latter substance in its turn has been split by J. L. Soret, P. T. Cleve, Lecoq de Boisbaudran and others into erbia, holmia, thulia and dysprosia, but it is still doubtful whether any one of these four splitting products is a single substance. The rare earth metals are found in the minerals gadolinite, samarskite, fergusonite, euxenite and cerite. They are separated from the minerals by converting them into oxalates, which by ignition give the corresponding oxides. The oxides are then converted into double sulphates which are separated from each other by repeated fractional crystallization or by fractional precipitation with ammonia or some other base. Erbium forms rose-coloured salts and a rose-coloured oxide. The oxide dissolves slowly in acids; it is not reduced by hydrogen and is infusible. The salts show a characteristic absorption spectrum.

See J. F. Bahr and R. Bunsen (*Ann.*, 1866, 137, p. 1); A. v. Welsbach (*Monats.*, 1883, 4, p. 641; 1884, 5, p. 508; 1885, 6, p. 477); P. T. Cleve (*Comptes rendus*, 1879, 89, p. 478; 1880, 91, pp. 328, 381; 1882, 95, p. 1225; *Bull. de la soc. chim.*, 1874, 21, p. 196; 1883, 39, p. 287); C. Marignac (*Ann. Chim. phys.*, 1849 [3] 27, p. 226); B. Brauner (*Monats.*, 1882, 3, p. 13); W. Crookes (*Proc. Roy. Soc.*, 1886, 40, p. 502); Lecoq de Boisbaudran (*Comptes rendus*, 1886, 102, p. 1005); A. Bettendorf (*Ann.*, 1892, 270, p. 376); M. Muthmann (*Ber.*, 1898, 31, p. 1718; 1900, 33, p. 42); G. Krüss (*Zeit. f. anorg. Chem.*, 1893, 3, p. 108).

ERCILLA Y ZÚNIGA, ALONSO DE (1533–1595), Spanish soldier and poet, was born in Madrid on the 7th of August 1533. In 1548 he was appointed page to the heir-apparent, afterwards Philip II. In this capacity Ercilla visited Italy, Germany and the Netherlands, and was present in 1554 at the marriage of his master to Mary of England. Hearing that an expedition was preparing to subdue the Araucanians of Chile, he joined the adventurers. He distinguished himself in the ensuing campaign; but, having quarrelled with a comrade, he was condemned to death in 1558 by his general, Garcia Hurtado de Mendoza. The sentence was commuted to imprisonment, but Ercilla was speedily released and fought at the battle of Quipeo (14th of December 1558). He returned to Spain in 1562, visited Italy, France, Germany, Bohemia, and in 1570 married Maria de Bazán, a lady distantly connected with the Santa Cruz family; in 1571 he was made knight of the order of Santiago, and in 1578 he was employed by Philip II. on a mission to Saragossa. He complained of living in poverty but left a modest fortune, and was obviously disappointed at not being offered the post of secretary of state. His principal work is *La Araucana*, a poem based on the events of the wars in which he had been engaged. It consists of three parts, of which the first, composed in Chile and published in 1569, is a versified narrative adhering strictly to historic fact; the second, published in 1578, is encumbered with visions and other romantic machinery; and the third, which appeared in 1589–1590, contains, in addition to the subject proper, a variety of episodes mostly irrelevant. This so-called epic lacks symmetry, and has been over-praised by Cervantes and Voltaire; but it is written in excellent Spanish, and is full of vivid rhetorical passages. An analysis of the poem was given by Hayley in his *Essay on Epic Poetry* (1782).

A good biography precedes the *Morceaux choisis* (Paris, 1900) by Jean Ducamin.

ERCKMANN-CHATRIAN, the joint names of two French writers whose collaboration made their work that of, so to speak, one personality. ÉMILE ERCKMANN (1822–1899) was born on the 20th of May 1822 at Phalsbourg, and LOUIS GRATIEN CHARLES ALEXANDRE CHATRIAN (1826–1890) on the 18th of December 1826 at Soldatenthal, Lorraine. In 1847 they began to write together, and continued doing so till 1889. Chatrian died in 1890 at Villemomble near Paris, and Erckmann at Lunéville in 1899. The list of their publications is a long one, ranging from the *Histoires et contes fantastiques* (1849; reprinted from the *Démocrate du Rhin*), *L'Illustre Docteur Mathéus* (1859), *Madame Thérèse* (1863), *L'Ami Fritz* (1864), *Histoire d'un conscrit de 1813* (1864), *Waterloo* (1865), *Le Blocus* (1867), *Histoire d'un paysan* (4 vols., 1868–1870), *L'Histoire du plébiscite* (1872), to *Le Grand-père Lebigue* (1880); besides dramas like *Le Juif polonais* (1869) and *Les Rantzau* (1882). Without any special literary claim, their stories are distinguished by simplicity and genuine descriptive power, particularly in the battle scenes and in connexion with Alsatian peasant life. They are marked by a genuine democratic spirit, and by real patriotism, which developed after 1870 into hatred of the Germans. The authors attacked militarism by depicting the horrors of war in the plainest terms.

See also J. Claretie, *Erckmann-Chatrian* (1883), in the series of "Célébrités contemporaines."

ERDÉLYI, JÁNOS (1814–1868), Hungarian poet and author, was born in 1814 at Kapos, in the county of Ungvár, and educated at the Protestant college of Sárospatak. In 1833 he removed to Pest, where he was, in 1839, elected member of the Hungarian Academy of Sciences. His literary fame was made by his collection of Hungarian national poems and folk-tales, *Magyar Népköltési Gyüjtemény, Népdalok és Mondák* (Pest, 1846–1847). This work, published by the Kisfaludy Society, was supplemented by a dissertation upon Hungarian national poetry, afterwards partially translated into German by Stier (Berlin, 1851). Erdélyi also compiled for the Kisfaludy Society an extensive collection of Hungarian proverbs—*Magyar Közmondások könyve* (Pest, 1851),—and was for some time editor of the *Szépirodalmi Szemle* (*Review of Polite Literature*). In 1848 he was appointed director of the national theatre at Pest; but after 1849 he resided at his native town. He died on the 23rd of January 1868. A collection of folklore was published the year after his death, entitled *A Nép Költészete népdalok, népmesék és közmondások* (Pest, 1869). This work contains 300 national songs, 19 folk-tales and 7362 Hungarian proverbs.

ERDMANN, JOHANN EDUARD (1805–1892), German philosophical writer, was born at Wolmar in Livonia on the 13th of June 1805. He studied theology at Dorpat and afterwards at Berlin, where he fell under the influence of Hegel. From 1829 to 1832 he was a minister of religion in his native town. Afterwards he devoted himself to philosophy, and qualified in that subject at Berlin in 1834. In 1836 he was professor-extraordinary at Halle, became full professor in 1839, and died there on the 12th of June 1892. He published many philosophical text-books and treatises, and a number of sermons; but his chief claim to remembrance rests on his elaborate *Grundriss der Geschichte der Philosophie* (2 vols., 1866), the 3rd edition of which has been translated into English. Erdmann's special merit is that he does not rest content with being a mere summarizer of opinions, but tries to exhibit the history of human thought as a continuous and ever-developing effort to solve the great speculative problems with which man has been confronted in all ages. His chief other works were: *Leib und Seele* (1837), *Grundriss der Psychologie* (1840), *Grundriss der Logik und Metaphysik* (1841), and *Psychologische Briefe* (1851).

ERDMANN, OTTO LINNÉ (1804–1869), German chemist, son of Karl Gottfried Erdmann (1774–1835), the physician who introduced vaccination into Saxony, was born at Dresden on the 11th of April 1804. In 1820 he began to attend the medico-chirurgical academy of his native place, and in 1822 he entered the university of Leipzig where in 1827 he became extraordinary professor, and in 1830 ordinary professor of chemistry. This office he held until his death, which happened at Leipzig on the 9th of October 1869. He was particularly successful as a teacher, and the laboratory established at Leipzig under his direction in 1843 was long regarded as a model institution. As an investigator he is best known for his work on nickel and indigo and other dye-stuffs. With R. F. Marchand (1813–1850) he also carried out a number of determinations of atomic weights. In 1828, in conjunction with A. F. G. Werther (1815–1869), he founded the *Journal für technische und ökonomische Chemie*, which became in 1834 the *Journal für praktische Chemie*. He was also the author of *Über das Nickel* (1827), *Lehrbuch der Chemie* (1828), *Grundriss der Waarenkunde* (1833), and *Über das Studium der Chemie* (1861).

EREBUS, in Greek mythology, son (according to Hesiod, *Theog.* 123) of Chaos, and father of Aether (upper air) and Hemera (day) by his sister Nyx (night). The word, which signifies darkness, is in Homer the gloomy subterranean region through which the departed shades pass into Hades. The entrance to it was in the extreme west, on the borders of Ocean, in the mythical land of the Cimmerians. It is to be distinguished from Tartarus, the place of punishment for the wicked.

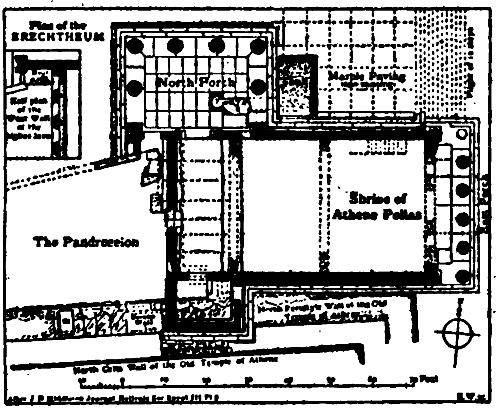
ERECH (*Uruk* in the Babylonian inscriptions; Gr. *Orchoë*), the Biblical name of an ancient city of Babylonia, situated E. of the present bed of the Euphrates, on the line of the ancient Nil canal, in a region of marshes, about 140 m. S.S.E. from Bagdad It was one of the oldest and most important cities of Babylonia and the site of a famous temple, called E-Anna, dedicated to the worship of Nana, or Ishtar. Erech played a very important part in the political history of the country from an early time, exercising hegemony in Babylonia at a period before the time of Sargon. Later it was prominent in the national struggles of the Babylonians against Elam (2000 B.C. and earlier), in which it suffered severely; recollections of these conflicts are embodied in the Gilgamesh epic; as it has come down to us through the library of Assur-bani-pal. Erech enjoyed much distinction in the later times, as a seat of learning and of the worship of Ishtar, and Assur-bani-pal drew largely on its literary stores for his library at Nineveh, from which we derive our principal information concerning ancient Babylonian literature. The inscriptions found here show that it continued in existence through the Persian and Seleucid periods. The ruins of the ancient site, known as Warka, which are among the largest in all Babylonia, forming an irregular circle nearly 6 m. in circumference, bounded by a wall, still standing in some places to the height of 40 ft., were explored and partially excavated by W. K. Loftus in 1850 and 1854. The most conspicuous ruin, now called Abu-Berdi, "Father of Marsh Grass," or Buwariye, "reed matting," because of the layers of reeds between each twelve courses of unbaked brick, is the *ziggurat* (tower) of the ancient temple of E-Anna. It is about 100 ft. in height, and strikingly resembles in general appearance the ruins of the ziggurat of the temple of Enlil at Nippur. Second to this in size was the ruin called Wuswas, a walled quadrangle, including an area of more than seven and a half acres, within which was an edifice 246 ft. long and 174 ft. wide, elevated on an artificial platform 50 ft. in height. The south-west facade, still standing in some places to the height of 23 ft., exhibited an interesting use of half columns, and stepped recesses for purposes of decoration. In another ruin Loftus found a wall, 30 ft. long, composed entirely of small yellow terra-cotta nail-headed cones, such as have been discovered in great numbers, inscribed and uninscribed, used for votive purposes in connexion with walls at Tello and elsewhere in Babylonia. His excavations being superficial, the Babylonian inscriptions found by him, about one hundred in all, exclusive of the ancient Ur-Gur bricks from the temple, belong in general to the neo-Babylonian, Persian and Seleucid periods. The older remains are buried deep beneath the huge mass of later debris. Loftus also discovered at Erech, almost everywhere within and without the walls, great numbers of clay coffins, piled one above another, to the height of over 30 ft., forming a vast and, on the whole, well-ordered cemetery belonging to the Persian, Parthian and later occupations of Babylonia, during which period Erech, like other cities of the south, evidently became a necropolis for a large extent of country. After Loftus's time the mounds were visited by various travellers, but no further excavations have been conducted. Work on this important part of the site is attended with very great difficulties, owing to the inaccessible position of the ruins, the unsettled character of the country, the frequent sand-storms, and above all, the immense mass of material of later periods which must be removed before a systematic excavation of the more ancient and interesting ruins could be undertaken. A curious feature of the Warka neighbourhood is the existence of conical sand-hills, rising to a considerable height, so compact as to be almost like stone. These hills extend from Warka northward as far as Tel Ede.

See W. K. Loftus, *Chaldaea and Susiana* (1857); J. P. Peters, *Nippur* (1897); E. Sachau, *Am Euphrat und Tigris* (1900). Cf. also NIPPUR and authorities there quoted. (J. P. PE.)

ERECHTHEUM, a temple (commonly called after Erechtheus, to whom a portion of it was dedicated) on the acropolis at Athens, unique in plan, and in its execution the most refined example of the Ionic order. There is no clear evidence as to when the building was begun, some placing it among the temples projected by Pericles, others assigning it to the time after the peace of Nicias in 421 B.C. The work was interrupted by the stress of the Peloponnesian War, but in 409 B.C. a commission was appointed to make a report on the state of the building and to undertake its completion, which was carried out in the following year.

The peculiar plan of the Erechtheum has given rise to much speculation. It may be due partly to the natural conformation of the rock and the differences of level, partly to the necessity of enclosing within a single building several objects of ancient sanctity, such as the mark of Poseidon's trident and the spring that arose from it, the sacred olive tree of Athena, and the tomb of Cecrops. But there are some features which cannot be so explained, and which have led Professor W. Dörpfeld and others to believe that the plan, as we now have it, is a modification or abridgment of the original design, due to the same conservative influences as led to the curtailment of the plan of the Propylaea (*q.v.*).

The building as completed consisted of a temple of the ordinary type, opening by a door and two windows to the east front, before which stood a portico of six Ionic columns. This part was the temple of Athena Polias. Adjoining it on the west was the central chamber, on a lower level; this chamber was separated by a partition, originally of wood and later of marble, from the western compartment of the temple, which was of peculiar construction. The west end was formed by a wall, on which stood four columns between antae; but the main entrance to this western compartment was through a large and very ornate doorway on the north; and a large Ionic portico, consisting of four columns in the front, and one in the return on each side, was placed in front of this door. At the south end of the western compartment was a smaller door, with steps leading up to the higher level, within a projecting space enclosed by a low wall and covered with a projecting porch carried by six "maidens" or caryatides. The construction of the building at this southwestern corner shows that there was some sacred object that had to be bridged over by a huge block of marble; this we know from inscriptions to have been the Cecropeum or tomb of Cecrops. In the north portico a square hole in the floor, with a corresponding hole in the roof above it, must have given access to another sacred object, the mark of Poseidon's trident in the rock. The sacred olive tree probably stood just outside the temple to the west in the Pandroseion. The Ionic order, as used in this temple, is of the most ornate Attic type. The bases of the columns are either reeded or decorated with a plait-pattern; the capital has the broad channel between the volutes subdivided by a carefully-profiled incision; and the top of the shafts is ornamented by a broad band of palmette or honeysuckle pattern. A similar band of ornament runs round the top of the walls outside, and at their base is a reeded torus. The frieze consisted of white marble figures in relief, affixed to a background of black Eleusinian stone.



The contents of the Erechtheum are described by Pausanias. It contained the ancient image of Athena Polias, and three altars, one to Poseidon and Erechtheus, one to Butes and one to Hephaestus; there were portraits of the family of the Butadae on the walls. Within it was also the gold lamp of Callimachus, which burnt for a year without refilling, and had a chimney in the form of a palm-tree.

The Erechtheum was damaged by a fire, soon after its completion, in 406 B.C., but was repaired early in the following century. The west end appears to have been damaged in Roman times and to have been replaced by the attached columns with windows between them which appear in old drawings and are still partially extant. It was used as a church in Christian times, and under Turkish rule as the harem of the governor of Athens. Lord Elgin carried off to London, about 1801–1803, one of the columns of the east portico and one of the caryatides; these were replaced later by terra-cotta casts. During the siege of the Acropolis in 1827, the roof of the north portico was thrown down and the building was otherwise much damaged. It was partially rebuilt between 1838 and 1846; the west front was blown down in a storm in 1852. Since 1900 the project of rebuilding the Erechtheum as far as possible with the original blocks has again been undertaken.

See Stuart, *Antiquities of Athens*; Inwood, *The Erechtheum*; H. Forster in *Papers of American School at Athens*, i. (1882–1883); J. H. Middleton, *Plans and Drawings of Athenian Buildings* (1900), pls. xiv.-xxii.; E. A. Gardner, *Ancient Athens*, chap. viii.; W. Dorpfeld, "Der ursprungliche Plan des Erechtheion" in *Mitteil. Athen.*, 1904, p. 101, taf. 6; G. P. Stevens, "The East Wall of the Erechtheum," in *American Journ. Arch.*, 1906, pls. vi.-ix. (E. Gr.)

ERECHTHEUS, in Greek legend, a mythical king of Athens, originally identified with Erichthonius, but in later times distinguished from him. According to Homer, who knows nothing of Erichthonius, he was the son of Aroura (Earth), brought up by Athena, with whom his story is closely connected. In the later story, Erichthonius (son of Hephaestus and Atthis or Athena herself) was handed over by Athena to the three daughters of Cecrops—Aglauros (or Agraulos), Herse and Pandrosos—in a chest, which they were forbidden to open. Aglauros and Herse disobeyed the injunction, and when they saw the child (which had the form of a snake, or round which a snake was coiled) they went mad with fright, and threw themselves from the rock of the Acropolis (or were killed by the snake). Athena herself then undertook the care of Erichthonius, who, when he grew up, drove out Amphictyon and took possession of the kingdom of Athens. Here he established the worship of Athena, instituted the Panathenaea, and built an Erechtheum. The Erechtheus of later times was supposed to be the grandson of Erechtheus-Erichthonius, and was also king of Athens. When Athens was attacked by the Thracian Eumolpus (or by the Eleusinians assisted by Eumolpus) victory was promised Erechtheus if he sacrificed one of his daughters. Eumolpus was slain and Erechtheus was victorious, but was himself killed by Poseidon, the father of Eumolpus, or by a thunderbolt from Zeus. The contest between Erechtheus and Eumolpus formed the subject of a lost tragedy by Euripides; Swinburne has utilized the legend in his *Erechtheus*. The scene of the opening of the chest is represented on a Greek vase in the British Museum. The name Erichthonius is connected with χθών ("earth") and the representation of him as half-snake, like Cecrops, indicates that he was regarded as one of the autochthones, the ancestors of the Athenians who sprung from the soil.

See Apollodorus iii. 14. 15; Euripides, *Ion*; Ovid, *Metam.* ii. 553; Hyginus, *Poët. astron.* ii. 13; Pausanias i. 2. 5. 8; E. Ermatinger, *Die attische Autochthonensage* (1897); article by J. A. Hild in Daremberg and Saglio's *Dictionnaire des antiquités*; B. Powell in *Cornell Studies*, xvii. (1906), who identifies Erechtheus, Erichthonius, Poseidon and Cecrops, all denoting the sacred serpent of Athena, whose cult she first contested, but then amalgamated with her own. The birth of Erichthonius (as a corn-spirit) is interpreted by Mannhardt as a mythical way of describing the growth of the corn, and by J. E. Harrison (*Myths and Monuments of Ancient Athens*, xxvii-xxxvi.) as a fiction to explain the ceremony performed by the two maidens called Arrephori. See also Farnell, *Cults of the Greek States*, i. 270; and Frazer's *Pausanias*, ii. 169.

ERESHKIGAL, also known as ALLATU, the name of the chief Babylonian goddess of the nether-world where the dead are gathered. Her name signifies "lady of the nether-world." She is known to us chiefly through two myths, both symbolizing the change of seasons, but intended also to illustrate certain doctrines developed in the temple-schools of Babylonia. One of these myths is the famous story of Ishtar's descent to Irkalla or Aralu, as the lower world was called, and her reception by her sister who presides over it; the other is the story of Nergal's offence against Ereshkigal, his banishment to the kingdom controlled by the goddess and the reconciliation between Nergal and Ereshkigal through the latter's offer to have Nergal share the honours of the rule over Irkalla. The story of Ishtar's descent is told to illustrate the possibility of an escape from Irkalla, while the other myth is intended to reconcile the existence of two rulers of Irkalla—a goddess and a god.

It is evident that it was originally a goddess who was supposed to be in control of Irkalla, corresponding to Ishtar in control of fertility and vegetation on earth. Ereshkigal is therefore the sister of Ishtar and from one point of view her counterpart, the symbol of nature during the non-productive season of the year. As the doctrine of two kingdoms, one of this world and one of the world of the dead, becomes crystallized, the dominions of the two sisters are sharply differentiated from one another. The addition of Nergal represents the harmonizing tendency to unite with Ereshkigal as the queen of the nether-world the god who, in his character as god of war and of pestilence, conveys the living to Irkalla and thus becomes the one who presides over the dead. (M. Ja.)

ERETRIA (mod. *Aletria*), an ancient coast town of Euboea about 15 m. S.E. of Chalcis, opposite to Oropus. Eretria, like its neighbour Chalcis (*q.v.*), early entered upon a commercial and colonizing career. Besides founding townships in the west and north of Greece, it acquired dependencies among the Cyclades and joined the great mercantile alliance of Miletus and Aegina. Since the so-called Lelantine War (7th century B.C.) against the coming league of Chalcis, it began to be overshadowed by its rivals. The interference of Eretria in the Ionian revolt (498) brought upon it the vengeance of the Persians, who captured and destroyed it shortly before the battle of Marathon (490). The city was soon rebuilt, and as a member of both the Delian Leagues attached itself by numerous treaties to the Athenians. The latter, through their general Phocion, rescued it from the tyrants suborned by Philip of Macedon (354 and 341). Under Macedonian and Roman rule Eretria fell into insignificance; for a short period under Mark Antony, the triumvir, it became a possession of Athens. Eretria was the birthplace of the tragedian Achaeus and of the "Megarian" philosopher Menedemus.

The modern village, which is sometimes called Nea Psará because the inhabitants of Psará were transferred there in 1821, is on unhealthy low-lying ground near the sea. The excavation of the site was carried out by the American School of Athens (1890–1895). At the foot of the Acropolis Hill, where the ground begins to rise, the theatre lies; and though the material of which this was built is rough, and only seven imperfect rows of seats remain, a good part of the scena and of the chambers behind it is preserved, and beneath these there runs a tunnel, which, together with other peculiar features, has raised interesting questions in connexion with the arrangement of the Greek theatre, the orchestra being at present on a level about 12 ft. below that of the rooms in the scena. Near by are the substructions of a temple of Dionysus and a large altar, and also a gymnasium with arrangements for bathing. Besides these, in 1900 the substructions of a temple of Apollo Daphnephoros were unearthed. Both the northern and the southern side of the hill are flanked by walls, which seem to have reached the sea, where there was a mole and a harbour; and the wall of the acropolis itself remains in one part to the height of eight courses.

AUTHORITIES.—Strabo x. 447 f.; Herodotus v. 99, vi. 101; *Corpus Inscr. Atticarum*, i. 339, iv. (2), pp. 5, 10, 22; H. Heinze, *De rebus Eretriensium* (Göttingen, 1869); W. M. Leake, *Travels in Northern Greece* (London, 1835), ii. 266, 443; B. V. Head, *Historia numorum* (Oxford, 1887), pp. 305-308; *Papers of the American School at Athens*, vol. vi. (E. Gr.)

ERETRIAN SCHOOL OF PHILOSOPHY. This Greek school was the continuation of the Elian school, which was transferred to Eretria by Menedemus. It was of small importance, and in the absence of certain knowledge must be supposed to have adhered to the doctrines of Socrates. (See MENEDEMUS.)

ERFURT, a city of Germany, in Prussian Saxony, on the Gera, and the railway Halle-Bebra, about midway between Gotha and Weimar, which are 14 m. distant. Pop. (1875) 48,025; (1905) 100,065. The city, which is dominated on the west by the two citadels of Petersberg and Cyriaxburg, is irregularly built, the only feature in its plan, or want of plan, being the Friedrich Wilhelmsplatz, a broad open space of irregular shape abutting on the Petersberg. On the south-western side of this square, which contains a monument to the elector Frederick Charles Joseph of Mainz (1719–1802), is the Domberg, an eminence on which stand, side by side, the cathedral and the great church of St Severus with its three spires (14th century). The churches are approached by a flight of forty-eight stone steps, the grouping of the whole mass of buildings being exceedingly impressive. The cathedral (*Beatae Mariae Virginis*) is one of the finest churches in Germany. It was begun in the 12th century, but the nave was rebuilt in the 13th in the Gothic style. The magnificent chancel (1349–1372), with the 14th-century crypt below, rests on massive substructures, known as the *Cavate*. The twin towers are set between the chancel and nave. The cathedral contains, besides fine 15th-century glass, some very rich portal sculptures and bronze castings, among others the coronation of the Virgin by Peter Vischer. In one of its towers is the famous bell, called Maria Gloriosa, which bears the date 1497, and weighs 270 cwt. Besides the cathedral and St Severus, which are Roman Catholic, Erfurt possesses several very interesting medieval churches, now Evangelical. Among these may be mentioned the Predigerkirche, dating from the latter half of the 12th century; the Reglerkirche, a Romanesque building (restored in 1859) with a 12th-century tower; and the Barfüsserkirche, a Gothic building containing fine 14th-century monuments. All these were originally monastic churches. Of the former religious houses there survive a Franciscan convent, with a girls' school attached, and an Ursuline convent. The Augustinian monastery, in which Luther lived as a friar, is now used as an orphanage, under the name of the *Martinsstift*. The cell of Luther was destroyed by fire in 1872. A bronze statue of the reformer was erected in the Anger, the chief street of the town, in 1890. At one time Erfurt had a university, of which the charter dated from 1392; but it was suppressed in 1816, and its funds devoted to other purposes, among these being the endowment of an institution founded in 1758 and now called the royal academy of sciences, and the support of the royal library, which now contains 60,000 volumes and over 1000 manuscripts. On the W. and S.W. extensive new quarters have grown up within recent years, *e.g.* Hirschbrühl. The interior of the town hall (1869–1875) is adorned with legendary and historical frescoes by Kämpfer and Peter Janssen. Erfurt possesses also a picture gallery and an antiquarian collection.

The educational establishments of the town include a gymnasium, a realgymnasium, a realschule, technical schools for building and handicrafts, a high-class commercial school, a school of agriculture, and an academy of music. The most notable industry of Erfurt is the culture of flowers and of vegetables, which is very extensively carried on. This industry had its origin in the large gardens attached to the monasteries. It has also important and growing manufactures of ladies' mantles, boots and shoes, machines, furniture, woollen goods, musical instruments, agricultural machinery and implements, leather, tobacco, chemicals, &c. Brewing, bleaching and dyeing are also carried on on a large scale, and there are extensive railway works and a government rifle factory.

Erfurt (Med. *Erpesfurt*, *Erphorde*, Lat. *Erfordia*) is a town of great antiquity. Its origin is obscure, but in 741 it was sufficiently important for St Boniface to found a bishopric here, which was, however, after the martyrdom of the first bishop, Adolar, in 755, reabsorbed in that of Mainz. In 805 the place received certain market rights from the emperor Charlemagne. Later the overlordship was claimed by the archbishops of Mainz, on the strength of charters granted by the emperor Otto I., and their authority in Erfurt was maintained by a burgrave and an *advocatus*, the office of the latter becoming in the 12th century hereditary in the family of the counts of Gleichen. In spite of many vicissitudes (from 1109 to 1137, for instance, the town was subject to the landgraves of Thuringia), and of a charter granted in 1242 by the emperor Frederick II., the archbishops succeeded in upholding their claims. In 1255, however, Archbishop Gerhard I. had to grant the city municipal rights, the burgraviate disappeared, and Erfurt became practically a free town. Its power was at its height early in the 15th century, when it joined the Hanseatic League. It had acquired by force or purchase various countships and other fiefs in the neighbourhood, and ruled a considerable territory; and its wealth was so great that in 1378 it established a university, the first in Europe that embraced the four faculties. By the end of the century, however, its prosperity had sunk owing to the perpetual feud with Mainz, the internecine war in Saxony, and the consequent dwindling of trade. By the convention of Amorbach in 1483 the overlordship of Erfurt was ultimately transferred by the electors of Mainz to Saxony. The political and religious quarrels of the 16th century still further depressed the city, in which the reformed religion was established in 1521. Then came the Thirty Years' War, during which Erfurt was for a while occupied by the Swedes. After the peace of Westphalia (1648) the city was assigned by the emperor to the elector of Mainz, and, on its refusal to submit, it was placed under the ban of the Empire (1660). In 1664 it was captured by the troops of the archbishop of Mainz, and remained in the possession of the electorate till 1802, when it came into the possession of Prussia. In 1808 it was the scene of the memorable interview between Napoleon and the emperor Alexander I. of Russia, at which the kings of Bavaria, Saxony, Westphalia and Württemberg also assisted, which is known as the congress of Erfurt. Here in 1850 the parliament of the short-lived Prussian Northern Union (known as the Erfurt parliament) held its sittings. In 1902 the 100th anniversary of the city's incorporation with Prussia was celebrated.

See W. J. A. von Tettau, *Erfurt in seiner Vergangenheit und Gegenwart* (Erfurt, 1880); C. Beyer, *Geschichte der Stadt Erfurt* (Erfurt, 1900); and F. W. Kampschulte, *Die Universität Erfurt in ihrem Verhältnisse zu dem Humanismus und der Reformation* (1856–1858). For a detailed bibliography see U. Chevalier, *Répertoire des sources. Topo-bibliographie* (Montebéliard, 1894–1899), s.v.

ERGOT, or SPURRED RYE, the drug *ergota* or *Secale cornutum* (Ger. *Mutterkorn*; Fr. *seigle ergoté*), consisting of the sclerotium (or hard resting condition) of a fungus, *Claviceps purpurea*, parasitic on the pistils of many members of the Grass family, but obtained almost exclusively from rye, *Secale cereale*. In the ear of rye that is infected with ergot a species of fermentation takes place, and there exudes from it a sweet yellowish mucus, which after a time disappears. The ear loses its starch, and ceases to grow, and its ovaries become penetrated with the white spongy tissue of the mycelium of the fungus which towards the end of the season forms the sclerotium, in which state the fungus lies dormant through the winter.

The drug consists of grains, usually curved (hence the name, from the O. Fr. *argot*, a cock's spur), which are violet-black or dark-purple externally, and whitish with a tinge of pink within, are between ⅓ and 1⅓ in. long, and from 1 to 4 lines broad, and have two lateral furrows, a close fracture, a disagreeable rancid taste, and a faint, fishy odour, which last becomes more perceptible when the powder of the drug is mixed with potash solution. Ergot should be kept in stoppered bottles in order to preserve it from the attacks of a species of mite, and to prevent the oxidation of its fatty oil.

The extremely complex composition of this drug has been studied in great detail, and with such important results that instead of giving ergot itself by the mouth in doses of 20 to 60 grains, it is now possible to obtain much more rapid and certain results by giving one three-hundredth of a grain of one of its constituents hypodermically. This constituent is the alkaloid cornutine, which is the valuable ingredient of the drug. Other ingredients are a fixed oil, present to the extent of 30%, ergotinic acid, a glucoside, trimethylamine, which gives the drug its unpleasant odour, and sphacelinic acid, a non-nitrogenous resinoid body. Of the numerous preparations only two need be mentioned—the liquid extract (dose 10 minims to 2 drachms or more), and the hypodermic injection. The latter does not keep well, and the best way of using ergot is to dissolve tablets obtained from a reputable maker, and containing some of the active principles, in pure water, the solution being injected subcutaneously.

Ergot has no external action. Given internally it stimulates the intestinal muscles and may cause diarrhoea. After absorption it slows the pulse by stimulation of the vagus nerves. It has indeed been asserted that the slow pulse characteristic of the puerperal period is really due to the common administration of ergot at that time. This is probably an exaggeration. The important actions of ergot are on the blood-vessels and the uterus. The drug greatly raises the blood-pressure by causing extreme contraction of the arteries. This is mainly due to a direct action on the muscular coats of the vessels, but is also partly of central origin, since the drug also stimulates the vaso-motor centre in the medulla oblongata. This action on the vessels is so marked as to constitute the drug a haemostatic, not only locally but also remotely. It may arrest bleeding from the nose, for instance, when injected hypodermically. Nearly all the constituents share in causing this action, but the sphacelinic acid is probably the most potent. Ergot is the most powerful known stimulant of the pregnant uterus. The action is a double one. At least four of its constituents act directly on the muscular fibre of the uterus, whilst the cornutine acts through the nerves. Of great practical importance is the fact that the cornutine causes rhythmic contractions such as naturally occur, whilst the sphacelinic acid produces a *tonic* contraction of the uterus, which is unnatural and highly inimical to the life of the foetus. Ergot is used in therapeutics as a haemostatic, and is very valuable in haemoptysis and sometimes in haematemesis. But its great use is in obstetrics. The drug should regularly be given hypodermically, and it is important to note that if the injection be made immediately under the skin, an abscess, or considerable discomfort, may ensue. The injection should be intra-muscular, the needle being boldly plunged into a muscular mass, such as that of the deltoid or the gluteal region. The indications for the use of ergot in obstetrics are highly complex and demand detailed treatment. It can only be said here that the drug should only in the rarest possible cases be given whilst the child is still *in utero*. This rule is necessitated by the sphacelinic acid, which causes an unnatural state of the organ. When it is possible to obtain pure cornutine, which is unfortunately very expensive, the precautions necessary in other cases may be abrogated.

Chronic poisoning, or *ergotism*, used frequently to occur amongst the poor fed on rye infected with the *Claviceps*. As it is practically impossible to reproduce the symptoms of ergotism nowadays, whether experimentally in the lower animals, or when the drug is being administered to a human being for some therapeutic purpose, it is believed that the symptoms of ergotism were rendered possible only by the semi-starvation which must have ensued from the use of such rye-bread; for the grain disappears as the fungus develops. There were two types of ergotism. In the gangrenous form various parts of the body underwent gangrene as a consequence of the arrest of blood-supply produced by the action of sphacelinic acid on the arteries. In the spasmodic form the symptoms were of a nervous character. The initial indications of the disease were cutaneous itching, tingling and formication, which gave place to actual loss of cutaneous sensation, first observed in the extremities. Amblyopia and some loss of hearing also occurred, as well as mental failure. With weakness of the voluntary muscles went intermittent spasms which weakened the patient and ultimately led to death by implication of the respiratory muscles. The last-known "epidemic" of ergotism occurred in Lorraine and Burgundy in the year 1816.

ERIC XIV. (1533–1577), king of Sweden, was the only son of Gustavus Vasa and Catherine of Saxe-Lauenburg. The news of his father's death reached Eric as he was on the point of embarking for England to press in person his suit for the hand of Queen Elizabeth. He hastened back to Stockholm, after burying his father, summoned a *Riksdag*, which met at Arboga on the 15th of April 1561, and adopted the royal propositions known as the Arboga articles, considerably curtailing the authority of the royal dukes, John and Charles, in their respective provinces. Two months later Eric was crowned at Upsala, on which occasion he first introduced the titles of baron and count into Sweden, by way of attaching to the crown the higher nobility, these new counts and barons receiving lucrative fiefs adequate to the maintenance of their new dignities.

From the very beginning of his reign Eric's morbid fear of the upper classes drove him to give his absolute confidence to a man of base origin and bad character, though, it must be admitted, of superior ability. This was Göran Persson, born about 1530, who had been educated abroad in Lutheran principles, and after narrowly escaping hanging at the hands of Gustavus Vasa for some vile action entered the service of his son. This powerful upstart was the natural enemy of the nobility, who suffered much at his hands, though it is very difficult to determine whether the initiative in these prosecutions proceeded from him or his master. Göran was also a determined opponent of Duke John, with whom Eric in 1563 openly quarrelled, because John, contrary to the royal orders, had married (Oct. 4, 1562) Catherine, daughter of Sigismund I. of Poland, engaging at the same time to assist the Polish king to conquer Livonia. This act was a flagrant breach of that paragraph of the Arboga articles which forbade the royal dukes to contract any political treaty without the royal assent. An army of 10,000 men was immediately sent by Eric to John's duchy of Finland, and John and his consort were seized, brought over to Sweden and detained as prisoners of state in Gripsholm Castle. But Eric did not stop here. His suspicion suggested to him that, if his own brother failed him, the loyalty of the great nobles, especially the members of the ancient Sture family, who had been notable in Sweden when the Vasas were unknown, could not be depended upon. The head of the Sture family at this time was Count Svante, who had married a sister of Gustavus Vasa's second wife, and had by her a numerous family, of whom two sons, Nils and Eric, still survived. The dark tragedy, known as the Sture murders, began with Eric XIV.'s strange treatment of young Count Nils. In 1566 he was summoned before a newly erected tribunal and condemned to death for gross neglect of duty, though not one of the frivolous charges brought against him could be substantiated. The death penalty was commuted into a punishment worse because more shameful than death. On the 15th of June 1566 the unfortunate youth, bruised and bleeding from shocking ill-treatment, was placed upon a wretched hack, with a crown of straw on his head, and led in derision through the streets of Stockholm. The following night he was sent a prisoner to the fortress of Örbyhus. A few days later he was appointed ambassador extraordinary, and despatched to Lorraine to resume the negotiations for Eric's marriage with the princess Renata. Before he returned, however, Eric had resolved to marry Karin, or Kitty Mansdatter, the daughter of a common soldier, who had been his mistress since 1565. In January 1567 Eric extorted a declaration from two of his senators that they would assist him to punish all who should try to prevent his projected marriage; and, in the middle of May, a *Riksdag* was summoned to Upsala to judge between the king and those of the aristocracy whom he regarded as his personal enemies. Eric himself arrived at Upsala on the 16th in a condition of incipient insanity. On the 19th he opened parliament in a speech which, as he explained, he had to deliver extempore owing to "the treachery" of his secretary. Two days later Nils Sture arrived at Upsala fresh from his embassy to Lorraine, and was at once thrown into prison, where other members of the nobility were already detained. On the following day Eric murdered Nils in his cell with his own hand, and by his order the other prisoners were despatched by the royal provost marshal forthwith. These murders were committed so promptly and secretly that it is doubtful whether the estates, actually in session at the same place, knew what had been done when, on the 26th of May, under violent pressure from Göran Persson, they signed a document declaring that all the accused gentlemen under detention had acted like traitors, and confirming all sentences already passed or that might be passed upon them.

During the greater part of 1567 Eric was so deranged that a committee of senators was appointed to govern the kingdom. One of his illusions was that not he was king but his brother John, whom he now set at liberty. When, at the beginning of 1568, Eric recovered his reason, a reconciliation was effected between the king and the duke, on condition that John recognised the legality of his brother's marriage with Karin Mansdatter, and her children as the successors to the throne. A month later, on the 4th of July, he was solemnly married to Karin at Stockholm by the primate. The next day Karin was crowned queen of Sweden and her infant son Gustavus proclaimed prince-royal. Shortly after his marriage Eric issued a circular ordering a general thanksgiving for his delivery from the assaults of the devil. This document, in every line of which madness is legible, convinced most thinking people that Eric was unfit to reign. The royal dukes, John and Charles, had already taken measures to depose him; and in July the rebellion broke out in Östergötland. Eric at first offered a stout resistance and won two victories; but on the 17th of September the dukes stood before Stockholm, and Eric, after surrendering Göran Persson to the horrible vengeance of his enemies, himself submitted, and resigned the crown. On the 30th of September 1568 John III. was proclaimed king by the army and the nobility; and a *Riksdag*, summoned to Stockholm, confirmed the choice and formally deposed Eric on the 25th of January 1569. For the next seven years the ex-king was a source of the utmost anxiety to the new government. No fewer than three rebellions, with the object of releasing and reinstating him, had to be suppressed, and his prison was changed half a dozen times. On the 10th of March 1575, an assembly of notables, lay and clerical, at John's request, pronounced a formal sentence of death upon him. Two years later, on the 24th of February 1577, he died suddenly in his new prison at Örbyhus, poisoned, it is said, by his governor, Johan Henriksen.

See *Sveriges Historia*, vol. iii. (Stockholm, 1880); Robert Nisbet Bain, *Scandinavia*, cap. 4-6 (Cambridge, 1905); Eric Tegel, *Konung Eriks den XIV. historia* (Stockholm, 1751). (R. N. B.)

ERICACEAE, in botany, a natural order of plants belonging to the higher or gamopetalous division of Dicotyledons. They are woody plants, sometimes with a slender creeping stem as in bilberry, *Vaccinium* (fig. 1), or *Andromeda* (fig. 2), or forming low bushes as in the heaths, or larger, sometimes becoming tree-like, as in species of *Rhododendron*. The leaves are alternate, opposite or whorled in arrangement, and in their form and structure show well-marked adaptation for life in dry or exposed situations. Thus in the true heaths they are needle-like, with the margins often rolled back to form a groove or an almost closed chamber on the under side. In others such as *Rhododendron* or *Arbutus* they are often leathery and evergreen, the strongly cuticularized upper surface protecting a water-storing tissue situated above the green layers of the leaf. The flowers are sometimes solitary and axillary or terminal as in *Andromeda*, but are generally arranged in racemose inflorescences at the end of the branches as in *Arbutus* and *Rhododendron*, or on small lateral shoots as in *Erica*. They are hermaphrodite and generally regular with parts in 4 or 5, thus: sepals 4 or 5, petals 4 or 5, stamens 8 or 10 in two series, the outer of which is opposite the petals, and carpels 4 or 5. The corolla is usually more or less bell-shaped, and in the heaths persists in a dry state in the fruit. The petals with the stamens are situated on the outer edge of a honey-secreting disk. The anthers show a very great variety in shape, the halves are often more or less free and often appendaged; they open to allow the escape of the pollen by a terminal pore or slit. The carpels are united to form a 4- to 5-chambered ovary, which bears a simple elongated style ending in a capitate stigma; each ovary-chamber contains one to many ovules attached to a central placenta. The brightly coloured corolla, the presence of nectar and the scent render the flowers attractive to insects, and the projection of the stigma beyond the anthers favours crossing. The fruit is generally a capsule containing many seeds, as in *Erica* (fig. 3) or *Rhododendron*; sometimes a berry as in *Arbutus*.

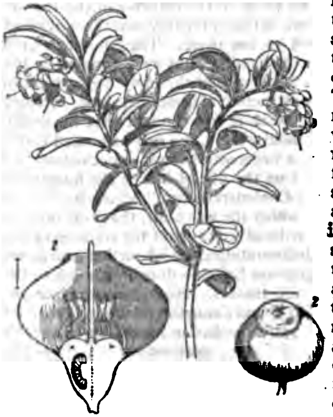


FIG. 1.—*Vaccinium vitis-idaea*, with leaf and flower, . 1, Flower of *V. myrtillus*, cut lengthwise. 2, Fruit of same.

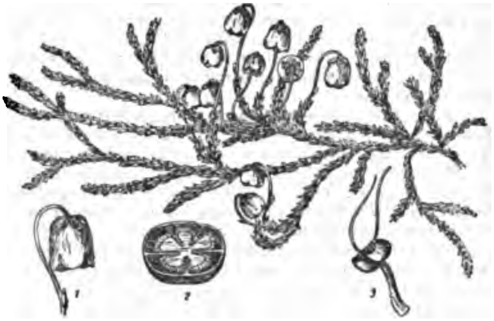


FIG. 2.—*Andromeda Hypnoides*, nat. size. 1, Flower; 2, Unripe fruit cut across; 3, Stamen—all enlarged.

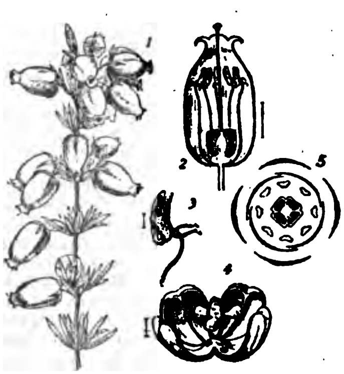


FIG. 3.

1, Flowering shoot of *Erica cinerea*, about 1½ nat. size.
2, Flower cut lengthwise.
3, Stamen showing appendages and porous dehiscence of anther.
4, Capsule showing the loculicidal dehiscence; a few seeds remain attached to the central axis.
5, Diagram of the flower having four sepals, four divisions of the corolla, eight stamens in two rows, and four divisions of the pistil.

The order falls into four distinct tribes, which are characterized by the relative position of the ovary and by the fruit and seed. They are as follows:—

1. *Rhododendron tribe*, characterized by capsular fruit, seed with a loose coat, deciduous petals and anthers without appendages. It consists mainly of the great genus *Rhododendron* (in which *Azalea* is included by recent botanists), which is chiefly

developed in the mountains of eastern Asia, many species occurring on the Himalayas. *Dabeocia*, St Dabeoc's heath, occurs in Ireland.

2. *Arbutus Tribe.*—Fruit a berry or capsule, petals deciduous and anthers with bristle-like appendages, chiefly north temperate to arctic in distribution. *Arbutus Unedo*, the strawberry-tree, so called from its large scarlet berry, is a southern European species which extends into south Ireland. *Arctostaphylos* (bearberry) and *Andromeda* are arctic and alpine genera occurring in Britain. *Epigaea repens* is the trailing arbutus or mayflower of Atlantic America.

3. *Vaccinium Tribe.*—Ovary inferior, fruit a berry. Extends from the north temperate zone to the mountains of the tropics. *Vaccinium*, the largest genus, has four British species: *V. Myrtillus* is the bilberry (*q.v.*), blaeberry or whortleberry, *V. Vitis-Idaea* the cowberry, and *V. Oxycoccos* the cranberry (*q.v.*). This tribe is sometimes regarded as a separate order Vacciniaceae, distinguished by its inferior ovary.

4. *Erica Tribe.*—Fruit usually a capsule, seeds round, not winged: corolla persisting round the ripe fruit; anthers often appendaged. The largest genus is *Erica*, the true heath (*q.v.*), with over 400 species, the great majority of which are confined to the Cape; others occur on the mountains of tropical Africa and in Europe and North Africa, especially the Mediterranean region. *E. cinerea* (purple heather) and *E. Tetralix* (cross-leaved heath) are common British heaths. *Calluna* is the ling or Scotch heather.

ERICHSEN, SIR JOHN ERIC, Bart. (1818–1896), British surgeon, born on the 19th of July 1818 at Copenhagen, was the son of Eric Erichsen, a member of a well-known Danish family. He studied medicine at University College, London, and at Paris, devoting himself in the early years of his career to physiology, and lecturing on general anatomy and physiology at University College hospital. In 1844 he was secretary to the physiological section of the British Association, and in 1845 he was awarded the Fothergillian gold medal of the Royal Humane Society for his essay on asphyxia. In 1848 he was appointed assistant surgeon at University College hospital, and in 1850 became full surgeon and professor of surgery, his lectures and clinical teaching being much admired; and in 1875 he joined the consulting staff. His *Science and Art of Surgery* (1853) went through many editions. He rose to be president of the College of Surgeons in 1880. From 1879 to 1881 he was president of the Royal Medical and Chirurgical Society. He was created a baronet in 1895, having been for some years surgeon-extraordinary to Queen Victoria. As a surgeon his reputation was world-wide, and he counts (says Sir W. MacCormac in his volume on the Centenary of the Royal College of Surgeons) "among the makers of modern surgery." He was a recognized authority on concussion of the spine, and was often called to give evidence in court on obscure cases caused by railway accidents, &c. He died at Folkestone on the 23rd of September 1896.

ERICHT, LOCH, a lake partly in Inverness-shire and partly in Perthshire, Scotland, lying between the districts of Badenoch on the N. and Rannoch on the S. The boundary line is drawn from a point opposite to the mouth of the Alder, and follows the centre of the longitudinal axis north-eastwards to 56° 50′ N., where it strikes eastwards to the shore. All of the lake to the S. and E. of this line belongs to Perthshire, the rest, forming the major portion, to Inverness-shire. It is a lonely lake, situated in extremely wild surroundings at a height of 1153 ft. above the sea, being thus the loftiest lake of large size in the United Kingdom. It is over 14½ m. long, with a mean breadth of half a mile and over 1 m. at its maximum. Its area amounts to some 7¼ sq. m., and it receives the drainage of an area of nearly 50½ sq. m. The mean depth is 189 ft., and the maximum 512 ft. It has a general trend from N.E. to S.W., the head lying 1 m. from Dalwhinnie station on the Highland railway. It receives many streams, and discharges at the south-western extremity by the Ericht. Salmon and trout afford good fishing. The surrounding mountains are lofty and rugged. Ben Alder (3757 ft.) on the west shore is the chief feature of the great Corrour deer forest. The only point of interest on the banks is the cavern, near the mouth of the Alder, in which Prince Charles Edward concealed himself for a time after the battle of Culloden.

ERICSSON, JOHN (1803–1889), Swedish-American naval engineer, was born at Langbanshyttan, Wermland, Sweden, on the 31st of July 1803. He was the second son of Olaf Ericsson, an inspector of mines, who died in 1818. Showing from his earliest years a strong mechanical bent, young Ericsson, at the age of twelve, was employed as a draughtsman by the Swedish Canal Company. From 1820 to 1827 he served in the army, where his drawing and military maps attracted the attention of the king, and he soon attained the rank of captain. In 1826 he went to London, at first on leave of absence from his regiment, and in partnership with John Braithwaite constructed the "Novelty," a locomotive engine for the Liverpool & Manchester railway competition at Rainhill in 1829, when the prize, however, was won by Stephenson's "Rocket." The number of Ericsson's inventions at this period was very great. Among other things he worked out a plan for marine engines placed entirely below the water-line. Such engines were made for the "Victory," for Captain (afterwards Sir) John Ross's voyage to the Arctic regions in 1829, but they did not prove satisfactory. In 1833 his caloric engine was made public. In 1836 he took out a patent for a screw-propeller, and though the priority of his invention could not be maintained, he was afterwards awarded a one-fifth share of the £20,000 given by the Admiralty for it. At this time Captain Stockton, of the United States navy, gave an order for a small iron vessel to be built by Laird of Birkenhead, and to be fitted by Ericsson with engines and screw. This vessel reached New York in May 1839. A few months later Ericsson followed his steamer to New York, and there he resided for the rest of his life, establishing himself as an engineer and a builder of iron ships. In 1848 he was naturalized as a citizen of the United States. He had many difficulties to contend with, and it was only by slow degrees that he established his fame and won his way to competence. At his death he seems to have been worth about £50,000. The provision of defensive armour for ships of war had long occupied his attention, and he had constructed plans and a model of a vessel lying low in the water, carrying one heavy gun in a circular turret mounted on a turntable. In 1854 he sent his plans to the emperor of the French. Louis Napoleon, however, acting probably on the advice of Dupuy de Lôme, declined to use them. The American Civil War, and the report that the Confederates were converting the "Merrimac" into an ironclad, caused the navy department to invite proposals for the construction of armoured ships. Among others, Ericsson replied, and as it was thought that his design might be serviceable in inland waters, the first armoured turret ship, the "Monitor," was ordered; she was launched on the 30th of January 1862, and on the 9th of March she fought the celebrated action with the Confederate ram "Merrimac." The peculiar circumstances in which she was built, the great importance of the battle, and the decisive nature of the result gave the "Monitor" an exaggerated reputation, which further experience did not confirm. In later years Ericsson devoted himself to the study of torpedoes and sun motors. He published *Solar Investigations* (New York, 1875) and *Contributions to the Centennial Exhibition* (New York, 1877). He died in New York on the 8th of March 1889, and in the following year, on the request of the Swedish government, his body was sent to Stockholm and thence into Wermland, where, at Filipstad, it was buried on the 15th of September.

A *Life of Ericsson* by William Conant Church was published in New York in 1890 and in London in 1893.

ERIDANUS, or FLUVIUS ("the river"), in astronomy, a constellation of the southern hemisphere, mentioned by Eudoxus (4th century B.C.) and Aratus (3rd century B.C.); Ptolemy catalogued 34 stars in it. *θ Eridani*, a fine double star of magnitudes 3·5 and 5·5, is now of the third magnitude. It is supposed to be identical with the *Achernar* of Al-Sufi, who described it as of the first magnitude; this star has therefore decreased in brilliancy in historic times. The star o_2 *Eridani* (numbered 40 by Flamsteed) was discovered to be a ternary star group by Herschel in 1783; it consists of a close pair, of magnitudes 9·2 and 10·9, revolving in a period of 180 years, associated with a star of magnitude 4·5, which is distant from the pair by 82″; these stars have an exceptionally swift proper motion, about 4″ per annum. Eridanus was the ancient name of the river Po.

ERIDU, one of the oldest religious centres of the Sumerians, described in the ancient Babylonian records as the "city of the deep." The special god of this city was Ea (*q.v.*), god of the sea and of wisdom, and the prominence given to this god in the incantation literature of Babylonia and Assyria suggests not only that many of our magical texts are to be traced ultimately to the temple of Ea at Eridu, but that this side of the Babylonian religion had its origin in that place. Certain of the most ancient Babylonian myths, especially that of Adapa, may also be traced back to the shrine of Ea at Eridu. But while of the first importance in matters of religion, there is no evidence in Babylonian literature of any special political importance attaching to Eridu, and certainly at no time within our knowledge did it exercise hegemony in Babylonia. The site of Eridu was discovered by J. E. Taylor in 1854, in a ruin then called by the natives Abu-Shahrein, a few miles south-south-west of Moghair, ancient Ur, nearly in the centre of the dry bed of an inland sea, a deep valley, 15 m. at its broadest, covered for the most part with a nitrous incrustation, separated from the alluvial plain about Moghair by a low, pebbly, sandstone range, called the Hazem, but open toward the north to the Euphrates and stretching southward to the Khanega wadi below Suk-esh-Sheiukh. In the rainy season this valley becomes a sea, flooded by the discharge of the Khanega; in summer the Arabs dig holes here which supply them with brackish water. The ruins, in which Taylor conducted brief excavations, consist of a platform of fine sand enclosed by a sandstone wall, 20 ft. high, the corners toward the cardinal points, on the N.W. part of which was a pyramidal tower of two stages, constructed of sun-dried brick, cased with a wall of kiln-burned brick, the whole still standing to a height of about 70 ft. above the platform. The summit of the first stage was reached by a staircase on the S.E. side, 15 ft. wide and 70 ft. long, constructed of polished marble slabs, fastened with copper bolts, flanked at the foot by two curious columns. An inclined road led up to the second stage on the N.W. side. Pieces of polished alabaster and marble, with small pieces of pure gold and gold-headed copper nails, found on and about the top of the second stage, indicated that a small but richly adorned sacred chamber, apparently plated within or without in gold, formerly crowned the top of this structure. Around the whole tower was a pavement of inscribed baked bricks, resting on a layer of clay 2 ft. thick. On the S.E. part of the terrace were the remains of several edifices, containing suites of rooms. Inscriptions on the bricks identified the site as that of Eridu. Since Taylor's time the place has not been visited by any explorer, owing to the unsafe condition of the neighbourhood; but T. K. Loftus (1854) and J. P. Peters (1890) both report having seen it from the summit of Moghair. The latter states that the Arabs at that time called the ruin Nowawis, and apparently no longer knew the name Abu-Shahrein. Through an error, in many recent maps and Assyriological publications Eridu is described as located in the alluvial plain, between the Tigris and the Euphrates. It was, in fact, an island city in an estuary of the Persian Gulf, stretching up into the Arabian plateau. Originally "on the shore of the sea," as the old records aver, it is now about 120 m. from the head of the Persian Gulf. Calculating from the present rate of deposit of alluvium at the head of that gulf, Eridu should have been founded as early as the seventh millennium B.C. It is mentioned in historical inscriptions from the earliest times onward, as late as the 6th century B.C. From the evidence of Taylor's excavations, it would seem that the site was abandoned about the close of the Babylonian period.

See J. E. Taylor, *Journal of the Royal Asiatic Society*, vol. xv. (1855); F. Delitzsch, *Wo lag das Paradies?* (1881); J. P. Peters, *Nippur* (1897); M. Jastrow, *The Religion of Babylonia and Assyria* (1898); H. V. Hilprecht, *Excavations in Assyria and Babylonia* (1904); L. W. King, *A History of Sumer and Akkad* (1910). (J. P. PE.)

ERIE, the most southerly of the Great Lakes of North America, between 41° 23′ and 42° 53′ N., and 78° 51′ and 83° 28′ W., bounded W. by the state of Michigan, S. and S.E. by Ohio, Pennsylvania and New York, and N. by the province of Ontario. It is nearly elliptical, the major axis, 250 m. long, lying east and west; its greatest breadth is 60 m.; its area about 10,000 sq. m.; and the total area of its basin 34,412 sq. m. Its elevation above mean sea-level is 573 ft.; and its surface is nearly 9 ft. below that of Lake Huron, which discharges into it through St Clair river, Lake St Clair and Detroit river, and is 327 ft. above that of Lake Ontario, this great difference being absorbed by the rapids and falls in the Niagara river, which joins the two lakes. Lake Erie is very shallow, and may be divided into three basins, the western extending to Point Pelee and including all the islands, containing about 1200 sq. m., with a comparatively flat bottom at 5 to 6 fathoms; the main basin, between Point Pelee and the narrows at Long Point, containing about 6700 sq. m., and having a marked shelving bottom deepening gradually to 14 fathoms; and the portion east of the narrows, containing about 2100 sq. m., having a depression 30 fathoms deep just east from Long Point, with an extensive flat of 11 fathoms depth between it and the main basin. The Canadian shore is low and flat throughout, the United States shore is low but bordered by an elevated plateau through which the rivers have cut deep channels. The lake basin is relatively so small that the rivers are without importance; Grand river, on the north shore, is the largest tributary. The flat alluvial soil bordering on the lake is very fertile, and the climate is well adapted for fruit cultivation. Large quantities of peaches, grapes and small fruits are grown; the islands in the west end have a climate much warmer and more equable than the adjoining mainland, and are practically covered with vineyards. The low clayey or sandy shores are subject to erosion by waves. In severe storms the water near shore is filled with sand, which is deposited where the currents are checked around the ends of jetties in such a way as to form bars out into the lake across improved channels. This shoaling has rendered continuous dredging necessary at every harbour on the lake west of Erie, Pa. In consequence of the shallowness of the lake its waters are easily disturbed, making navigation very rough and dangerous, and causing large fluctuations of surface. Strong winds are frequent, as nearly every cyclonic depression traversing North America, either from the westward or the Gulf of Mexico, passes near enough to Lake Erie to be felt. Westerly gales are more frequent, and have more effect on the water surface than easterly ones, lowering the water as much as 7 to 8 ft. at the west end and raising it 5 to 8 ft. at the east end. The worst storms occur in autumn, when the immense quantity of shipping on the lake makes them specially destructive. There are no tides, and usually only a slight current towards the outlet, though powerful currents are temporarily produced by the rapid return of waters after a storm, and during the height of a westerly gale there is invariably a reflex current into the west end of the lake. There is an annual fluctuation in the level of the lake, varying from a minimum of 9 in. to a maximum of 2 ft., the normal low level occurring in February and the high level in midsummer. Standard high water (of 1838) is 575·11 ft. above mean sea-level, and the lowest record was 570·8 in November 1895. The harbours and exits of the lake freeze over, but the body of the lake never freezes completely.

Ice-breaking car ferries run across the lake all winter. General navigation opens as a rule in the middle of April and closes in the middle of December. The volume of traffic is immense, because practically all freight from the more westerly lakes finds terminal harbours in Lake Erie. Official statistics of commerce passing through the Detroit river into the lake during the season of 1906 show that 35,128 vessels, having a net register of 50,673,897 tons, carried 63,805,571 (short) tons of freight, valued at $662,971,053. The 1175 vessels engaged in this business were valued at $106,223,000. Over 90% of the whole traffic is in United States ships to United States ports. Fine passenger steamers run nightly between Buffalo and Cleveland and Detroit, and there are many shorter passenger routes.

The universe of created things, as we have seen, is twofold:—*first*, that which is created and creates—the primordial ideas, archetypes, immutable relations, divine acts of will, according to which individual things are formed; *second*, that which is created and does not create, the world of individuals, the effects of the primordial causes, without which the causes have no true being. Created things have no individual or self-independent existence; they are only in God; and each thing is a manifestation of the divine, *theophania, divina apparitio*.

God alone, the uncreated creator of all, has true being. He is the true universal, all-containing and incomprehensible. The lower cannot comprehend the higher, and therefore we must say that the existence of God is above being, above essence; God is above goodness, above wisdom, above truth. No finite predicates can be applied to him; his mode of being cannot be determined by any category. True theology is negative. Nevertheless the world, as the *theophania*, the revelation of God, enables us so far to understand the divine essence. We recognize his being in the being of all things, his wisdom in their orderly arrangement, his life in their constant motion. Thus God is for us a Trinity—the Father as substance or being (οὐσία), the Son as wisdom (δύναμις), the Spirit as life (ἐνέργεια). These three are realized in the universe—the Father as the system of things, the Son as the word, *i.e.* the realm of ideas, the Spirit as the life or moving force which introduces individuality and which ultimately draws back all things into the divine unity. In man, as the noblest of created things, the Trinity is seen most perfectly reflected; *intellectus* (νοῦς), *ratio* (λόγος) and *sensus* (διάνοια) make up the threefold thread of his being. Not in man alone, however, but in all things, God is to be regarded as realizing himself, as becoming incarnate.

The infinite essence of God, which may indeed be described as *nihilum* (nothing) is that from which all is created, from which all proceeds or emanates. The first procession or emanation, as above indicated, is the realm of ideas in the Platonic sense, the word or wisdom of God. These ideas compose a whole or inseparable unity, but we are able in a dim way to think of them as a system logically arranged. Thus the highest idea is that of *goodness*; things *are*, only if they are good; being without well-being is naught. *Essence* participates in goodness—that which is good has being, and is therefore to be regarded as a species of good. *Life*, again, is a species of essence, *wisdom* a species of life, and so on, always descending from genus to species in a rigorous logical fashion.

The ideas are the eternal causes, which, under the moving influence of the spirit, manifest themselves in their effects, the individual created things. Manifestation, however, is part of the being or essence of the causes, that is to say, if we interpret the expression, God of necessity manifests himself in the world and is not without the world. Further, as the causes are eternal, timeless, so creation is eternal, timeless. The Mosaic account, then, is to be looked upon merely as a mode in which is faintly shadowed forth what is above finite comprehension. It is altogether allegorical, and requires to be interpreted. Paradise and the Fall have no local or temporal being. Man was originally sinless and without distinction of sex. Only after the introduction of sin did man lose his spiritual body, and acquire the animal nature with its distinction of sex. Woman is the impersonation of man's sensuous and fallen nature; on the final return to the divine unity, distinction of sex will vanish, and the spiritual body will be regained.

The most remarkable and at the same time the most obscure portion of the work is that in which the final return to God is handled. Naturally sin is a necessary preliminary to this redemption, and Erigena has the greatest difficulty in accounting for the fact of sin. If God is true being, then sin can have no substantive existence; it cannot be said that God knows of sin, for to God knowing and being are one. In the universe of things, *as* a universe, there can be no sin; there must be perfect harmony. Sin, in fact, results from the will of the individual who falsely represents something as good which is not so. This misdirected will is punished by finding that the objects after which it thirsts are in truth vanity and emptiness. Hell is not to be regarded as having local existence; it is the inner state of the sinful will. As the object of punishment is not the will or the individual himself, but the misdirection of the will, so the result of punishment is the final purification and redemption of all. Even the devils shall be saved. All, however, are not saved at once; the stages of the return to the final unity, corresponding to the stages in the creative process, are numerous, and are passed through slowly. The ultimate goal is *deificatio, theosis* or resumption into the divine being, when the individual soul is raised to a full knowledge of God, and where knowing and being are one. After all have been restored to the divine unity, there is no further creation. The ultimate unity is that which neither is created nor creates.

EDITIONS.—There is a complete edition of Erigena's works in J. P. Migne's *Patrologiae cursus completus* (vol. cxxii.), edited by H. J. Floss (Paris, 1853). The *De divina praedestinatione* was published in Gilbert Mauguin's *Veterum auctorum qui nono saeculo de praedestinatione et gratia scripserunt opera et fragmenta* (Paris, 1650). The commentary ("Expositiones") on Dionysius' *Hierarchiae caelestes* appeared in the *Appendix ad opera edita ab A. Maio* (ed. J. Cozza, Rome, 1871). Of the *De divisione naturae*, editions have been published by Thomas Gale (Oxford, 1681); C. B. Schlüter (Münster, 1838); and in Floss's *Opera omnia*; there is a German translation by Ludwig Noack, *Johannes Scotus Erigena über die Eintheilung der Natur* (3 vols., 1874–1876). Erigena was also the author of some poems edited by L. Traube in *Monumenta Germaniae historica. Poetae Latini aevi Carolini*, iii. (1896). A commentary on the *Opuscula sacra* of Boëtius is attributed to him and edited by E. K. Rand (1906). Monographs on Erigena's life and works are numerous; see St René Taillandier, *Scot Érigène et la philosophie scholastique* (1843); T. Christlieb, *Leben u. Lehre des Johannes Scotus Erigena* (Gotha, 1860); J. N. Huber, *Johannes Scotus Erigena* (Munich, 1861); W. Kaulich, *Das speculative System des Johannes Scotus Erigena* (Prague, 1860), A. Stöckl, *De Joh. Scoto Erigena* (1867); L. Noack, *Über Leben und Schriften des Joh. Scotus Erigena: die Wissenschaft und Bildung seiner Zeit* (Leipzig, 1876); R. L. Poole, *Medieval Thought* (1884), and article in *Dictionary of National Biography*; T. Wotschke, *Fichte und Erigena* (Halle, 1896); M. Baumgartner in Wetzer and Welte's *Kirchenlexikon*, x. (1897); Alice Gardner's *Studies in John the Scot* (1900); J. Dräseke, *Joh. Scotus Erigena und seine Gewährsmänner* (Leipzig, 1902); S. M. Deutsch in Herzog-Hauck's *Realencyklopädie für protestantische Theologie*, xviii. (1906); J. E. Sandys, *Hist. of Classical Scholarship* (1906), pp. 491-495. See also the general works on scholastic philosophy, especially Hauréau, Stöckl and Kaulich. An admirable résumé is given by F. D. Maurice, *Medieval Phil.* pp. 45-79. (R. AD.; J. M. M.)

ERIGONE, in Greek mythology, daughter of Icarius, the hero of the Attic deme Icaria. Her father, who had been taught by Dionysus to make wine, gave some to some shepherds, who became intoxicated. Their companions, thinking they had been poisoned, killed Icarius and buried him under a tree on Mount Hymettus (or threw his body into a well). Erigone, guided by her faithful dog Maera, found his grave, and hanged herself on the tree. Dionysus sent a plague on the land, and all the maidens of Athens, in a fit of madness, hanged themselves like Erigone. Icarius, Erigone and Maera were set among the stars as Boötes (or Arcturus), Virgo and Procyon. The festival called Aeora (the "swing") was subsequently instituted to propitiate Icarius and Erigone. Various small images (in Lat. *oscilla*) were suspended on trees and swung backwards and forwards, and offerings of fruit were made (Hyginus, *Fab.* 130, *Poët. astron.* ii. 4; Apollodorus iii. 14). The story was probably intended to explain the origin of these *oscilla*, by which Dionysus, as god of trees (Dendrites), was propitiated, and the baneful influence of the dog-star averted (see also OSCILLA).

ERIN, an ancient name for Ireland. The oldest form of the word is Ériu, of which Érinn is the dative case. Ériu was itself almost certainly a contraction from a still more primitive form *Iberiu* or *Iveriu*; for when the name of the island was written in ancient Greek it appeared as Ἰουερνιά (Ivernia), and in Latin as *Iberio, Hiberio* or *Hibernia*, the first syllable of the word Ériu being thus represented in the classical languages by two distinct vowel sounds separated by *b* or *v*. Of the Latin variants, *Iberio* is the form found in the most ancient Irish MSS., such as the *Confession* of St Patrick, and the same saint's *Epistle to Coroticus*. Further evidence to the same effect is found in the fact that the ancient Breton and Welsh names for Ireland were Ywerddon or Iverdon. In later Gaelic literature the primitive form Ériu became the dissyllable Éire; hence the Norsemen called the island the land of Éire, *i.e.* Ireland, the latter word being originally pronounced in three syllables. (See IRELAND: *Notices of Ireland in Greek and Roman writers*.) Nothing is known as to the meaning of the word in any of its forms, and Whitley Stokes's suggestion that it may have been connected with the Sanskrit *avara*, meaning "western." is admittedly no more than conjecture. There was, indeed, a native Irish legend, worthless from the standpoint of etymology, to account for the origin of the name. According to this myth there were three kings of the Dedannans reigning in Ireland at the coming of the Milesians, named MacColl, MacKecht and MacGrena. The wife of the first was Eire, and from her the name of the country was derived. Curiously, Ireland in ancient Erse poetry was often called "Fodla" or "Bauba," and these were the wives of the other two kings in the legend.

ERINNA, Greek poet, contemporary and friend of Sappho, a native of Rhodes or the adjacent island of Telos, flourished about 600 (according to Eusebius, 350 B.C.). Although she died at the early age of nineteen, her poems were among the most famous of her time and considered to rank with those of Homer. Of her best-known poem, Ηλακάτη (the *Distaff*), written in a mixture of Aeolic and Doric, which contained 300 hexameter lines, only 4 lines are now extant. Three epigrams in the Palatine anthology, also ascribed to her, probably belong to a later date.

The fragments have been edited (with those of Alcaeus) by J. Pellegrino (1894).

ERINYES (Lat. *Furiae*), in Greek mythology, the avenging deities, properly the angry goddesses or goddesses of the curse pronounced upon evil-doers. According to Hesiod (*Theog.* 185) they were the daughters of Earth, and sprang from the blood of the mutilated Uranus; in Aeschylus (*Eum.* 321) they are the daughters of Night, in Sophocles (*O.C.* 40) of Darkness and Earth. Sometimes one Erinys is mentioned, sometimes several; Euripides first spoke of them as three in number, to whom later Alexandrian writers gave the names Alecto (unceasing in anger), Tisiphone (avenger of murder), Megaera (jealous). Their home is the world below, whence they ascend to earth to pursue the wicked. They punish all offences against the laws of human society, such as perjury, violation of the rites of hospitality, and, above all, the murder of relations. But they are not without benevolent and beneficent attributes. When the sinner has expiated his crime they are ready to forgive. Thus, their persecution of Orestes ceases after his acquittal by the Areopagus. It is said that on this occasion they were first called Eumenides ("the kindly"), a euphemistic variant of their real name. At Athens, however, where they had a sanctuary at the foot of the Areopagus hill and a sacred grove at Colonus, their regular name was Semnae (venerable). Black sheep were sacrificed to them during the night by the light of torches. A festival was held in their honour every year, superintended by a special priesthood, at which the offerings consisted of milk and honey mixed with water, but no wine. In Aeschylus, the Erinyes are represented as awful, Gorgon-like women, wearing long black robes, with snaky locks, bloodshot eyes and claw-like nails. Later, they are winged maidens of serious aspect, in the garb of huntresses, with snakes or torches in their hair, carrying scourges, torches or sickles. The identification of Erinyes with Sanskrit Saranyu, the swift-speeding storm cloud, is rejected by modern etymologists; according to M. Bréal, the Erinyes are the personification of the formula of imprecation (ἀρά), while E. Rohde sees in them the spirits of the dead, the angry souls of murdered men:

See C. O. Müller, *Dissertations on the Eumenides of Aeschylus*, (Eng. tr., 1835); A. Rosenberg, *Die Erinyen* (1874); J. E. Harrison, *Prolegomena to the Study of Greek Religion* (1903); and *Journal of Hellenic Studies*, xix. p. 205, according to whom the Erinyes were primarily local ancestral ghosts, potent for good or evil after death, earth genii, originally conceived as embodied in the form of snakes, whose primitive haunt and sanctuary was the omphalos at Delphi; E. Rohde, *Psyche* (1903); A. Rapp in Roscher's *Lexikon der Mythologie*, and J. A. Hild in Daremberg and Saglio's *Dictionnaire des antiquités*, s. v. FURIAE.

ERIPHYLE, in Greek mythology, sister of Adrastus and wife of Amphiaraus. Having been bribed by Polyneices with the necklace of Harmonia, she persuaded her husband to take part in the expedition of the Seven against Thebes, although he knew it would prove fatal to him. Before setting out, the seer charged his sons to slay their mother as soon as they heard of his death. The attack on Thebes was repulsed, and during the flight the earth opened and swallowed up Amphiaraus together with his chariot. His son Alcmaeon, as he had been bidden, slew his mother, and was driven from place to place by the Erinyes, seeking purification and a new home (Apollodorus iii. 6. 7).

ERIS, in Greek mythology, a sister of the war-god Ares (Homer, *Iliad*, iv. 440), and in the Hesiodic theogony (225) a daughter of Night. In the later legends of the Trojan War, Eris, not having been invited to the marriage festival of Peleus and Thetis, flings a golden apple (the "apple of discord") among the guests, to be given to the most beautiful. The claims of the three deities Hera, Aphrodite and Athena are decided by Paris in favour of Aphrodite, who as a reward assists him to gain possession of Helen (Hyginus, *Fab.* 92; Lucian, *Charidemus*, 17). Hesiod also mentions (*W. and D.* 24) a beneficent Eris, the personification of honourable rivalry. In Virgil (*Aeneid*, viii. 702) and other Roman poets Eris is represented by Discordia.

ERITH, an urban district in the north-western parliamentary division of Kent, England, 14 m. E. by S. of London, on the South Eastern & Chatham railway. Pop. (1891) 13,414; (1901) 25,296. It lies on the south bank of the Thames and extends up the hills above the shore, many villas having been erected on the higher ground. The park of a former seat, Belvedere, was thus built over (*c.* 1860), and the mansion became a home for disabled seamen. The church of St John the Baptist, though largely altered by modern restoration, retains Early English to Perpendicular portions, and some early monuments and brasses. Erith has large engineering and gun factories, and in the neighbourhood are gunpowder, oil, glue and manure works. The southern outfall works of the London main drainage system are at Crossness in the neighbouring lowland called Plumstead Marshes. Erith is the headquarters of several yacht clubs. Erith, the name of which is commonly derived from A.S. *Ærra-hythe* (old haven), was anciently a borough, and was granted a market and fairs in 1313. Down to the close of the 17th century it was of some importance as a naval station.

ERITREA, an Italian colony on the African coast of the Red Sea. It extends from Ras Kasar, a cape 110 m. S. of Suakin, in 18° 2′ N., as far as Ras Dumeira (12° 42′ N.), in the Strait of Bab-el-Mandeb, a coast-line of about 650 m. The colony is bounded inland by the Anglo-Egyptian Sudan, Abyssinia and French Somaliland. It consists of the coast lands lying between the capes named and of part of the northern portion of the Abyssinian plateau. The total area is about 60,000 sq. m. The population is approximately 450,000, of which, exclusive of soldiers, not more than 3000 are whites.

The land frontier starting from Ras Kasar runs in a south-westerly direction until in about 14° 15′ N., 36° 35′ E. it reaches the river Setit, some distance above the junction of that stream with the Atbara. This, the farthest point inland, is 198 m. S.W. of Massawa. The frontier now turns east, following for a short distance the course of the river Setit; thence it strikes north-easterly to the Mareb, and from 38° E. follows that river and its tributaries the Belesa and Muna, until within 42 m. of the sea directly south of Annesley Bay. At this point the frontier turns south and east, crossing the Afar or Danakil country at a distance of 60 kilometres (37·28 m.) from the coast-line. About 12°20′ N. the French possessions in Somaliland are reached. Here the frontier turns N.E. and so continues until the coast of the Red Sea is again reached at a point south of the town of Raheita. In the southern part of the colony are small sultanates, such as those of Aussa and Raheita, which are under Italian protection. The Dahlak archipelago and other groups of islands along the coast belong to Eritrea.

Physical Features.—The coast-line is of coral formation and is, in the neighbourhood of Massawa, thickly studded with small islands. The chief indentations are Annesley Bay, immediately south of Massawa, and Assab Bay in the south. The colony consists of two widely differing regions. The northern division is part of the Abyssinian highlands. The southern division, part of the Afar or Danakil country, includes all the territory of the colony south of Annesley Bay. These two regions are connected by a narrow strip of land behind Annesley Bay, where the Abyssinian hills approach close to the sea. From this bay the coast-line trends S.E. so that at Tajura Bay the distance between the Abyssinian hills and the sea is over 200 m. The Afar country is part of the East African rift-valley, and in the southern parts of the valley its surface is diversified by ranges of hills, frequently volcanic, and by lakes. The plains, however, extend over large areas, they are generally arid and are often covered with mimosa trees which form a kind of jungle called by the natives *khala*. The torrents which descend from the Abyssinian plateau usually fail to reach the sea. They are mostly bordered by dense vegetation; in the dry season water is found in pools in the river beds or can be obtained by digging. The principal rivers enter and are lost in one or other of two salt plains or basins, that of Asali in the north and that of Aussa in the south. The Hawash flows through the Aussa country in a N.E. direction, but is lost in lakes Abbebad and Aussa (see ABYSSINIA). The Raguali and other rivers drain into the Asali basin. This basin, like that of Aussa, is in places 200 ft. below sea-level. On the west the Asali basin reaches to the Abyssinian foot-hills; in its southern part is the small lake Alelbad. The eastern edge of the basin is formed by a ridge of gypsum and on its margin grow palms. In parts the salt lies thick on the plain, which then has the appearance of a lake frozen over. South of Lake Alelbad is a volcano called Artali or Erta-alé ("the smoky"), and farther to the S.E., in about 13° 15′ N., is the peak of Afdera, which was in eruption in June 1907. The hills, 1000 to 4000 ft. in height, which run more or less parallel to and a few miles from the coast, include the volcano of Dubbi (reported active in 1861), some 30 m. S. of the port of Edd (Eddi). In 14° 52′ N., 39° 53′ E. and near the northern end of the zone of depression the volcano of Alid (2985 ft.) rises from the trough. Its chief crest forms an elongated ring and encloses a crater over half a mile in diameter and with walls 350 ft. high. North and south of Alid extends a vast lava field. Dubbi and Alid are in Italian territory; the greater part of Afar belongs to Abyssinia.

At Annesley Bay the narrow coast plain is succeeded by foothills separated by small valleys through which flow innumerable streams. From these hills the ascent to the plateau which constitutes northern Eritrea is very steep. This tableland, which has a general elevation of about 6500 ft., is fairly fertile despite a desert region—Sheb—to the S.E. of Keren. It is characterized by rich, well-watered valleys, verdant plains and flat-topped hills with steep sides, running in ranges or isolated. The highest hills in Eritrean territory rise to about 10,000 ft. The plateau is known by various names, the region directly west of Massawa being called Hamasen. To the west and north the plateau sinks in terraces to the plains of the Sudan, and eastward falls more abruptly to the Red Sea, the coast plain, known as the Samhar, consisting of sandy country covered with mimosa and, along the khors, with a somewhat richer vegetation.

The colony contains no navigable streams. For a short distance the Setit (known in its upper course as the Takazze), a tributary of the Atbara, forms the frontier, as does also in its upper course the Gash or Mareb (see ABYSSINIA). The Mareb, often dry in summer, in the floods is a large and impassable river. Both the Setit and Mareb have a general westerly course across the Abyssinian plateau. The Baraka (otherwise Barka) and Anseba rise in the Hamasen plateau near Asmara within a short distance of each other. The Baraka flows west and then north; the Anseba, which has a more easterly course, also flows northward and joins the Baraka a little N. of 17° N. A few miles below the confluence the Baraka leaves Italian territory. It is (as is the Anseba) an intermittent stream. After heavy rain it discharges some of its water into the Red Sea north of Tokar. The whole of the hill country north of Asmara belongs to the drainage area of the Baraka or Anseba. Of the numerous streams which, north of the Danakil country, run direct from the hills to the Red Sea, the Hadas may be mentioned, as along the valley of that stream is one of the most frequented routes to the tableland. The Hadas, in time of flood, reaches the ocean near Adulis in Annesley Bay.

Climate.—The climate in different parts of the colony varies greatly. Three distinct climatic zones are found:—(1) that of the coastlands, including altitudes up to 1650 ft., (2) that of the escarpments and valleys, and (3) that of the high plateau and alpine summits. In the coast zone the heat and humidity are excessive during most of the year, June, September and October being the hottest months. Rains occur between November and April, during which time the temperature is lower. In this zone malarial fevers prevail in winter. The heat is greatest at Massawa, where the mean temperature averages 88° F., but where, in summer, the thermometer often rises to 120° F. in the shade. In the second zone the climate is more temperate and there is considerable variation in temperature owing to nocturnal radiation. This zone falls within the régime of the summer monsoon rains, while those districts adjoining the coast zone enjoy also winter rains. August is the most rainy and May the hottest month. On the high plateau, *i.e.* the third zone, the climate is generally moderately cool. Slight rain falls in the spring and abundant monsoon rains from June to September. The heat is greatest in the dry season, November to April. Above 8500 ft. the climate becomes sub-alpine in character.

Flora and Fauna.—In the low country the flora differs little from that of tropical Africa generally, whilst on the plateau the vegetation is characteristic of the temperate zone. The olive tree grows on the high plateau and covers the flanks of the hills to within 3000 ft. of sea-level. The sycamore-fig tree grows to enormous proportions in parts of the plateau. Lower down durra, maize and bultuc grow in profusion. In the northern part of the colony, especially along the Khor Baraka, the dom palm flourishes. The fauna includes, in the low country, the lion, panther, elephant, camel, and antelope of numerous species. On the plateau the fauna is that of Abyssinia (*q.v.*).

Inhabitants.—The inhabitants of the plains and foothills are for the most part semi-nomad shepherds, living on durra and milk. In the north these people are largely of Arab or Hamitic stock, such as the Beni-Amer, but include various negro tribes. Afar and Somali form the population of the southern regions. The inhabitants of the plateau are Abyssinians. The nomads are Mussulmans and are, as a rule, docile and pacific, though the Danakils are given to occasional raiding. The Abyssinians are more warlike, but they have settled down under Italian rule. Among the native industries are mat-weaving, cotton-weaving, silver-working and rudimentary iron and leather working. (See AFARS: SOMALILAND and ABYSSINIA.)

Towns.—The principal places on the coast are Massawa (*q.v.*), pop. about 10,000, the chief seaport of the colony, Assab, chief town of the Danakil region, to which converges the trade from Abyssinia across the Aussa country, and Zula (*q.v.*), identified with the ancient Adulis. The chief town in the interior is Asmara (*q.v.*), the capital of the colony and under the Abyssinians capital of the province of Hamasen, and favourite headquarters of Ras Alula (see below and also ABYSSINIA). It is situated 7800 ft. above the sea, and has something of the aspect of a European town. Keren, 50 m N.W. of Asmara, is the centre for a district (Bogos) fertilized by the upper course of the Anseba; Agordat, on the river Baraka, on the road from Keren to Kassala, is the centre of the Beni-Amer, Algheden and Sabderat tribes; Mogolo, on the lower Mareb, is the rendezvous of the Baria and Baza tribes. Towards Abyssinia the chief towns are Saganeiti (capital of the Okulé-Kusai province), Godofelasei and Adi-Ugri, the two latter situated in the fertile plain of the Seraé; Adiquala, on the edge of the Mareb gorge; and Arrasa, the centre of the districts constituting the province of Deki-Tesfa.

Agriculture and Trade.—The nomads of the plains possess large herds of cattle and camels. The low country is almost entirely pastoral and unsuited for the cultivation of crops. On the other hand almost all European cereals flourish in the intermediate zone and on the high plateau, and the Abyssinian is a good agriculturist and understands irrigation. Numbers of emigrants from Italy possess farms on the plateau. Experiments in the cultivation of coffee, tobacco and cotton have given good results in the intermediate zone. Besides camels and oxen, sheep and goats are numerous, and meat, hides and butter are articles of local trade. Hides are the principal export (about £50,000 a year). Wax, gum, coffee and ivory are also exported. Pearl fishing is carried on at Massawa and the Dahlak islands. The annual value of the fisheries is about £40,000 (pearls £10,000, mother of pearl £30,000). Gold mines are worked near Asmara. Salt, obtained from the salt lakes in the Aussa and Danakil countries, is a valuable article of commerce. Cotton goods are the chief imports. There is a little trade with northern Abyssinia, but it is undeveloped. For the five years 1901–1905 the average value of the external trade was £456,000 per annum. The imports more than doubled the exports.

Communications.—A railway, 65 m. long, connects Massawa with Asmara. An extension of the line is planned from Asmara to Sabderat and Kassala. The whole territory is crossed by camel and mule paths between the sea and the high plateau, and between the various centres of population. Every valley that brings water to the Red Sea has a route leading to the high plateau. The great arteries, however, number three, which, starting from Massawa by way of Asmara, run, two to Abyssinia, and one to Kassala and Khartum. They are all more or less practicable for carts, and are flanked by a good telegraph line as long as they lie in Italian territory. There are also two caravan routes from Assab Bay, across the Danakil country to southern Abyssinia. The northern leads by a comparatively easy ascent to Yejju, the more southern follows the valley of the Hawash. A telegraph line 500 m. long connects Massawa with Adis Ababa via Asmara. Massawa is also telegraphically connected with the outside world by a cable to Perim via Assab. There is regular steamship communication with Italy.

Administration.—Eritrea is administered by a civil governor responsible to the ministry of foreign affairs at Rome. It is divided into six provinces, each governed by a regional commissioner. Some tracts of frontier territory are detached from the various regions and entrusted to political residents, as, for instance, on the Sudan frontier and also on the Abyssinian boundary, where strict surveillance is necessary to repress raiding incursions from Tigré, and where the chief intelligence department is established. The six regions or principal provinces are:—Asmara, which includes Hamasen and other small districts; Keren, which comprises the high territories to the north of Asmara, *i.e.* the Bogos country; Massawa, extending over all the tribes between the high plateau and the sea from the Hababs to the Danakil; Assab, which extends from Edd to Raheita; Okulé-Kusai, the plateau country S.E. of Asmara; Seraé, including Deki-Tesfa, the country S.W. of Asmara. The regional commissioners and the political residents act either by means of the village headmen (*Shum* or *Chicca*), by the chiefs of districts in the few localities where villages are still organized in districts, or by the headmen of tribes, and by the councils of the elders wherever these remain.

Revenue is derived from customs duties, direct taxation and tribute paid by the nomad tribes. The local revenue, which for the period 1897–1907 was about £100,000 a year, is supplemented by grants from Italy, the total cost of the administration being about £400,000 yearly. Nearly half the expenditure is on the military force maintained.

Justice.—Civil justice for natives is administered, in the first instance, by the headmen of villages, provinces, tribes, or by councils of notables (*Shumagalle*); in appeal, by the residents and regional tribunals, and, in the last instance, by the colonial court of appeal. Europeans are entirely under Italian jurisdiction. Penal justice is administered by Italian judges only. An administrative tribunal settles, without appeal, questions of tribute, disputes concerning family, village or tribal landmarks, as well as suits involving the colonial government. The civil laws for the natives are those established by local usage. Europeans are answerable to the Italian civil code. Penal laws are the same as in Italy, except where modified by local usages. Appeal to the Rome court of cassation is admitted against all penal and civil sentences.

Defence.—Defence is entrusted to a corps of colonial troops, partly Italian and partly native; to a militia (*milizia mobile*) formed by natives who have already served in the colonial corps; and to the *chitet* or general levy which, in time of war, places all male able-bodied inhabitants under arms. The regional commissioners and political residents have at their disposal some hundreds of irregular paid soldiers under native chiefs. In war time these irregulars form part of the colonial corps, but in time of peace serve as frontier police. The colonial corps, about 5000 strong, garrisons the chief places of strategic importance, such as Asmara, Keren and Saganeiti. The irregular troops, on foot, or mounted on camels, number about 1000 men. The militia consists of 3500 men of all arms, and is intended in time of war to reinforce the various divisions of the colonial corps. The *chitet* yields between 3000 and 4000 men, to be employed on the lines of communication or in caravan service. All these troops are intended to ward off a first attack, so as to allow time for the arrival of reinforcements from Italy. The customs and political surveillance along the coast is entrusted, afloat, to the Massawa naval station, and, ashore, to a coastguard company 400 strong stationed at Meder, with detachments at Assab, Massawa, Raheita, Edd and Taclai.

History.—Traces of the ancient Eritrean civilization are scarce. During the prosperous periods of ancient Egypt, Egyptian squadrons asserted their rule over the west Red Sea coast, and under the Ptolemies the port of Golden Berenice (Adulis?) was an Egyptian fortress, afterwards abandoned. During the early years of the Roman empire, Eritrea formed part of an important independent state—that of the Axumites (Assamites). At the end of the reign of Nero, and perhaps even earlier, the king of the Axumites ruled over the Red Sea coast from Suakin to the strait of Bab-el-Mandeb, and traded constantly with Egypt. This potentate called himself "king of kings," commanded an army and a fleet, coined money, adopted Greek as the official language, and lived on good terms with the Roman empire. The Axumites belonged originally to the Hamitic race, but the immigration of the Himyaritic tribes of southern Arabia speedily imposed a new language and civilization. Therefore the ancient Abyssinian language, Geez, and its living dialects, Amharic and Tigrina, are Semitic, although modified by the influence of the old Hamitic Agau or Agao. Adulis (Adovlis), slightly to the north of Zula (*q.v.*), was the chief Axumite port. From Adulis started the main road, which led across the high plateau to the capital Axomis (Axum). Along the road are still to be seen vestiges of cities and inscribed monuments, such as the Himyaritic inscriptions on the high plateau of Kohait, the six obelisks with a Saban inscription at Toconda, and an obelisk with an inscription at Amba Sait. Other monuments exist elsewhere, as well as coins of the Axumite period with Greek and Ethiopian inscriptions. After the rise of the Ethiopian empire the history of Eritrea is bound up with that of Ethiopia, but not so entirely as to be completely fused. The documents of the Portuguese expedition of the 16th century and other Ethiopian records show that all the country north of the Mareb enjoyed relative autonomy under a vassal of the Ethiopian emperor.

Michael, counsellor of Solomon, who was king of the country north of the Mareb, usurped the throne of Solomon during the reign of the Emperor Atzié Jasu II. (1729–1753), and, after proclaiming himself ras of Tigré and "protector of the empire," ceded the North Mareb country to an enemy of the rightful dynasty. Hence a long struggle between the dispossessed family and the occupants of the North Mareb throne. The coast regions had meantime passed from the control of the Abyssinians. In the 16th century the Turks made themselves masters of Zula, Massawa, &c., and these places were never recovered by the Abyssinians. In 1865 Massawa and the neighbouring coast was acquired by Egypt, the khedive Ismail entertaining projects for connecting the port by railway with the Nile. The Egyptians took advantage of civil war in Abyssinia to seize Keren and the Bogos country in 1872[1], an action against which the negus Johannes (King John), newly come to the throne, did not at the time protest. In 1875 and 1876 the Egyptians, who sought to increase their conquests, were defeated by the Abyssinians at Gundet and Gura. Walad Michael, the hereditary ruler of Bogos, fought as ally of King John at Gundet and of the Egyptians at Gura. For two years Walad Michael continued to harass the border, but in December 1878 he submitted to King John, by whose orders he was (Sept. 1879) imprisoned upon an amba, or flat-topped mountain, whence he only succeeded in escaping in 1890. In 1879 his territory was given by King John to Ras Alula, who retained it until, in August 1889, the Italians occupied Asmara (see Abyssinia: *History*).

An Egyptian garrison remained at Keren in the Bogos country until 1884, when in consequence of the revolt of the Mahdi it was withdrawn, Bogos being occupied by Abyssinia on the 12th of September of that year. On the 5th of February 1885 an Italian force, with the approval of Great Britain, occupied Massawa, the Egyptian garrison returning to Egypt. This occupation led to wars with Abyssinia and finally to the establishment of the colony in its present limits. The history of the Italian-Abyssinian relations is fully told in the articles Italy and Abyssinia (history sections).

It was not, however, at Massawa that Italy first obtained a foothold in eastern Africa. The completion of the Suez Canal led Italy as well as Great Britain and France to seek territorial rights on the Red Sea coasts. The purchase of Assab and the neighbouring region for £1880, from the sultan Berehan of Raheita for use as a coaling station by the Italian Rubattino Steamship Company, in March 1870, formed the nucleus of Italy's colonial possessions. This purchase was protested against by Egypt, Turkey and Great Britain; the last named power being willing to recognize an Italian commercial settlement, but nothing more. (The Indian government viewed the establishment of the Italians on the new highway to the East with a good deal of ill-humour.) Eventually, the British opposition being overcome and that of Egypt and Turkey disregarded, Assab, by a decree of the 5th of July 1882, was declared an Italian colony. Between 1883 and 1888 various treaties were concluded with the sultan of Aussa ceding the Danakil coast to Italy and recognizing an Italian protectorate over the whole of his country—through which passes the trade route from Assab Bay to Shoa.

On the 1st of January 1890 the various Italian possessions on the coast of the Red Sea were united by royal decree into one province under the title of the Colony of Eritrea—so named after the Erythraeum Mare of the Romans. At first the government of the colony was purely military, but after the defeat of the Italians by the Abyssinians at Adowa, the administration was placed upon a civil basis (1898–1900). The frontiers were further defined by a French-Italian convention (24th of January 1900) fixing the frontier between French Somaliland and the Italian possessions at Raheita, and also by various agreements with Great Britain and Abyssinia. A tripartite agreement between Italy, Abyssinia and Great Britain, dated the 15th of May 1902, placed the territory of the Kanama tribe, on the north bank of the Setit, within Eritrea. A convention of the 16th of May 1908 settled the Abyssinian-Eritrean frontier in the Afar country, the boundary being fixed at 60 kilometres from the coast. The task of reconstructing the administration on a civil basis and of developing the commerce of the colony was entrusted to Signor F. Martini, who was governor for nine years (1898–1906). Under civil rule the colony made steady though somewhat slow progress.

Authorities.—See B. Melli, *La Colonia Eritrea dalle sue origini al anno 1901* (Parma, 1901); G. B. Penne, *Per l'Italia Africana. Studio critico* (Rome, 1906); R. Perini, *Di qua dal Marèb* (Florence, 1905), a monograph on the Asmara zone; F. Martini, *Nell' Africa Italiana* (3rd ed., Milan, 1891); A. B. Wylde, *Modern Abyssinia*, chaps. v.-ix. (London, 1901); E. D. Schoenfeld, *Erythräa und der ägyptische Sudân*, chaps. i.-xii. (Berlin, 1904); Luigi Chiala, *La Spedizione di Massaua* (Turin, 1888); *Abyssinian Green Books* published at intervals in 1895 and 1896, covering the period from 1870 to the end of the Italo-Abyssinian War; Vico Mantegazza, *La Guerra in Africa* (Florence, 1896); General Baratieri, *Memorie d'Africa* (Rome, 1898); C. de la Jonquière, *Les Italiens en Érythrée* (Paris, 1897); G. F. H. Berkeley, *The Campaign of Adowa* (London, 1902). For orography and geology see an article by P. Verri in *Boll. Soc. geog. italiana*,

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[1] During the Second Empire unsuccessful efforts were made by France to obtain a Red Sea port and a foothold in northern Abyssinia. (See Somaliland: *French*.)

1909, and for climate an article in *Rivista coloniale* (1906), by A. Tancredi. A. Allori compiled a *Piccolo Dizionario eritreo, italiano-arabo-amarico* (Milan, 1895).

For Afar consult W. Munzinger, "A Journey through the Afar Country" in *Journ. Royal Geog. Soc.* for 1869; V. Bottego, "Nella Terra dei Danakil," in *Boll. Soc. Geog. Italiana*, 1892; Count C. Rossini, "Al Rágali" in *L'Espl. Comm.* of Milan, 1903–1904; and articles by G. Dainelli and O. Marinelli in the *Riv. Geog. Italiana* of Florence for 1906–1908, dealing with the volcanic regions.

Bibliographies will be found in G. Fumagalli's *Bibliografia Etiopica* (Milan, 1893) and in the *Riv. Geog. Italiana* for 1907.

ERIVAN, a government of Russia, Transcaucasia, having the province of Kars on the W., the government of Tiflis on the N., that of Elisavetpol on the N. and E., and Persia and Turkish Armenia on the S. It occupies the top of an immense plateau (6000-8000 ft.). Continuous chains of mountains are met with only on its borders, and in the E., but the whole surface is thickly set with short ridges and isolated mountains of volcanic origin, of which Alagöz (14,440 ft.) and Ararat (16,925 ft.) are the most conspicuous and the most important. Both must have been active in Tertiary times. Lake Gok-cha (540 sq. m.) is encircled by such volcanoes, and the neighbourhood of Alexandropol is a "volcanic amphitheatre," being entirely buried under volcanic deposits. The same is true of the slopes leading down to the river Aras; and the valley of the upper Aras is a stony desert, watered only by irrigation, which is carried on with great difficulty owing to the character of the soil. The government is drained by the Aras, which forms the boundary with Persia and flows with great velocity down its stony bed, the fall being 17-22 ft. per mile in its upper course, and 9 ft. at Ordubad, where it quits the government, while lower down it again increases to 23 ft. Many of the small lakes, filling volcanic craters, are of great depth. Timber is very scarce. A variety of useful minerals exists, but only rock-salt is obtained, at Nakhichevan and Kulp. The climate is extremely varied, the following being the average temperatures and mean annual rainfall at Alexandropol (alt. 5078 ft.) and Aralykh (2755 ft.) respectively: year 42°, January 12°, July 65°, mean rainfall 16·2 in.; and year 53°, January 20·5°, July 79°, rainfall 6 3 in. The population numbered 829,578 in 1897 (only 375,086 women), of whom 82,278 lived in the towns. An estimate in 1906 gave a total of 909,100. They consist chiefly of Armenians (441,000), Tatars (40%), Kurds (49,389), with Russians, Greeks and Tates. Most of the Armenians belong to the Gregorian (Christian) Church, and only 4020 to the Armenian Catholic Church. The Tatars are mostly Shiite Mussulmans, only 27,596 being Sunnites; 7772 belong to the peculiar faith of the Yezids. While barley only can be grown on the high parts of the plateau, cotton, mulberry, vines and all sorts of fruit are cultivated in the valley of the Aras. Cattle-breeding is extensively carried on; camels also are bred, and leeches are collected out of the swamps and exported to Persia. Industry is in its infancy, but cottons, carpets, and felt goods are made in the villages. A considerable trade is carried on with Persia, but trade with Asia Minor is declining. The government is divided into seven districts—Erivan, Alexandropol, Echmiadzin (chief town, Vagarshapat), Nakhichevan, Novobayazet, Surmali (chief town, Igdyr), and Sharur-daralagöz (chief town, Norashen). The principal towns are Erivan (see below), Alexandropol (32,018 inhabitants in 1897), Novobayazet (8507), Nakhichevan (8845), and Vagarshapat (3400).

ERIVAN, or IRWAN, in Persian, *Rewan*, a town of Russia, capital of the government of the same name, situated in 40° 14′ N., 44° 38′ E., 234 m. by rail S.S.W. of Tiflis, on the Zanga river, from which a great number of irrigation canals are drawn. Altitude, 3170 ft. Pop. (1873) 11,938; (1897) 29,033. The old Persian portion of the town consists mainly of narrow crooked lanes enclosed by mud walls, which effectually conceal the houses, and the modern Russian portion is laid out in long ill-paved streets. On a steep rock, rising about 600 ft. above the river, stand the ruins of the 16th-century Turkish fortress, containing part of the palace of the former Persian governors, a handsome but greatly dilapidated mosque, a modern Greek church and a cannon foundry. One chamber, called the Hall of the Sardar, bears witness to former splendour in its decorations. The finest building in the city is the mosque of Hussein Ali Khan, familiarly known as the Blue Mosque from the colour of the enamelled tiles with which it is richly encased. At the mosque of Zal Khan a passion play is performed yearly illustrative of the assassination of Hussein, the son of Ali. Erivan is an Armenian episcopal see, and has a theological seminary. The only manufactures are a little cotton cloth, leather, earthenware and blacksmiths' work. The fruits of the district are noted for their excellence—especially the grapes, apples, apricots and melons. Armenians, Persians and Tatars are the principal elements in the population, besides some Russians and Greeks. The town fell into the power of the Turks in 1582, was taken by the Persians under Shah Abbas in 1604, besieged by the Turks for four months in 1615, and reconquered by the Persians under Nadir Shah in the 18th century. In 1780 it was successfully defended against Heraclius, prince of Georgia; and in 1804 it resisted the Russians. At length in 1827 Paskevich took the fortress by storm, and in the following year the town and government were ceded to Russia by the peace of Turkman-chai. A Tatar poem in celebration of the event has been preserved by the Austrian poet, Bodenstedt, in his *Tausend und ein Tage im Orient* (1850).

ERLANGEN, a town of Germany, in the kingdom of Bavaria, on a fertile plain, at the confluence of the Schwabach and the Regnitz, 11 m. N.W. of Nuremberg, on the railway from Munich to Bamberg. Pop. (1905) 23,720. It is divided into an old and a new town, the latter consisting of wide, straight and well-built streets. The market place is a fine square. Upon it stand the town-hall and the former palace of the margraves of Bayreuth, now the main building of the university. The latter was founded by the margrave Frederick (d. 1763), who, in 1742, established a university at Bayreuth, but in 1743 removed it to Erlangen. A statue of the founder, erected in 1843 by King Louis I. of Bavaria, stands in the centre of the square and faces the university buildings. The university has faculties of philosophy, law, medicine and Protestant theology. Connected with it are a library of over 200,000 volumes, geological, anatomical and mineralogical institutions, a hospital, several clinical establishments, laboratories and a botanical garden. Among the churches of the town (six Protestant and one Roman Catholic), only the new town church, with a spire 220 ft. high, is remarkable. The chief industries of Erlangen are spinning and weaving, and the manufacture of glass, paper, brushes and gloves. The brewing industry is also important, the beer of Erlangen being famous throughout Germany and large quantities being exported.

Erlangen owes the foundation of its prosperity chiefly to the French Protestant refugees who settled here on the revocation of the edict of Nantes and introduced various manufactures. In 1017 the place was transferred from the bishopric of Würzburg to that of Bamberg; in 1361 it was sold to the king of Bohemia. It became a town in 1398 and passed into the hands of the Hohenzollerns, burgraves of Nuremberg, in 1416. There for nearly three centuries it was the property of the margraves of Bayreuth, being ceded with the rest of Bayreuth to Prussia in 1791. In 1810 it came into the possession of Bavaria. Erlangen was for many years the residence of the poet Friedrich Rückert, and of the philosophers Johann Gottlieb Fichte and Friedrich Wilhelm von Schnelling.

See Stein and Müller, *Die Geschichte von Erlangen* (1898).

ERLE, SIR WILLIAM (1793–1880), English lawyer and judge, was born at Fifehead-Magdalen, Dorset, on the 1st of October 1793, and was educated at Winchester and at New College, Oxford. Having been called to the bar at the Middle Temple in 1819 he went the western circuit, became counsel to the Bank of England, sat in parliament from 1837 to 1841 for the city of Oxford, and, although of opposite politics to Lord Lyndhurst, was made by him a judge of the common pleas in 1845. He was transferred to the queen's bench in the following year, and in 1859 came back to the common pleas as chief justice upon the promotion of Sir Alexander Cockburn. He retired in 1866, receiving the highest eulogiums for the ability and impartiality with which he had discharged the judicial office. He died at his estate at Bramshott, Hampshire, on the 28th of January

1880, and a monument without his name but in his memory (sometimes erroneously supposed to mark the place where an old gibbet was) stands on the top of Hindhead.

See E. Manson, *Builders of our Law* (1904).

ERLKÖNIG, or Erl-King, a mythical character in modern German literature, represented as a gigantic bearded man with a golden crown and trailing garments, who carries children away to that undiscovered country where he himself abides. There is no such personage in ancient German mythology, and the name is linguistically nothing more than the perpetuation of a blunder. It first appeared in Herder's *Stimmen der Völker* (1778), where it is used in the translation of the Danish song of the *Elf-King's Daughter* as equivalent to the Danish *ellerkonge*, or *ellekonge*, that is, *elverkonge*, the king of the elves; and the true German word would have been *Elbkönig* or *Elbenkönig*, afterwards used under the modified form of *Elfenkönig* by Wieland in his *Oberon* (1780). Herder was probably misled by the fact that the Danish word *elle* signifies not only elf, but also alder tree (Ger. *Erle*). His mistake at any rate has been perpetuated by both English and French translators, who speak of a "king of the alders," "un roi des aunes," and find an explanation of the myth in the tree-worship of early times, or in the vapoury emanations that hang like weird phantoms round the alder trees at night The legend was adopted by Goethe as the subject of one of his finest ballads, rendered familiar to English readers by the translations of Lewis and Sir Walter Scott; and since then it has been treated as a musical theme by Reichardt and Schubert

ERMAN, PAUL (1764–1851), German physicist, was born in Berlin on the 29th of February 1764. He was the son of the historian Jean Pierre Erman (1735–1814), author of *Histoire des réfugiés*. He became teacher of science successively at the French gymnasium in Berlin, and at the military academy, and on the foundation of the university of Berlin in 1810 he was chosen professor of physics. He died at Berlin on the 11th of October 1851. His work was mainly concerned with electricity and magnetism, though he also made some contributions to optics and physiology. His son, Georg Adolf Erman (1806–1877), was born in Berlin on the 12th of May 1806, and after studying natural science at Berlin and Königsberg, spent from 1828 to 1830 in a journey round the world, an account of which he published in *Reise um die Erde durch Nordasien und die beiden Oceane* (1833–1848). The magnetic observations he made during his travels were utilized by C. F. Gauss in his theory of terrestrial magnetism. He was appointed professor of physics at Berlin in 1839, and died there on the 12th of July 1877. From 1841 to 1865 he edited the *Archiv für wissenschaftliche Kunde von Russland*, and in 1874 he published, with H. J. R. Petersen, *Die Grundlagen der Gauss'schen Theorie und die Erscheinungen des Erdmagnetismus im Jahre 1829*.

His son Johann Peter Adolf Erman (1854–), a famous Egyptologist, was born in Berlin on the 31st of October 1854. Educated at Leipzig and Berlin, he became extraordinary professor in 1883 and ordinary professor in 1892 of Egyptology in the university of Berlin, and in 1885 he was appointed director of the Egyptian department of the royal museum. For an account of the Egyptological work of Erman and his school, see Egypt: *Language*.

ERMANARIC (fl. 350–376), king of the East Goths, belonged to the Amali family, and was the son of Achiulf. His name occurs as Ermanaricus (Jordanes), Aírmanareiks (Gothic), *Eormenric* (A. Sax.), Jörmunrek (Norse), Ermenrich (M.H. German). Ermanaric built up for himself a vast kingdom, which eventually extended from the Danube to the Baltic and from the Don to the Theiss. He drove the Vandals out of Dacia, compelled the allegiance of the neighbouring tribes of West Goths, procured the submission of the Herules, of many Slav and Finnish tribes, and even of the Esthonians on the shores of the Gulf of Bothnia. In his later days the west Goths threw off his yoke, and, on the invasion of the Huns, rather than witness the downfall of his kingdom he is said by Ammianus Marcellinus to have committed suicide. His fate early became the centre of popular tradition, which found its way into the narrative of Jordanes or Jornandes (*De rebus geticis*, chap. 24), who compared him to Alexander the Great and certainly exaggerated the extent of his kingdom. He is there said to have caused a certain Sunilda or Sanielh to be torn asunder by wild horses on account of her husband's traitorous conduct. Her brothers Sarus and Ammius sought to avenge her. They succeeded in wounding, not in killing the Gothic king, whose death supervened in his one hundred and tenth year from the joint effects of his wound and fear of the Hunnish invasion. This is evidently a paraphrase of popular story which sought to supply plausible reasons for Ermanaric's end. In German legend Ermanaric became the typical cruel tyrant, and references to his crimes abound in German epic and in Anglo-Saxon poetry. He is made to replace Odoacer as the enemy of Dietrich of Bern, his nephew, and his history is related in the Norse *Vilkina* or *Thidrekssagá*, which chiefly embodies German tradition. His evil genius, Sifka, Sibicho or Bicci, brings about the death of his three sons. The Harlungs, Imbrecke and Fritile,[1] are his nephews, whom he has strangled for the sake of their treasure, the Brisinga meni. Sonhild or Svanhild becomes the wife of Ermanaric, and the motive for her murder is replaced by an accusation of adultery between Svanhild and her stepson. The story was already connected with the Nibelungen when it found its way to the Scandinavian north by way of Germany. In the *Völsunga Saga* Svanhild is the daughter of Sigurd and Gudrun. She is given in marriage to the Gothic king Jörmunrek (Ermanaric), who sends his son Randver as proxy wooer in company of Bicci, the evil counsellor. Randver is persuaded by Bicci to take his father's bride for himself. Randver is hanged and Svanhild trampled to death by horses in the gate of the castle. Gudrun eggs on Sörli and Hamdir or Hamtheow, her two sons by her third husband, Jonakr the Hun, to avenge their sister. On the way they slay their half-brother Erp, whom they suspect of lukewarmness in the cause; arrived in the hall of Ermanaric they make a great slaughter of the Goths, and hew off the hands and feet of Ermanaric, but they themselves are slain with stones. The tale is told with variations by Saxo Grammaticus (*Historia Danica*, ed. Müller, p. 408, &c.), and in the Icelandic poems, the *Lay of Hamtheow*, *Gudrun's Chain of Woe*, and in the prose *Edda*.

Bibliography.—W. Grimm, in *Die deutsche Heldensage* (2nd ed., Berlin, 1867), quotes the account given by Jordanes, references in Beowulf, in the *Wanderer's Song*, *Exeter Book*, in *Parcival*, in *Dietrichs Flucht*, the account given in the *Quedlinburg Chronicle*, by Ekkehard in the *Chronicon Urspergense*, by Saxo Grammaticus, &c. See also Vigfússon and Powell, *Corpus poëticum boreale*, vol. i. (Oxford, 1883), and H. Symons, "Die deutsche Heldensage" in Paul's *Grundriss d. german. Phil.* vol. iii. (Strassburg, 1900).

ERMELAND, or Ermland (*Varmia*), a district of Germany, in East Prussia, extending from the Frisches Haff, a bay in the Baltic, inland towards the Polish frontier. It is a well-wooded sandy tract of country, has an area of about 1650 sq. m., a population of 240,000, and is divided into the districts of Braunsberg, Heilsberg, Rössel and Allenstein.

Ermeland was originally one of the eleven districts of old Prussia and was occupied by the Teutonic Knights (*Deutscher Orden*), being made in 1250 one of the four bishoprics of the country under their sway. The bishop of Ermeland shortly afterwards declared himself independent of the order, and became a prince of the Empire. In 1466 Ermeland, together with West Prussia, was by the peace of Thorn attached to the crown of Poland, and the bishop had a seat in the Polish senate. In 1772 it was again incorporated with Prussia. Among the bishops of the see, which still exists, with its seat in Frauenberg, may be mentioned Aeneas Sylvius Piccolomini, afterwards Pope Pius II., and Cardinal Stanislaus Hosius (1504–1579), the founder of the Jesuit college in Braunsberg.

See Hipler, *Literaturgeschichte des Bisthums Ermeland* (Braunsberg, 1873); the *Monumenta historiae Warmiensis* (Mainz, 1860–1864, and Braunsberg, 1866–1872, 4 vols.); and Buchholz, *Abriss einer Geschichte des Ermlands* (Braunsberg, 1903.)

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[1] Emerka and Fridla (Beowulf, *Quedlingburg Chron.*), Aki and Etgard (*Vilkina Saga*). In the original myth the Harlungs, who are not to be confused with the Hartung brothers, were sent to bring home Sûryâ, the bride of the sky-god, Irmintiu.

ERMELO, a district and town of the Transvaal. The district lies in the south-east of the province and is traversed by the Drakensberg. In it are Lake Chrissie, the only true lake in the country, and the sources of the Vaal, Olifants, Komati, and Usuto rivers, which rise within 30 m. of one another. The region has a general elevation of about 5500 ft. and is fine agricultural and pastoral country, besides containing valuable minerals, including coal and gold. Ermelo town, pop. (1904) 1451, is by rail 175 m. S.E. of Johannesburg, and 74 m. S.S.W. of Machadodorp on the Pretoria-Delagoa Bay railway. A government experimental farm, with some 1000 acres of plantations, is maintained here.

ERMINE, an alternative name for the stoat (*Putorius ermineus*), apparently applicable in its proper sense only when the animal is in its white winter coat. This animal measures 10 in. in length exclusive of the tail, which is about 4 in. long, and becomes bushy towards the point. The fur in summer is reddish brown above and white beneath, changing in the winter of northern latitudes to snowy whiteness, except at the tip of the tail, which at all seasons is black. In Scottish specimens this change in winter is complete, but in those found in the southern districts of England it is usually only partial, the ermine presenting during winter a piebald appearance. The white colour is evidently protective, enabling the animals to elude the observations of their enemies, and to steal unobserved on their prey. It also retains heat better than a dark covering, and may thus serve to maintain an equable temperature at all seasons within the body. The colour change seems to be due to phagocytes devouring the pigment-bodies of the hair, and not to a moult.

Ermine or Stoat (*Putorius ermineus*).

The species is a native of the temperate and subarctic zones of the Old World, and is represented in America by a form which can scarcely be regarded as specifically distinct. It inhabits thickets and stony places, and frequently makes use of the deserted burrows of moles and other underground mammals. Exceedingly sanguinary in disposition, and agile in its movements, it feeds principally on rats, water-rats and rabbits, which it pursues with pertinacity and boldness, hence the name *stoat*, signifying bold, by which it is commonly known. It takes readily to water, and will even climb trees in pursuit of prey. It is particularly destructive to poultry and game, and has often been known to attack hares, fixing itself to the throat of its victim, and defying all the efforts of the latter to disengage it. The female brings forth five young ones about the beginning of summer. The winter coat of the ermine forms one of the most valuable of commercial furs, and is imported in enormous quantities from Norway, Sweden, Russia and Siberia. It is largely used for muffs and tippets, and as a trimming for state robes, the jet black points of the tails being inserted at regular intervals as an ornament. In the reign of Edward III. the wearing of ermine was restricted to members of the royal family; but it now enters into almost all state robes, the rank and position of the wearer being in many cases indicated by the presence or absence, and the disposition, of the black spots. (See also FUR.)

ERMINE STREET. Documents and writers of the 11th and succeeding centuries occasionally mention four "royal roads" in Britain—Icknield Street, Erning or Ermine Street, Watling Street and Foss Way—as standing apart from all other existing roads and enjoying the special protection of the king. Unfortunately these authorities are not at all agreed as to their precise course; the roads themselves do not occur as specially privileged in actual legal or other practice, and it is likely that the category of Four Roads is the invention of a lawyer or an antiquary. The names are, however, attested to some extent by early charters which name them among other roads, as boundaries. From these charters we know that Icknield Street ran along the Berkshire downs and the Chilterns, that Ermine Street ran more or less due north through Huntingdonshire, that Watling Street ran north-west across the midlands from London to Shrewsbury, and Foss diagonally to it from Lincoln or Leicester to Bath and mid-Somerset. This evidence only proves the existence of these roads in Saxon and Norman days. But they all seem to be much older. Icknield Street is probably a prehistoric ridgeway along the downs, utilized perhaps by the Romans near its eastern end, but in general not Roman. Ermine Street coincides with part of a line of Roman roads leading north from London through Huntingdon to Lincoln. This line is followed by the Old North Road through Cheshunt, Buntingford, Royston, and Huntingdon to Castor near Peterborough; and thence it can be traced through lanes and byways past Ancaster to Lincoln. Watling Street is the Roman highway from London by St Alban's (Verulamium) to Wroxeter near Shrewsbury (Viroconium). Foss is the Roman highway from Lincoln to Bath and Exeter. Hence it has been supposed, and is still frequently alleged, that the Four Roads were the principal highways of Roman Britain. This, however, is not the case. Icknield Street is not Roman and the three roads which follow Roman lines, Ermine Street, Watling Street, and Foss, held no peculiar position in the Romano-British road system (see BRITAIN: *Roman*). In later times, the names Ermine Street, Icknield Street and Watling Street have been applied to other roads of Roman or supposed Roman origin. This, however, is wholly the work of Elizabethan or subsequent antiquaries and deserves no credence.

The derivations of the four names are unknown. Icknield, Ermine and Watling may be from English personal names; Foss, originally Fos, seems to be the Lat. *fossa* in its occasional medieval sense of a bank of upcast earth or stones, such as the *agger* of a road. (F. J. H.)

ERMOLDUS NIGELLUS, or ERMOLD THE BLACK, was a monk of Aquitaine, who accompanied King Pippin, son of the emperor Louis I., on a campaign into Brittany in 824. Subsequently he was banished from Pippin's court on a charge of inciting the king against his father, and retired to Strassburg, where he sought to regain the emperor's favour by writing a poem on his life and deeds. About 830 he obtained his recall, and has been identified with Hermoldus, who appears as Pippin's chancellor in 838. Ermoldus was a cultured man with a knowledge of the Latin poets, and his poem, *In honorem Hludovici imperatoris*, has some historical value. It consists of four books and deals with the life and exploits of Louis from 781 to 826. He also wrote two poems in imitation of Ovid, which were addressed to Pippin.

His writings are published in the *Monumenta Germaniae historica. Scriptores*, Band 2 (Hanover, 1826 fol.); by J. P. Migne in the *Patrologia Latina*, tome 105 (Paris, 1844); and by E. Dümmler in the *Poëtae Latini aevi Carolini*, Band 2 (Berlin, 1881–1884). See W. O. Henkel, *Über den historischen Werth der Gedichte des Ermoldus Nigellus* (Eilenburg, 1876); W. Wattenbach, *Deutschlands Geschichtsquellen*, Band 1 (Berlin, 1904); and A. Potthast, *Bibliotheca historica*, pp. 430-431 (Berlin, 1896).

ERNE, the name of a river and two lakes in the north-west of Ireland. The river rises in Lough Gowna, county Longford, 214 ft. above sea-level, flows north through Lough Oughter with a serpentine course and a direction generally northward, and then broadens into the Upper Lough Erne, a shallow irregular sheet of water 13 m. long, so beset with islands as to present the appearance of a number of water-channels ramifying through the land. The river then winds past the town of Enniskillen on its island, and enters Lough Erne, a beautiful lake nearly 18 m. long and 5 m. in extreme width, containing many islands, but less closely covered with them than the upper lough. One of them, Devenish, is celebrated for its antiquarian remains (see ENNISKILLEN). The river then runs westward to Donegal Bay, forming a fine fall at Ballyshannon (*q.v.*). Lough Erne contains trout and pike. These waters admit of navigation by small steamers, but little trade is carried on. The area of the Erne basin, which includes a vast number of small loughs, is about 1600 sq. m., and it covers part of the counties Cavan, Longford, Leitrim, Fermanagh and Donegal. The length of the Erne valley is about 70 m.

ERNEST I. [Ernst Anton Karl Ludwig], duke of Saxe-Coburg-Gotha (1784–1844), was the son of Francis, duke of Saxe-Coburg-Saalfeld, and was born on the 2nd of January 1784. At the time of his father's death (9th of December 1806) the duchy of Coburg was occupied by Napoleon as conquered territory, and Ernest did not come into his inheritance till after the peace of Tilsit (July 1807). Owing to the part he had played in assisting the Prussians at the battle of Auerstädt he continued out of favour with Napoleon, and he threw himself with vigour into the war of liberation against the French. After the battle of Leipzig he was given the command of the V. army corps and reduced Mainz by blockade; he also commanded the Saxon troops during the campaign of 1815. By the congress of Vienna he was rewarded with the principality of Lichtenberg on the left bank of the Rhine, which received a slight augmentation after the second peace of Paris. These territories he sold to Prussia in 1834. In 1826, in the division of the territories of the duchy of Saxe-Gotha which followed the death of its last duke (February 1825), he received the duchy of Gotha, ceding that of Saalfeld to the duke of Meiningen; and he now exchanged his style of Ernest III. of Saxe-Coburg-Saalfeld for that of Ernest I. of Saxe-Coburg-Gotha. In 1821 he had given a constitution to Coburg, but he did not interfere with the traditional system of estates at Gotha. He died on the 29th of January 1844.

Duke Ernest, who was not only a good soldier and keen sportsman, but an enlightened patron of the arts and sciences, did much for the economic, educational and constitutional development of his territories; and his advice always carried great weight in the councils of the other German sovereigns. It was, however, for the splendid international position attained by the house of Coburg under him that his reign is chiefly distinguished. His younger brother Leopold (*q.v.*) became king of the Belgians; his brother Ferdinand (b. 1785) married the wealthy princess Antoinette von Kohary (1816) and was the father of the duchess of Nemours and of the future King Ferdinand of Portugal. Of his sisters, Antoinette (1779–1824) married Duke Alexander of Württemberg; Juliane [Alexandra Feodorovna] (1781–1860) married the Russian cesarevich Constantine, from whom she was, however, divorced in 1820; and Victoria (1786–1861), wife of Edward Augustus, duke of Kent, became the mother of Queen Victoria. Duke Ernest was twice married: (1) in 1817 to Louise, daughter of Duke Augustus of Saxe-Gotha, whom he finally divorced in 1826; (2) in 1831 to Maria, daughter of Duke Alexander of Württemberg. Of his sons, by his first wife, Ernest succeeded him in the duchy, and Albert married Queen Victoria.

ERNEST II., duke of Saxe-Coburg-Gotha (1818–1893), was born at Coburg on the 21st of June 1818, being the eldest son of Duke Ernest I. He enjoyed a varied education; he studied at the university of Bonn with his brother Albert; his military training he received in the Saxon army. The widespread connexions of his family opened to him many courts of Europe, and after he became of age he travelled much. The position of his uncle Leopold, who was king of the Belgians, and especially the marriage of his brother Albert to the queen of England, his cousin, gave him peculiar opportunities for becoming acquainted with the political problems of Europe. In 1840–1841 he undertook a journey to Spain and Portugal; in the latter country another cousin, Ferdinand, was king-consort. In 1844 he succeeded his father. His own character and the influence of the king of the Belgians made him one of the most Liberal princes in Germany. He was able to bring to a satisfactory conclusion disputes with the Coburg estates. He passed through the ordeal of the revolution of 1848 with little trouble, for he anticipated the demands of the people of Gotha for a reform, and in 1852 introduced a new constitution by which the administration of his two duchies was assimilated in many points. The government of his small dominions did not afford sufficient scope for his restless and versatile ambition; his desire to play a great part in German affairs was probably increased by the feeling that, though he was the head of his house, he was to some extent overshadowed by the younger branches of the family which ruled in Belgium, England and Portugal. He was one of the foremost supporters of every attempt made to reform the German constitution and bring about the unity of Germany. He took a warm interest in the proceedings of the Frankfort parliament, and it was often said, probably without reason, that he hoped to be chosen emperor himself. However that may be, he strongly urged the king of Prussia to accept that position when it was offered him in 1849; he took a very prominent part in the complicated negotiations of the following year, and it was at his suggestion that a congress of princes met at Berlin in 1850. He highly valued the opportunities which this and similar meetings gave him for exercising political influence, and he would have felt most at home as a member of a permanent council of the German princes.

Ambitious also of military distinction, and sympathizing with the rising of the people of Schleswig-Holstein against the Danes in 1849, Ernest accepted a command in the federal army. In the engagement of Eckernförde in April 1849 the troops under his orders succeeded in capturing two Danish frigates, a remarkable feat of which he was justly proud. His greatest services to Germany were performed during the years of reaction which followed; almost alone among the German princes he remained faithful to the Liberal and National ideals, and he allowed his dominions to be used as an asylum by the writers and politicians who had to leave Prussia and Saxony. The reactionary parties looked on him with great suspicion, and it was at this time that he formed a friendship with Gustav Freytag, the celebrated novelist, whom he protected when the Prussian government demanded his arrest. His connexion with the English court gave him a position of much influence, but no one was more purely German in his feelings and opinions. The marriage of his niece Victoria with Frederick, the heir to the Prussian throne, strengthened his connexion with Prussia, but caused the Conservative party to look with increased suspicion on the Coburg influence. He was the first German prince to visit Napoleon III., and was present when Orsini made his celebrated attempt on the emperor's life. After 1860 he became the chief patron and protector of the *National Verein*; he encouraged the newly-formed rifle clubs, and notwithstanding the strong disapproval of his fellow-monarchs, allowed his court to become the centre of the rising national agitation. Still a warm adherent of Prussia, in 1862 he set an example to the other princes by voluntarily making an agreement by which his troops were placed in war under the command of the king of Prussia. Like all the other Nationalists, he was much embarrassed by the policy of Bismarck, and the democratic opinions of the Coburg court, which were shared by the crown prince Frederick, were a serious embarrassment to that minister. The opposition became more accentuated when the duke allowed his dominions to be used as the headquarters of the agitation in favour of Frederick, duke of Augustenburg, who claimed the duchies of Schleswig and Holstein, and it was at this time that Bismarck is reported to have said that if Frederick the Great had been alive the duke would have been in the fortress of Spandau. In 1863 he was present at the *Fürstentag* in Frankfort, and from this time was in more frequent communication with the Austrian court, where his cousin Alexander, Count Mensdorff, was minister. However, when war broke out in 1866, he at once placed his troops at the disposition of Prussia; Bismarck had in an important letter explained to him his policy and tactics. He was personally concerned in one of the most interesting events of the war; for the Hanoverian army, in its attempt to march south and join the Bavarians, had to pass through Thuringia, and the battle of Langensalza was fought in the immediate neighbourhood of Gotha. His troops took part in the battle, which ended in the rout of the Prussians, the duke, who was not present during the fight, in vain attempting to stop it. He bore an important share in the negotiations before and after the battle, and his action at this time has been the subject of much controversy, for it was suggested that while he offered to mediate he really acted as a partisan of Prussia. For his services to Prussia he received as a present the forest of Schmalkalden. He was with the Prussian headquarters in Bohemia during the latter part of the war.

With the year 1866 the political rôle which Ernest had played ended. The result was perhaps not quite equal to his expectations, but it must be remembered how difficult was the position of the minor German princes; and he quoted with great satisfaction the words used in 1871 by the emperor William at Versailles, that "to him in no small degree was due the establishment of the empire." He was a man of varied tastes, a good musician—he composed several operas and songs—and a keen sportsman, a quality in which he differed from his brother. Notwithstanding his Liberalism, he had a great regard for the dignity of his rank and family, and in his support of constitutional government would never have sacrificed the essential prerogatives of sovereignty. He died at Reinhardsbrunn on the 22nd of August 1893. In 1842 the duke married Alexandrine, daughter of the grandduke of Baden; there were no children by this marriage and the succession to Saxe-Coburg Gotha passed therefore to the children of his younger brother Albert. By Albert's marriage contract the duchy could not be held together with the English crown; thus his eldest son, afterwards Edward VII., was passed over and it came to his second son, Alfred, duke of Edinburgh (1844–1900). When Alfred died without sons in July 1900 the succession to the duchy passed to a younger brother Arthur, duke of Connaught; but the duke and his son, Arthur, passed on their claim to Charles Edward, duke of Albany (b. 1884), who became duke of Saxe-Coburg-Gotha in succession to his uncle Alfred. In 1905 Charles Edward married Victoria Adelaide (b. 1885), princess of Schleswig-Holstein, by whom he has a son John Leopold (b. 1906).

Duke Ernest was something of a writer. He brought out an account of the travels in Egypt and Abyssinia which he undertook in 1862 as *Reise des Herzogs Ernst von Sachsen-Koburg-Gotha nach Ägypten* (Leipzig, 1864); and he published his memoirs, *Aus meinem Leben und aus meiner Zeit* (Berlin, 1887–1889). This work is in three volumes and contains much valuable information on a most critical period of German history; there is an English translation by P. Andreae (1888–1890).

See also Sir T. Martin, *Life of H.R.H. the Prince Consort* (1875–1880); Hon. C. Grey, *Early Years of the Prince Consort* (1867); A. Ohorn, *Herzog Ernst II., ein Lebensbild* (Leipzig, 1894); and E. Tempeltey, *Herzog Ernst von Koburg und das Jahr 1866* (Berlin, 1898). (J. W. He.)

ERNEST AUGUSTUS (1771–1851), king of Hanover and duke of Cumberland, fifth son of the English king George III., was born at Kew on the 5th of June 1771. Having studied at the university of Göttingen, he entered the Hanoverian army, serving as a leader of cavalry when war broke out between Great Britain and France in 1793, and winning a reputation for bravery. He lost the sight of one eye at the battle of Tournai in May 1794, and when Hanover withdrew from the war in 1795 he returned to England, being made lieutenant-general in the British army in 1799. In the same year he was created duke of Cumberland and Teviotdale and granted an allowance of £12,000 a year, after which he held several lucrative military positions in England, and began to attend the sittings of the House of Lords and to take part in political life. A stanch Tory, the duke objected to all proposals of reform, especially to the granting of any relief to the Roman Catholics, and had great influence with his brother the prince regent, afterwards King George IV., in addition to being often consulted by the Tory leaders. In 1810 he was severely injured by an assassin, probably his valet Sellis, who was found dead; and subsequently two men were imprisoned for asserting that the duke had murdered his valet. Recovering from his wounds, Cumberland again proceeded to the seat of war; and having been made a British field-marshal, was in command of the Hanoverian army during the campaigns of 1813 and 1814, being present, although not in action, at the battle of Leipzig. In May 1815 Ernest married his cousin, Frederica (1778–1841), daughter of Charles II. duke of Mecklenburg-Strelitz and widow of Frederick, prince of Solms-Braunfels, a union which was very repugnant to his mother Queen Charlotte, and was disliked in England, where the duke's strong Toryism had made him unpopular. Parliament refused to increase his allowance from £18,000, to which it had been raised in 1804, to £24,000 a year, and indignant at the treatment he received the duke spent some years in Berlin. Returning to England after the accession of George IV. in 1820, his political power was again considerable, while deaths in the royal family made it likely that he would succeed to the throne. Although his personal influence with the sovereign ceased upon the death of George IV. in 1830, the duke continued to oppose all measures for the extension of civil and religious liberty, including the Reform Bill of 1832; and his unpopularity was augmented by suspicions that he had favoured the formation of Orange lodges in the army. When William IV. died in June 1837, the crowns of Great Britain and Hanover were separated; and Ernest, as the nearest male heir of the late king, became king of Hanover. At once cancelling the constitution which William had given to his kingdom in 1833, he acted as an absolute monarch, and the constitution which he sanctioned in 1840 was permeated with his own illiberal ideas. In German politics he was vigilant and active, and mindful of the material interests of his country. His reign, however, was a stormy one, and serious trouble between king and people had arisen when he died at Herrenhausen on the 18th of November 1851 (see HANOVER: *History*). In spite of his arbitrary rule and his reactionary ideas the king was popular among his subjects, and his statue in Hanover bears the words "*Dem Landes Vater sein treues Volk.*" Ernest, who is generally regarded as the ablest of the sons of George III., left an only child, George, who succeeded him as king of Hanover.

See C. A. Wilkinson, *Reminiscences of the Court and Times of King Ernest of Hanover* (London, 1886); von Malortie, *Konig Ernst August* (Hanover, 1861); and the various histories of Great Britain and Hanover for the period.

ERNESTI, JOHANN AUGUST (1707–1781), German theologian and philologist, was born on the 4th of August 1707, at Tennstädt in Thuringia, of which place his father was pastor, besides being superintendent of the electoral dioceses of Thuringia, Salz and Sangerhausen. At the age of sixteen he was sent to the celebrated Saxon cloister school of Pforta (Schulpforta). At twenty he entered the university of Wittenberg, and studied afterwards at the university of Leipzig. In 1730 he was made master in the faculty of philosophy. In the following year he accepted the office of conrector in the Thomas school of Leipzig, of which J. M. Gesner was then rector, an office to which Ernesti succeeded in 1734. He was, in 1742, named professor *extraordinarius* of ancient literature in the university of Leipzig, and in 1756 professor *ordinarius* of rhetoric. In the same year he received the degree of doctor of theology, and in 1759 was appointed professor *ordinarius* in the faculty of theology. Through his learning and his manner of discussion, he co-operated with S. J. Baumgarten of Halle (1706–1757) in disengaging the current dogmatic theology from its many scholastic and mystical excrescences, and thus paved a way for a revolution in theology. He died, after a short illness, in his seventy-sixth year, on the 11th of September 1781.

It is perhaps as much from the impulse which Ernesti gave to sacred and profane criticism in Germany, as from the intrinsic excellence of his own works in either department, that he must derive his reputation as a philologist or theologian. With J. S. Semler he co-operated in the revolution of Lutheran theology, and in conjunction with Gesner he instituted a new school in ancient literature. He detected grammatical niceties in Latin, in regard to the consecution of tenses which had escaped preceding critics. His canons are, however, not without exceptions. As an editor of the Greek classics, Ernesti hardly deserves to be named beside his Dutch contemporaries, Tiberius Hemsterhuis (1685–1766), L. C. Valckenaer (1715–1785), David Ruhnken (1723–1798), or his colleague J. J. Reiske (1716–1774). The higher criticism was not even attempted by Ernesti. But to him and to Gesner is due the credit of having formed, by discipline and by example, philologists greater than themselves, and of having kindled the national enthusiasm for ancient learning. It is chiefly in hermeneutics that Ernesti has any claim to eminence as a theologian. But here his merits are distinguished, and, at the period when his *Institutio Interpretis N. T.* was published (1761), almost peculiar to himself. In it we find the principles of a general interpretation, formed without the assistance of any particular philosophy, but consisting of observations and rules which, though already enunciated, and applied in the criticism of the profane writers, had never rigorously been employed in biblical exegesis. He was, in fact, the founder of the grammatico-historical school. He admits in the sacred writings as in the classics only one acceptation, and that the grammatical, convertible into and the same with the logical and historical. Consequently he censures the opinion of those who in the illustration of the Scriptures refer everything to the illumination of the Holy Spirit, as well as that of others who, disregarding all knowledge of the languages, would explain words by things. The "analogy of faith," as a rule of interpretation, he greatly limits, and teaches that it can never afford of itself the explanation of words, but only determine the choice among their possible meanings. At the same time he seems unconscious of any inconsistency between the doctrine of the inspiration of the Bible as usually received and his principles of hermeneutics.

Among his works the more important are:—I. In classical literature: *Initia doctrinae Solidioris* (1736), many subsequent editions; *Initia rhetorica* (1730); editions, mostly annotated, of Xenophon's *Memorabilia* (1737), Cicero (1737–1739), Suetonius (1748), Tacitus (1752), the *Clouds* of Aristophanes (1754), Homer (1759–1764), Callimachus (1761), Polybius (1764), as well as of the *Quaestura* of Corradus, the Greek lexicon of Hedericus, and the *Bibliotheca Latina* of Fabricius (unfinished); *Archaeologia litteraria* (1768), new and improved edition by Martini (1790); Horatius Tursellinus *De particulis* (1769). II. In sacred literature: *Antimuratorius sive confutatio disputationis Muratorianae de rebus liturgicis* (1755–1758); *Neue theologische Bibliothek*, vols. i. to x. (1760–1769); *Institutio interpretis Nov. Test.* (3rd ed., 1775); *Neueste theologische Bibliothek*, vols. i. to x. (1771–1775). Besides these, he published more than a hundred smaller works, many of which have been collected in the three following publications:—*Opuscula oratoria* (1762, 2nd ed., 1767); *Opuscula philologica et critica* (1764, 2nd ed., 1776); *Opuscula theologica* (1773). See Herzog-Hauck, *Realencyklopädie*; J. E. Sandys, *Hist. of Class. Schol.* iii. (1908).

ERNESTI, JOHANN CHRISTIAN GOTTLIEB (1756–1802), German classical scholar, was born at Arnstadt, Thuringia, and studied under his uncle, J. A. Ernesti, at the university of Leipzig. On the 5th of June, 1782, he was made supplementary professor of philosophy at his own university; and on the death of his cousin August Wilhelm in 1801 he was for five months professor of rhetoric. He died on the 5th of June of the following year.

His principal works are:—Editions of Aesop's *Fabulae* (1781); of the *Glossae sacrae of Hesychius* (1785) and *Suidas and Phavorinus* (1786); and of *Silius Italicus Punica* (1791–1792); *Lexicon Technologiae Graecorum rhetoricae* (1795); *Lexicon technologiae Latinorum rhetoricae* (1797), and *Cicero's Geist und Kunst* (1799–1802).

ERNST, HEINRICH WILHELM (1814–1865), German violinist and composer, was born at Brünn, in Moravia, in 1814. He was educated at the Conservatorium of Vienna, studying the violin under Joseph Böhm and Joseph Mayseder, and composition under Ignaz von Seyfried. At the age of sixteen he made a concert tour in south Germany, which established his reputation as a violinist of the highest promise. In 1832 he went to Paris, where he lived for several years. During this period he formed an intimacy with Stephen Heller, which resulted in their charming joint compositions—the *Pensées fugitives* for piano and violin. In 1843 he paid his first visit to London. The impression which he then made as a violinist was more than confirmed in the following year, when his rare powers were recognized by the musical public. Thenceforward he visited England nearly every year, until his health broke down owing to long-continued neuralgia of a most severe kind. The last seven years of his life were spent in retirement, chiefly at Nice, where he died on the 8th of October 1865. As a violinist Ernst was distinguished by his almost unrivalled executive power, loftiness of conception, and intensely passionate expression. As a composer he wrote chiefly for his own instrument, and his *Elegie* and *Otello Fantasia* rank among the most treasured works for the violin.

ERODE, a town of British India, in the Coimbatore district of Madras, situated on the right bank of the river Cauvery, which is here crossed by an iron railway girder bridge of 22 spans. Pop. (1901) 15,529. Here the South Indian railway joins the South-Western line of the Madras railway, 243 m. from Madras. There are exports of cotton and saltpetre; and the town has a steam cotton press.

EROS, a minor planet discovered by Witt at Berlin on the 14th of August 1898, and, so far as yet known, unique in that its perihelion lies far within the orbit of Mars.

EROS, in Greek mythology, the god of love. He is not mentioned in Homer; in Hesiod (*Theog.* 120) he is one of the oldest and the most beautiful of the gods, whose power neither gods nor men can resist. He also evolves order and harmony out of Chaos by uniting the separated elements. This cosmic Eros, who in Orphic cosmogony sprang from the world-egg which Chronos, or Time, laid in the bosom of Chaos, and which is the origin of all created beings, degenerated in later mythology into the capricious god of sexual passion, the son of Aphrodite and Zeus, Ares or Hermes. He is commonly represented as a mischievous boy, the tormentor of gods and men, even his own mother not being proof against his attacks. His brother is Anteros, the god of mutual love, who punishes those who do not return the love of others, without which Eros could not thrive; he is sometimes described as the opponent of Eros. The chief associates of Eros are Pothos and Himeros (Longing and Desire), Peitho (Persuasion), the Muses and the Graces; he himself is in constant attendance on Aphrodite. Later writers (Euripides being the first) assumed the existence of a number of Erotes (like the Roman Amores and Cupidines) with similar attributes. According to the philosophers, Eros was not only the god of sexual love, but also of the loyal and devoted friendship of men; hence the Theban "Sacred Band" was devoted to him, and the Cretans and Spartans offered sacrifice to him before going into battle (Athenaeus xiii. p. 561). In Alexandrian poetry Eros is at one time the powerful god who conquers all, at another the elfish god of love. For the Roman adaptation of Eros see CUPID; and for the later legend of Cupid and Psyche see PSYCHE.

In art Eros is represented as a beautiful youth or a winged child. His attributes are the bow and arrows and a burning torch. The rose, the hare, the cock and the goat are frequently associated with him. The most celebrated statue of him was at Thespiae, the work of Praxiteles. Other famous representations are the Vatican torso and Eros trying his bow (in the Capitoline museum).

See J. E. Harrison, *Prolegomena to the Study of Greek Religion* (1903); G. F. Schömann, *De Cupidine Cosmogonico* (1852); E. Gerhard, *Über den Gott Eros* (1850); articles in Roscher's *Lexikon der Mythologie*, Daremberg and Saglio's *Dictionnaire des antiquités*, and Pauly-Wissowa's *Realencyclopädie*.

ERPENIUS (original name VAN ERPE), **THOMAS** (1584–1624), Dutch Orientalist, was born at Gorcum, in Holland, on the 11th of September 1584. After completing his early education at Leiden, he entered the university of that city, and in 1608 took the degree of master of arts. By the advice of Scaliger he studied Oriental languages whilst taking his course of theology. He afterwards travelled in England, France, Italy and Germany, forming connexions with learned men, and availing himself of the information which they communicated. During his stay at Paris he contracted a friendship with Casaubon, which lasted during his life, and also took lessons in Arabic from an Egyptian, Joseph Barbatus, otherwise called Abu-dakni. At Venice he perfected himself in the Turkish, Persic and Ethiopic languages. After a long absence, Erpenius returned to his own country in 1612, and on the 10th of February 1613 he was appointed professor of Arabic and other Oriental languages, Hebrew excepted, in the university of Leiden. Soon after his settlement at Leiden, animated by the example of Savary de Brèves, who had established an Arabic press at Paris at his own charge, he caused new Arabic characters to be cut at a great expense, and erected a press in his own house. In 1619 the curators of the university of Leiden instituted a second chair of Hebrew in his favour. In 1620 he was sent by the States of Holland to induce Pierre Dumoulin or André Rivet to settle in that country; and after a second journey he was successful in inducing Rivet to comply with their request. Some time after the return of Erpenius, the states appointed him their interpreter; and in this capacity he had the duty imposed upon him of translating and replying to the different letters of the Moslem princes of Asia and Africa. His reputation had now spread throughout all Europe, and several princes, the kings of England and Spain, and the archbishop of Seville made him the most flattering offers; but he constantly refused to leave his native country. He was preparing an edition of the Koran with a Latin translation and notes, and was projecting an Oriental library, when he died prematurely on the 13th of November 1624.

Among his works may be mentioned his *Grammatica Arabica*, published originally in 1613 and often reprinted; *Rudimenta linguae Arabicae* (1620); *Grammatica Ebraea generalis* (1621); *Grammatica Chaldaica et Syria* (1628); and an edition of Elmacin's *History of the Saracens*.

ERROLL (or Errol), **FRANCIS HAY, 9th Earl of** (d. 1631), Scottish nobleman, was the son of Andrew, 8th earl, and of Lady Jean Hay, daughter of William, 6th earl. The date of his birth is unrecorded, but he succeeded to the earldom (cr. 1453) in 1585, was early converted to Roman Catholicism, and as the associate of Huntly joined in the Spanish conspiracies against the throne of Elizabeth. A letter written by him, declaring his allegiance to the king of Spain, having been intercepted and sent by Elizabeth to James in February 1589, he was declared a rebel by the council. He engaged with Huntly and Crawford in a rebellion in the north of Scotland, but their forces surrendered at Aberdeen on the arrival of the king in April; and in July Erroll gave himself up to James, who leniently refrained from exacting any penalty. In September of the same year he entered into a personal bond with Huntly for mutual assistance; and in 1590 displeased the king by marrying, in spite of his prohibition, Lady Elizabeth Douglas, daughter of the earl of Morton. He was imprisoned on suspicion of complicity in the attempt made by Gray and Bothwell to surprise the king at Falkland in June 1592; and though he obtained his release, he was again proclaimed a rebel on account of the discovery of his signature to two of the "Spanish Blanks," unwritten sheets subscribed with the names of the chief conspirators in a plot for a Spanish invasion of Scotland, to be filled up later with the terms of the projected treaty. After a failure to apprehend him in March 1593, Erroll and his companions were sentenced to abjure Romanism or leave the kingdom; and on their non-compliance were in 1594 declared traitors. On the 3rd of October they defeated at Glenlivet a force sent against them under Argyll; though Erroll himself was severely wounded, and Slains Castle, his seat, razed to the ground. The rebel lords left Scotland in 1595, and Erroll, on report of his further conspiracies abroad, was arrested by the states of Zealand, but was afterwards allowed to escape. He returned to Scotland secretly in 1596, and on the 20th of June 1597 abjured Romanism and made his peace with the Kirk. He enjoyed the favour of the king, and in 1602 was appointed a commissioner to negotiate the union with England. His relations with the Kirk, however, were not so amicable. The reality of his conversion was disputed, and on the 21st of May 1608 he was confined to the city of Perth "for the better resolution of his doubts," being subsequently declared an obstinate "papist," excommunicated, deprived of his estate, and imprisoned at Dumbarton; and after some further vacillation was finally released in May 1611. Lord Erroll died on the 16th of July 1631, and was buried in the church of Slains. He married (1) Anne, daughter of John, 4th earl of Atholl; (2) Margaret, daughter of the regent Murray; and (3) Elizabeth, daughter of William, 6th earl of Morton. By his third wife he had several children, of whom his eldest son, William, succeeded him. The dispute which began in his lifetime concerning the hereditary office of lord high constable between the families of Erroll and of the Earl Marischal was settled finally in favour of the former; thus establishing the precedence enjoyed by the earls of Erroll next after the royal family over all other subjects in Scotland.

See *The Erroll Papers* (Spalding Club Miscellany, vol. ii. 211); Andrew Lang, *Hist. of Scotland*, vol. ii.; *Hist. MSS. Comm. MSS. of Earl of Mar and Kellie*; D. Calderwood's *Hist. of the Church of Scotland*, John Spalding's *Memorials* (Spalding Club, 1850); *Collected Essays* of T. G. Law, ed. by P. H. Brown (1904); *Treason and Plot*, by M. A. S. Hume (1901).

ERROR (Lat *error*, from *errare*, to wander, to err), a mistake, a departure or deviation from what is true, exact or right. For the legal process by which a judgment could be reversed on the ground of error, known as a "writ of error," see Writ and Appeal. The words "error excepted" or "errors and omissions excepted" (contracted to "E.E." "E.& O.E."), are frequently placed at the end of a statement of account or an invoice, so that the accounting party may reserve the right to correct any errors or omissions which may be subsequently discovered, or make further claims in respect of them. In mathematics, "error" is the deviation of an observed or calculated quantity from its true value. The calculus of errors leads to the formulation of the "law of error," which is an analytical expression of the most probably true value of a series of discordant values (see Probability).

ERSCH, JOHANN SAMUEL (1766–1828), the founder of German bibliography, was born at Grossglogau, in Silesia, on the 23rd of June 1766. In 1785 he entered the university of Halle with the view of studying theology; but soon his whole attention became engrossed by history, bibliography and geography. At Halle he made the acquaintance of J. E. Fabri, professor of geography; and when the latter was made professor of history and statistics at Jena, Ersch accompanied him thither, and aided him in the preparation of several works. In 1788 he published the *Verzeichnis aller anonymischen Schriften*, as a supplement to the 4th edition of Meusel's *Gelehrtes Deutschland*. The researches required for this work suggested to him the preparation of a *Repertorium über die allgemeinen deutschen Journale und andere periodische Sammlungen für Erdbeschreibung, Geschichte, und die damit verwandten Wissenschaften* (Lemgo, 1790–1792). The fame which this publication acquired him led to his being engaged by Schütz and Hufeland to prepare an *Allgemeines Repertorium der Literatur*, published in 8 vols. (Jena and Weimar, 1793–1809), which condensed the literary productions of 15 years (1785–1800), and included an account not merely of the books published during that period, but also of articles in periodicals and magazines, and even of the criticisms to which each book had been subjected. While engaged in this great work he also projected *La France littéraire*, which was published at Hamburg in 5 vols., from 1797 to 1806. In 1795 he went to Hamburg to edit the *Neue Hamburger Zeitung*, founded by Victor Klopstock, brother of the poet, but returned in 1800 to Jena to take active part in the *Allgemeine Literaturzeitung*. He also obtained in the same year the office of librarian in the university, and in 1802 was made professor of philosophy. In 1803 he accepted the chair of geography and statistics at Halle, and in 1808 was made principal librarian. He here projected a *Handbuch der deutschen Literatur seit der Mitte des 18. Jahrh. bis auf die neueste Zeit* (Leipzig, 1812–1814) and, along with Johann Gottfried Gruber (*q.v.*), the *Allgemeine Encyklopädie der Wissenschaften und Künste* (Leipzig, 1818 fig.) which he continued as far as the 21st volume. The accuracy and thoroughness of this monumental encyclopaedia make it still an indispensable book of reference. Ersch died at Halle on the 16th of January 1828.

ERSKINE, EBENEZER (1680–1754), Scottish divine, the chief founder of the Secession Church (formed of dissenters from the Church of Scotland), was born on the 22nd of June 1680, most probably at Dryburgh, Berwickshire. His father, Henry Erskine, who was at one time minister at Cornhill, Durham, was ejected in 1662 by the Act of Uniformity, and, after suffering some years' imprisonment, was after the Revolution appointed to the parish of Chirnside, Berwickshire. After studying at the university of Edinburgh, Ebenezer became minister of Portmoak, Kinross-shire. There he remained for twenty-eight years, after which, in the autumn of 1731, he was translated to the West Church, Stirling. Some time before this, he, along with some other ministers, was "rebuked and admonished," by the general assembly, for defending the doctrines contained in the *Marrow of Modern Divinity* (see BOSTON, THOMAS). A sermon which he preached on lay patronage before the synod of Perth in 1733 furnished new grounds of accusation, and he was compelled to shield himself from rebuke by appealing to the general assembly. Here, however, the sentence of the synod was confirmed, and after many fruitless attempts to obtain a hearing, he, along with William Wilson of Perth, Alexander Moncrieff of Abernethy and James Fisher of Kinclaven, was suspended from the ministry by the commission in November of that year. Against this sentence they protested, and constituted themselves into a separate church court, under the name of the associate presbytery. In 1739 they were again summoned before the assembly, and in their corporate capacity declined to acknowledge the authority of the church, and were deposed in the following year. They received numerous accessions to their communion, and remained in harmony with each other till 1747, when a division took place in regard to the nature of the oath administered to burgesses. Erskine joined with the "burgher" section, and became their professor of theology. He continued also to preach to a numerous congregation in Stirling till his death, which took place on the 2nd of June 1754. Erskine was a very popular preacher, and a man of considerable force of character; he acted throughout on principle with honesty and courage. The burgher and anti-burgher sections of the Secession Church were reunited in 1820, and in 1847 they united with the relief synod in forming the United Presbyterian Church.

Erskine's published works consist chiefly of sermons. His *Life and Diary*, edited by the Rev. Donald Fraser, was published in 1840. His *Works* were published in 1785.

ERSKINE, HENRY (1746–1817), lord advocate of Scotland, the second son of Henry David, 10th earl of Buchan and brother of the lord chancellor Erskine, was born in Edinburgh on the 1st of November 1746. He was educated at the universities of St Andrews, Glasgow and Edinburgh, and was admitted a member of the faculty of advocates in 1768. His reputation as a clever and fluent speaker was first made in the debates of the general assembly, of which he had been early elected an elder. In 1783 he was appointed to the office of lord advocate, which he held during the brief coalition ministry of Fox and North. In 1785 he was elected dean of the faculty of advocates, and was re-elected annually till 1796, when his conduct in moving a series of resolutions at a public meeting, condemning the government's sedition and treason bills, brought on him the opposition of the ministerial party, and he was deposed in favour of Robert Dundas. On the formation of the Grenville ministry in 1806 he again became lord advocate and was returned to parliament for the Haddington burghs, which he exchanged at the general election of the same year for the Dumfries burghs. His tenure of the lord advocateship ended in March 1807 on the downfall of the ministry. In 1811 he gave up his practice at the bar and retired to his country residence of Almondel, in Linlithgowshire, where he died on the 8th of October 1817.

His eldest son, Henry David (1783–1857), succeeded as 12th earl of Buchan on his uncle's death in 1829.

Erskine's reputation will survive as the finest and most eloquent orator of his day at the Scottish bar; added to a charming forensic style was a most captivating wit, which, as Lord Jeffrey said, was "all argument, and each of his delightful illustrations a material step in his reasoning." Erskine was also the author of some poems, of which the best known is "The Emigrant" (1783).

See Lieut.-Col. A. Fergusson's *Henry Erskine* (1882).

ERSKINE, JOHN (1721–1803), Scottish divine, son of John Erskine of Carnock, was born on the 2nd of June 1721. He studied law for a time after completing his course in arts at the university of Edinburgh, but was eventually licensed to preach in 1743; and was successively parish minister of Kirkintilloch, near Glasgow, Culross, in Fifeshire (1753), New Greyfriars church in Edinburgh (1758), and Old Greyfriars church in 1768, where he became the colleague of Principal Robertson, the historian. Here he remained until his death, which took place on the 19th of January 1803. Dr Erskine's writings consist chiefly of controversial pamphlets on theological subjects. His sermons are clear, vigorous expositions of a moderate Calvinism, in which metaphysical argument and practical morality are happily blended. In church politics he was the leader of the evangelical party; and was much beloved for his high character and amiability.

For his life and works see Sir H. Moncreiff Wellwood, *Life and Writings of J. Erskine, D.D.* (Edinburgh, 1818).

ERSKINE, JOHN, of Carnock (1695–1768), Scottish jurist, son of Lieut.-Colonel John Erskine, was born in 1695. He was admitted a member of the faculty of advocates in 1719. Although he never enjoyed much practice at the bar, he acquired a high reputation as a sound and learned lawyer, and in 1737 was appointed professor of Scots law in the university of Edinburgh. In 1754 he published his *Principles of the Law of Scotland*. He retired from his chair in 1765; and during the remainder of his uneventful life he occupied himself with the preparation of his great work, the *Institutes of the Law of Scotland*, which he did not live to publish. He died at Cardross, Perthshire, on the 1st of March 1768.

Erskine's *Institutes*, although not exhibiting the grasp of principle which distinguished his great predecessor Lord Stair, is so conspicuous for learning, accuracy and sound good sense, that it has always been esteemed of the highest authority on the law of Scotland. The first edition appeared in 1773 and it has been many times reprinted. The *Principles*, although published first, is substantially an abridgment of the larger work, and is in some respects superior to it, being more concise and direct. It retains its place as the text-book on Scots law, and is frequently being re-edited.

ERSKINE, JOHN, of Dun (1509–1591), Scottish reformer, the son of Sir John Erskine, laird of Dun, was born in 1509, and was educated at King's College, Aberdeen. At the age of twenty-one Erskine was the cause—probably by accident—of a priest's death, and was forced to go abroad, where he came under the influence of the new learning. It was through his agency that Greek was first taught in Scotland by Petrus de Marsiliers at Montrose. This fact counted for much in the progress of the Reformation. Erskine was also drawn towards the new faith, being a close friend of George Wishart, the reformer, from whose fate he was saved by his wealth and influence, and of John Knox, whose advice openly to discountenance the mass was given in the lodgings of the laird of Dun. In the stormy controversies of the time of Mary Stuart and James VI. Erskine was a conspicuous figure and a moderating influence. He was able to soothe the queen when her feelings had been outraged by Knox's denunciations—being a man "most gentill of nature"—and frequently acted as mediator both between the catholic and reforming parties, and among the reformers themselves. In 1560 he was appointed—though a layman—superintendent of the reformed church of Scotland for Angus and Mearns, and in 1572 he gave his assent to the modified episcopacy proposed by Morton at the Leith convention. Though never himself ordained, he was held in such high esteem by the leaders of the church as to be more than once elected moderator of the general assembly (first in 1564), and he was amongst those who in 1578 drew up the *Second Book of Discipline*. From 1579 he was a member of the king's council. He died in 1591. Erskine owed his peculiar influence among the Scottish reformers to the union—rare in those days—of steadfast convictions with a conciliatory manner; Queen Mary described him as "a mild and sweet-natured man, with true honesty and uprightness."

See the "Dun Papers" in the *Spalding Club Miscellany*, vol. iv. (1849), and the article by T. F. Henderson in the *Dict. Nat. Biog.*

ERSKINE, RALPH (1685–1752), Scottish divine, brother of Ebenezer Erskine (*q.v.*), was born on the 18th of March 1685. After studying at the university of Edinburgh, he was in 1711 ordained assistant minister at Dunfermline. He homologated the protests which his brother laid on the table of the assembly after being rebuked for his synod sermon, but he did not formally withdraw from the establishment till 1737. He was also present, though not as a member, at the first meeting of the associate presbytery. When the severance took place on account of the oath administered to burgesses, he adhered, along with his brother, to the burgher section. He died after a short illness on the 6th of November 1752.

His works consist of sermons, poetical paraphrases and gospel sonnets. The *Gospel Sonnets* have frequently appeared separately. His *Life and Diary*, edited by the Rev. D. Fraser, was published in 1842.

ERSKINE, THOMAS, of Linlathen (1788–1870), Scottish theologian, youngest son of David Erskine, writer to the signet in Edinburgh, and of Anne Graham, of the Grahams of Airth, was born on the 13th of October 1788. He was a descendant of John, 1st or 6th earl of Mar, regent of Scotland in the reign of James VI., a grandson of Colonel John Erskine of Carnock. After being educated at the high school of Edinburgh and at Durham, he attended the literary and law classes at the university of Edinburgh, and becoming in 1810 a member of the Edinburgh faculty of advocates, he for some time enjoyed the intimate acquaintance of Cockburn, Jeffrey, Scott and other distinguished men whose talent then lent lustre to the Scottish bar. In 1816 he succeeded to the family estate of Linlathen, near Dundee, and devoted himself to theology. The writings of Erskine, especially his published letters, are distinguished by a graceful style, and possess originality and interest. His theological views have a considerable similarity to those of Frederick Denison Maurice, who acknowledges having been indebted to him for his first true conception of the meaning of Christ's sacrifice. Erskine had little interest in the "historical criticism" of Christianity, and regarded as the only proper criterion of its truth its conformity or nonconformity with man's spiritual nature, and its adaptability or non-adaptability to man's spiritual needs. He considered the incarnation of Christ as the necessary manifestation to man of an eternal sonship in the divine nature, apart from which those filial qualities which God demands from man could have no sanction; by *faith* as used in Scripture he understood to be meant a certain moral or spiritual activity or energy which virtually implied salvation, because it implied the existence of a principle of spiritual life possessed of an immortal power. This faith, he believed, could be properly awakened only by the manifestation, through Christ, of love as the law of life, and as identical with an eternal righteousness which it was God's purpose to bestow on every individual soul. As an interpreter of the mystical side of Calvinism and of the psychological conditions which correspond with the doctrines of grace Erskine is unrivalled. During the last thirty-three years of his life Erskine ceased from literary work. Among his friends were Madame Vernet, the duchess de Broglie, the younger Mdme de Stael, M. Vinet of Lausanne, Edward Irving, Frederick D. Maurice, Dean Stanley, Bishop Ewing, Dr John Brown and Thomas Carlyle. His wide influence was due to his high character and unassuming earnestness. He died at Edinburgh on the 20th of March 1870.

His principal works are *Remarks on the Internal Evidence for the Truth of Revealed Religion* (1820), an *Essay on Faith* (1822), and the *Unconditional Freeness of the Gospel* (1828). These have all passed through several editions, and have also been translated into French. He is also the author of the *Brazen Serpent* (1831), the *Doctrine of Election* (1839), several "Introductory Essays" to editions of *Christian Authors*, and a posthumous work entitled *Spiritual Order and Other Papers* (1871). Two vols. of his letters, edited by William Hanna, D.D., with reminiscences by Dean Stanley and Principal Shairp, appeared in 1877.

ERSKINE, THOMAS ERSKINE, 1st Baron (1750–1823), lord chancellor of England, was the third and youngest son of Henry David, 10th earl of Buchan, and was born in Edinburgh on the 10th of January 1750. From an early age he showed a strong desire to enter one of the learned professions; but his father, owing to his straitened circumstances, was unable to do more than give him a good school education at the high school of Edinburgh and the grammar school of St Andrews. In 1764 he was sent as a midshipman on board the "Tartar," but on finding, when he returned to this country after four years' absence in North America and the West Indies, that there was little immediate chance of his rank of acting lieutenant being confirmed, he quitted the service and entered the army, purchasing a commission in the 1st Royals with the meagre patrimony which had been left to him. But promotion here was as slow as in the navy; while in 1770 he had added greatly to his difficulties by marrying the daughter of Daniel Moore, M.P. for Marlow, an excellent wife, but as poor as himself. However, an accidental visit to an assize court in the town in which he was quartered, and an interview with Lord Mansfield, the presiding judge, confirmed his resolve to quit the army for the law. Accordingly on the 26th of April 1775 he was admitted a student of Lincoln's Inn. He also on the 13th of January following entered himself as a gentleman commoner on the books of Trinity College, Cambridge, but merely that by graduating he might be called two years earlier.

He read in the chambers of Francis Buller (afterwards Mr Justice Buller) and George (afterwards Baron) Wood, and was called to the bar on the 3rd of July 1778. His success was immediate and brilliant. An accident was the means of giving him his first case, *Rex* v. *Baillie*, in which he appeared for Captain Thomas Baillie, the lieutenant-governor of Greenwich hospital, who had published a pamphlet animadverting in severe terms upon the abuses which Lord Sandwich, the first lord of the admiralty, had introduced into the management of the hospital, and against whom a rule had been obtained from the court of king's bench to show cause why a criminal information for libel should not be filed. Erskine was the junior of five counsel; and it was his good fortune that the prolixity of his leaders consumed the whole of the first day, thereby giving the advantage of starting afresh next morning. He made use of this opportunity to deliver a speech of wonderful eloquence, skill and courage, which captivated both the audience and the court. The rule was discharged, and Erskine's fortune was made. He received, it is said, thirty retainers before he left the court. In 1781 he delivered another remarkable speech, in defence of Lord George Gordon—a speech which gave the death-blow to the doctrine of constructive treason. In 1783, when the Coalition ministry came into power, he was returned to parliament as member for Portsmouth. His first speech in the House of Commons was a failure; and he never in parliamentary debate possessed anything like the influence he had at the bar. He lost his seat at the dissolution in the following year, and remained out of parliament until 1790, when he was again returned for Portsmouth. But his success at the bar continued unimpaired. In 1783 he received a patent of precedence. His first special retainer was in defence of Dr W. D. Shipley, dean of St Asaph, who was tried in 1784 at Shrewsbury for seditious libel—a defence to which was due the passing of the Libel Act 1792, laying down the principle that it is for the jury, and not for the judge to decide the question whether or no a publication is a libel. In 1789 he was counsel for John Stockdale, a bookseller, who was charged with seditious libel in publishing a pamphlet in favour of Warren Hastings, whose trial was then proceeding; and his speech on this occasion, probably his greatest effort, is a consummate specimen of the art of addressing a jury. Three years afterwards he brought down the opposition alike of friends and foes by defending Thomas Paine, author of *The Rights of Man*—holding that an advocate has no right, by refusing a brief, to convert himself into a judge. As a consequence he lost the office of attorney general to the prince of Wales, to which he had been appointed in 1786; the prince, however, subsequently made amends by making him his chancellor. Among Erskine's later speeches may be mentioned those for Horne Tooke and the other advocates of parliamentary reform, and that for James Hadfield, who was accused of shooting at the king. On the accession of the Grenville ministry in 1806 he was made lord chancellor, an office for which his training had in no way prepared him, but which he fortunately held only during the short period his party was in power. Of the remainder of his life it would be well if nothing could be said. Occasionally speaking in parliament, and hoping that he might return to office should the prince become regent, he gradually degenerated into a state of useless idleness. Never conspicuous for prudence, he aggravated his increasing poverty by an unfortunate second marriage.

His first wife had died in 1805, and he married at Gretna Green a Miss Mary Buck. The date of this marriage is not definitely known. Once only—in his conduct in the case of Queen Caroline—does he recall his former self. He died at Almondell, Linlithgowshire, on the 17th of November 1823, of pneumonia, caught on the voyage to Scotland.

Erskine's great forensic reputation was, to a certain extent, a concomitant of the numerous political trials of the day, but it was also due to his impassioned eloquence and undaunted courage, which so often carried audience and jury and even the court along with him. As a judge he did not succeed; and it has been questioned whether under any circumstances he could have succeeded. For the office of chancellor he was plainly unfit. As a lawyer he was well read, but by no means profound. His strength lay in the keenness of his reasoning faculty, in his dexterity and the ability with which he disentangled complicated masses of evidence, and above all in his unrivalled power of fixing and commanding the attention of juries. To no department of knowledge but law had he applied himself systematically, with the single exception of English literature, of which he acquired a thorough mastery in early life, at intervals of leisure in college, on board ship, or in the army. Vanity is said to have been his ruling personal characteristic; but those who knew him, while they admit the fault, say that in him it never took an offensive form, even in old age, while the singular grace and attractiveness of his manner endeared him to all with whom he came in contact.

By his first wife he had four sons and four daughters. His eldest son, David Montagu (1776–1855), was a well-known diplomatist; his second son, Henry David (1786–1859), was dean of Ripon; and his third son, Thomas (1788–1864), became a judge of the court of common pleas. By his second wife he had one son, born in 1821.

In 1772 Erskine published *Observations on the Prevailing Abuses in the British Army*, a pamphlet which had a large circulation, and in later life, *Armata*, an imitation of *Gulliver's Travels*. His most noted speeches have repeatedly appeared in a collected form. See Campbell's *Lives of the Chancellors*; Moore's *Diaries*; Fergusson's *Henry Erskine* (1882); Dumerit's *Henry Erskine, a Study* (Paris, 1883); Lord Brougham's *Memoir*, prefixed to Erskine's *Speeches* (1847); Romilly's *Memoirs*; the *Croker Papers*; Lord Holland's *Memoirs*.

ERUBESCITE, a native copper-iron sulphide, Cu_5FeS_4, of importance as an ore of copper. It crystallizes in the cubic system, the usual form being that of interpenetrating cubes twinned on an octahedral plane. The faces are usually curved and rough, and the crystals confusedly aggregated together. Compact and granular masses are of more frequent occurrence. The colour on a freshly fractured surface is bronzy or coppery, but in moist air this rapidly tarnishes with iridescent blue and red colours; hence the names purple copper ore, variegated copper ore (Ger. *Buntkupfererz*), horse-flesh ore, and erubescite (from the Lat. *erubescere*, "to grow red"). The lustre is metallic, and the streak greyish-black; hardness 3; sp. gr. 5·0. Bornite (after Baron Ignaz von Born, b. 1742, d. 1791) is a name in common use for this mineral, and it predates erubescite, the name given by J. D. Dana in 1850, but afterwards rejected by him; French authors use the name phillipsite, after the English mineralogist, R. Phillips, who analysed the mineral; both these earlier names had, however, been previously used for other minerals.

Owing to the frequent presence of mechanically admixed chalcopyrite and chalcocite, the published analyses of erubescite show wide variations, the copper, for example, varying from 50 to 70%. Even the best Cornish crystals enclose a nucleus of chalcopyrite ($CuFeS_2$), and an analysis of these made in 1839 led to the long-accepted formula Cu_3FeS_3. Recently, B. J. Harrington has analysed carefully selected material and obtained the formula Cu_5FeS_4.

Erubescite occurs in copper-bearing veins, and has been mined as an ore of copper at Redruth in Cornwall, Montecatini in the province of Pisa, Tuscany, Bristol in Connecticut, Acton in Canada, and other localities in North America. The best crystallized specimens are from the Carn Brea mine and other copper mines in the neighbourhood of Redruth, and from Bristol in Connecticut. Recently a few large isolated crystals with the form of icositetrahedra have been found with calcite and albite in a gold-vein on Frossnitz-Alpe in the Gross-Venediger, Tirol. (L. J. S.)

ERYSIPELAS (a Greek word, probably derived from ἐρυθρός, red, and πέλλα, skin)—synonyms, *the Rose*, *St Anthony's Fire*—an acute contagious disease, characterized by a special inflammation of the skin, caused by a streptococcus. Erysipelas is endemic in most countries, and epidemic at certain seasons, particularly the spring of the year. The poison is not very virulent, but it certainly can be conveyed by bedding and the clothes of a third person. Two varieties are occasionally described, a traumatic and an idiopathic, but the disease seems to depend in all cases upon the existence of a wound or abrasion. In the so-called idiopathic variety, of which *facial erysipelas* is the best known, the point of entry is probably an abrasion by the lachrymal duct.

When the erysipelas is of moderate character there is simply a redness of the integument, which feels somewhat hard and thickened, and upon which there often appear small vesications. This redness, though at first circumscribed, tends to spread and affect the neighbouring sound skin, until an entire limb or a large area of the body may become involved in the inflammatory process. There is usually considerable pain, with heat and tingling in the affected part. As the disease advances the portions of skin first attacked become less inflamed, and exhibit a yellowish appearance, which is followed by slight desquamation of the cuticle. The inflammation in general gradually disappears. Sometimes, however, it breaks out again, and passes over the area originally affected the second time. But besides the skin, the subjacent tissues may become involved in the inflammation, and give rise to the formation of pus. This is termed *phlegmonous erysipelas*, and is much more apt to occur in connexion with the traumatic variety of the disease. Occasionally the affected parts become gangrenous. Certain complications are apt to arise in erysipelas affecting the surface of the body, particularly inflammation of serous membranes, such as the pericardium or pleura.

Erysipelas of the face usually begins with symptoms of general illness, the patient feeling languid, drowsy and sick, while frequently there is a distinct rigor followed with fever. Sore throat is sometimes felt, but in general the first indication of the local affection is a red and painful spot at the side of the nose or on one of the cheeks or ears. Occasionally it would appear that the inflammation begins in the throat, and reaches the face through the nasal fossae. The redness gradually spreads over the whole surface of the face, and is accompanied with swelling, which in the lax tissues of the cheeks and eyelids is so great that the features soon become obliterated and the countenance wears a hideous expression. Advancing over the scalp, the disease may invade the neck and pass on to the trunk, but in general the inflammation remains confined to the face and head. While the disease progresses, besides the pain, tenderness and heat of the affected parts, the constitutional symptoms are very severe. The temperature rises often to 105° or higher, remains high for four or five days, and then falls by crisis. Delirium is a frequent accompaniment. The attack in general lasts for a week or ten days, during which the inflammation subsides in the parts of the skin first attacked, while it spreads onwards in other directions, and after it has passed away there is, as already observed, some slight desquamation of the cuticle.

Although in general the termination is favourable, serious and occasionally fatal results follow from inflammation of the membranes of the brain, and in some rare instances sudden death has occurred from suffocation arising from oedema glottidis, the inflammatory action having spread into and extensively involved the throat. One attack of this disease, so far from protecting from, appears rather to predispose to others. It is sometimes a complication in certain forms of exhausting disease, such as phthisis or typhoid fever, and is then to be regarded as of serious import. A very fatal form occasionally attacks new-born infants, particularly in the first four weeks of their lives. In epidemics of puerperal fever this form of erysipelas has been specially found to prevail.

The treatment of erysipelas is best conducted on the expectant system. The disease in most instances tends to a favourable termination; and beyond attention to the condition of the stomach and bowels, which may require the use of some gentle laxative, little is necessary in the way of medicine. The employment of preparations of iron in large doses is strongly recommended by many physicians. But the chief point is the administration of abundant nourishment in a light and digestible form. Of the many local applications which may be employed, hot fomentations will be found among the most soothing. Dusting the affected part with powdered starch, and wrapping it in cotton wadding, is also of use.

In the case of phlegmonous erysipelas complicating wounds, free incisions into the part are necessary.

ERYTHRAE [mod. *Litri*], one of the Ionian cities of Asia Minor, situated on a small peninsula stretching into the Bay of Erythrae, at an equal distance from the mountains Mimas and Corycus, and directly opposite the island of Chios. In the peninsula excellent wine was produced. The town was said to have been founded by Ionians under Knopos, son of Codrus. Never a large city, it sent only eight ships to the battle of Lade. The Erythraeans owned for a considerable time the supremacy of Athens, but towards the close of the Peloponnesian war they threw off their allegiance to that city. After the battle of Cnidus, however, they received Conon, and paid him honours in an inscription, still extant. Erythrae was the birthplace of two prophetesses—one of whom, Sibylla, is mentioned by Strabo as living in the early period of the city; the other, Athenais, lived in the time of Alexander the Great. The ruins include well-preserved Hellenistic walls with towers, of which five are still visible. The acropolis (280 ft.) has the theatre on its N. slope, and eastwards lie many remains of Byzantine buildings. Modern Litri is a considerable place and port, extending from the ancient harbour to the acropolis. The smaller coasting steamers call, and there is an active trade with Chios and Smyrna.

ERYTHRITE, the name given to (1) a mineral composed of a hydrated cobalt arsenate, and (2) in chemistry, a tetrahydric alcohol. (1) The mineral erythrite has the formula $Co_3(AsO_4)_2 \cdot 8H_2O$, and crystallizes in the monoclinic system and is isomorphous with vivianite. It sometimes occurs as beautiful radially-arranged groups of blade-shaped crystals with a bright crimson colour and brilliant lustre. On exposure to light the colour and lustre deteriorate. There is a perfect cleavage parallel to the plane of symmetry, on which the lustre is pearly. Cleavage flakes are soft ($H=2$), sectile and flexible; specific gravity 2·95. The mineral is, however, more often found as an earthy encrustation with a peach-blossom colour, and in this form was early (1727) known as cobalt-bloom (Ger. *Kobaltblüthe*). The name erythrite, from ἐρυθρός, "red," was given by F. S. Beudant in 1382. Erythrite occurs as a product of alteration of smaltite ($CoAs_2$) and other cobaltiferous arsenides. The finest crystallized specimens are from Schneeberg in Saxony. The earthy variety has been found in Thuringia and Cornwall and some other places. (2) The alcohol erythrite has the constitutional formula $HO \cdot H_2C \cdot CH(OH) \cdot CH(OH) \cdot CH_2OH$; it is also known as erythrol, erythroglucin and phycite. It corresponds to tartaric acid, and, like this substance, it occurs in four stereo-isomeric forms. The internally compensated modification, *i*-erythrite, corresponding to mesotartaric acid, occurs free in the algae *Protococcus vulgaris*, and as the orsellinate, erythrin, $C_4H_6(OH)_2(O \cdot C_8H_7O_3)_2$, in many lichens and algae, especially *Roccella montagnei*. It has a sweet taste, melts at 126°, and boils at 330°. Careful oxidation with dilute nitric acid gives erythrose or tetrose, which is probably a mixture of a trioxyaldehyde and trioxyketone. Energetic oxidation gives erythritic acid and mesotartaric acid. *i*-Erythrite and the racemic mixture of the dextro and laevo varieties were synthesized by Griner in 1893 from divinyl.

ERZERUM, or **Arzrum** (Arm. *Garin*), the chief town of an important vilayet of the same name in Asiatic Turkey. It is a military station and a fortress of considerable strategical value, closing the roads from Kars, Olti and other parts of the frontier. Several important routes from Trebizond and various parts of Anatolia converge towards it from the west. It is situated at the eastern end of an open bare plain, 30 m. long and about 12 wide, bordered by steep, rounded mountains and traversed by the Kara Su, or western Euphrates, which has its source in the Dumlu Dagh a few miles north of that town, which lies at an elevation of 6250 ft. above sea-level, while the near hills rise to 10,000 ft. The scenery in the neighbourhood is striking, lofty bare mountains being varied by open plains and long valleys dotted with villages. Just east of the town is the broad ridge of the Deveboyun ("Camel's Neck"), across which the road passes to Kars. To the south is the Palanduken range, from which emerge numerous streams, supplying the town with excellent water. In the plain to the north the Kara Su traverses extensive marshes which afford good wildfowl-shooting in the spring.

The town is surrounded by an earthen enceinte or rampart with some forts on the hills just above it, and others on the Deveboyun ridge facing east, the whole forming a position of considerable strength. The old walls and the citadel have disappeared. Inside the ramparts the town lies rather cramped, with narrow, crooked streets, badly drained and dirty; the houses are generally built of dark grey volcanic stone with flat roofs, the general aspect, owing to the absence of trees, being somewhat gloomy. The water-supply from Palanduken is distributed by wooden pipes to numerous public fountains. The town has a population of about 43,000, including about 10,000 Armenians, 2000 Persians and a few Jews. It has a garrison in peace of about 5000 men. It is the seat of the British consulate for Kurdistan, and there are other European consulates besides an American mission with schools. The great altitude accounts for very severe winter cold, occasionally 10° to 25° below zero F., accompanied by blizzards (*tipi*) sometimes fatal to travellers overtaken by them. The summer heat is moderate (59° to 77°).

There are several well-built mosques (none older than the 16th century), public baths, and several good khans. There are Armenian and Catholic churches, but the most beautiful building is a *medresse* erected in the 12th century by the Seljuks, with ornamental doorway and two graceful minarets known as the *Chifte Minare*.

Situated on the main road from Trebizond into north-west Persia, the town has always a large caravan traffic, principally of camels, but since the improvement of communications in Russia this has declined. A good carriage-road leads to the coast at Trebizond, the journey being made in five or six days. There are also roads to Kars, Bayazid, Erzingan and Kharput. Blacksmiths' and coppersmiths' work is better here than in most Turkish towns; horse-shoes and brasswork are also famous. There are several tanneries, and Turkish boots and saddles are largely made. Jerked beef (*pasdirma*) is also prepared in large quantities for winter use. The plain produces wheat, barley, millet and vegetables. Wood fuel is scarce, the present supply being from the Tortum district, whence surface coal and lignite are also brought; but the usual fuel is *tezek* or dried cow-dung. The bazaars are of no great interest. Good Persian carpets and similar goods can be obtained.

Erzerum is a town of great antiquity, and has been identified with the Armenian Garin Kalakh, the Arabic Kalikale, and the Byzantine Theodosiopolis of the 5th century, when it was a frontier fortress of the empire—hence its name *Erzen-er-Rum*. It was captured by the Seljuks in 1201, when it was an important city, and it fell into Turkish possession in 1517. In July 1829 it was captured by the Russian general Paskevich, and the occupation continued until the peace of Adrianople (September 1829). The town was unsuccessfully attacked by the Russians on the 9th of November 1877 after a victory gained by them a short time previously on the Deveboyun heights; it was occupied by them during the armistice (7th of February 1878) and restored to Turkey after the treaty of Berlin. In 1859 a severe earthquake destroyed much of the town, and another in November 1901 caused much damage.

The Erzerum vilayet extends from the Persian frontier at Bayazid, all along the Russian frontier and westward into Anatolia at Baiburt and Erzingan. It is divided into the three sanjaks of Bayazid, Erzerum, and Erzingan. It includes the highest portion of the Armenian plateau, and consists of bare undulating uplands varied by lofty ranges. The deep gorges of the Chorokh and Tortum streams north of the town alone have a different appearance, being well wooded in places. Both arms of the Euphrates have their rise in this country as well as the Aras (Araxes) and the Chorokh (Acampsis). It is an agricultural country with few industries. Besides forests, iron, salt, sulphur and other mineral springs are found. Some of the coal and lignite mines in Tortum have been recently worked to supply fuel for Erzerum. The population is largely Armenian and Kurd with some Turks (Moslems 500,000, Christians 140,000). (C. W. W.; F. R. M.)

ERZGEBIRGE, a mountain chain of Germany, extending in a W.S.W. direction from the Elbe to the Elstergebirge along the frontier between Saxony and Bohemia. Its length from E.N.E. to W.S.W. is about 80 m. and its average breadth about 25 m. The southern declivity is generally steep and rugged, forming in some places an almost perpendicular wall of the height of from 2000 to 2500 ft.; while the northern, divided at intervals into valleys, sometimes of great fertility and sometimes wildly romantic, slopes gradually towards the great plain of northern Germany. The central part of the chain forms a plateau of an average height of more than 3000 ft. At the extremities of this plateau are situated the highest summits of the range:—in the south-east the Keilberg (4080 ft.); in the north-east the Fichtelberg (3980 ft.); and in the south-west the Spitzberg (3650 ft.). Between the Keilberg and the Fichtelberg, at the height of about 3300 ft., is situated Gottesgab, the highest town in Bohemia. Geologically, the Erzgebirge range consists mainly of gneiss, mica and phyllite. As its name (Ore Mountains) indicates, it is famous for its mineral ores. These are chiefly silver and lead, the layers of both of which are very extensive, tin, nickel, copper and iron. Gold is found in several places, and some arsenic, antimony, bismuth, manganese, mercury and sulphur. The Erzgebirge is celebrated for its lace manufactures, introduced by Barbara Uttmann in 1541, embroideries, silk-weaving and toys. The climate is in winter inclement in the higher elevations, and, as the snow lies deep until the spring, the range is largely frequented by devotees of winter sport, ski, tobogganing, &c. In summer the air is bracing, and many climatic health resorts have sprung into existence, among which may be mentioned Kipsdorf, Bärenfels and Oberwiesenthal. Communication with the Erzgebirge is provided by numerous lines of railway, some, such as that from Freiberg to Brüx, that from Chemnitz to Komotau, and that from Zwickau to Carlsbad, crossing the range, while various local lines serve the higher valleys.

The Elstergebirge, a range some 16 m. in length, in which the Weisse Elster has its source, runs S.W. from the Erzgebirge to the Fichtelgebirge and attains a height of 2630 ft.

See Grohmann, *Das Obererzgebirge und seine Städte* (1903), and Schurtz, *Die Pässe des Erzgebirges* (1891); also Daniel, *Deutschland*, vol. ii., and Gebauer, *Länder und Völkerkunde*, vol. i.

ERZINGAN, or Erzinjan (*Arsinga* of the middle ages), the chief town of a sanjak in the Erzerum vilayet of Asiatic Turkey. It is the headquarters of the IV. army corps, being a place of some military importance, with large barracks and military factories. It is situated at an altitude of 3900 ft., near the western end of a rich well-watered plain through which runs the Kara Su or western Euphrates. It is surrounded by orchards and gardens, and is about a mile from the right bank of the river, which here runs in two wide channels crossed by bridges. One wide street traverses the town from east to west, but the others are narrow, unpaved and dirty, except near the new government buildings and the large modern mosque of Hajji Izzet Pasha to the north, which are the only buildings of note. The principal barracks, military hospital and clothing factory are at Karateluk on the plain and along the foot-hills to the north 3 m. off, one recent addition to the business buildings having electric power and modern British machinery; some older barracks and a military tannery and boot factory being in the town. The population numbers about 15,000, of whom about half are Armenians living in a separate quarter. The principal industries are the manufacture of silk and cotton and of copper dishes and utensils. The climate is hot in summer but moderate in winter. A carriage-road leads to Trebizond, and other roads to Sivas, Karahissar, Erzerum and Kharput. The plain, almost surrounded by lofty mountains, is highly productive with many villages on it and the border hills. Wheat, fruit, vines and cotton are largely grown, and cattle and sheep are bred. Water is everywhere abundant, and there are iron and hot sulphur springs. The battle in which the sultan of Rum (1243) was defeated by the Mongols took place on the plain, and the celebrated Armenian monastery of St Gregory, "the Illuminator," lies on the hills 11 m. S.W. of the town.

Erzingan occupies the site of an early town in which was a temple of Anaitis. It was an important place in the 4th century when St Gregory lived in it. The district passed from the Byzantines to the Seljuks after the defeat of Romanus, 1071, and from the latter to the Mongols in 1243. After having been held by Mongols, Tatars and Turkomans, it was added to the Osmanli empire by Mahommed II. in 1473. In 1784 the town was almost destroyed by an earthquake. (C.W.W.; F. R. M.)

ESAR-HADDON [Assur-akhi-iddina, "Assur has given a brother."] Assyrian king, son of Sennacherib; before his accession to the throne he had also borne another name, Assur-etil-ilani-yukin-abla. At the time of his father's murder (the 20th of Tebet, 681 B.C.) he was commanding the Assyrian army in a war against Ararat. The conspirators, after holding Nineveh for 42 days, had been compelled to fly northward and invoke the aid of the king of Ararat. On the 12th of Iyyar (680 B.C.) a decisive battle was fought near Malatia, in which the veterans of Assyria won the day, and at the close of it saluted Esar-haddon as king. He returned to Nineveh, and on the 8th of Sivan was crowned king. A good general, Esar-haddon was also an able and conciliatory administrator. His first act was to crush a rebellion among the Chaldaeans in the south of Babylonia and then to restore Babylon, the sacred city of the West, which had been destroyed by his father. The walls and temple of Bel were rebuilt, its gods brought back, and after his right to rule had been solemnly acknowledged by the Babylonian priesthood Esar-haddon made Babylon his second capital. A year or two later Media was invaded and Median chiefs came to Nineveh to offer homage to their conqueror. He now turned to Palestine, where the rebellion of Abdi-milkutti of Zidon was suppressed, its leader beheaded and a new Zidon built out of the ruins of the older city (676–675 B.C.). All Palestine now submitted to Assyria, and 12 Syrian and 10 Cyprian princes (including Manasseh of Judah) came to pay him homage and supply him with materials for his palace at Nineveh. But a more formidable enemy had appeared on the Assyrian frontier (676 B.C.). The Cimmerii (see Scythia) under Teuspa poured into Asia Minor; they were, however, overthrown in Cilicia, and the Cilician mountaineers who had joined them were severely punished. It was next necessary to secure the southern frontier of the empire. Esar-haddon accordingly marched into the heart of Arabia, to a distance of about 900 m., across a burning and waterless desert, and struck terror into the Arabian tribes. At last he was free to complete the policy of his predecessors by conquering Egypt, which alone remained to threaten Assyrian dominion in the West. Baal of Tyre had transferred his allegiance from Esar-haddon to the Egyptian king Tirhaka and opened to the latter the coast road of Palestine; leaving a force, therefore, to invest Tyre, Esar-haddon led the main body of the Assyrian troops into Egypt on the 5th of Adar, 673 B.C. The desert was crossed with the help of the Arabian sheikh. Egypt seems to have submitted to the invader and was divided into twenty satrapies. Another campaign, however, was needed before it could be finally subdued. In 670 B.C. Esar-haddon drove the Egyptian forces before him in 15 days (from the 3rd to the 18th of Tammuz) all the way from the frontier to Memphis, thrice defeating them with heavy loss and wounding Tirhaka himself. Three days after Memphis fell, and this was soon afterwards followed by the surrender of Tyre and its king. In 668 B.C. Egypt again revolted, and while on the march to reduce it Esar-haddon fell ill and died on the 10th of Marchesvan. His empire was divided between his two sons Assur-bani-pal and Samas-sum-yukin, Assur-bani-pal receiving Assyria and his brother Babylonia, an arrangement, however, which did not prove to be a success. Esar-haddon was the builder of a palace at Nineveh as well as of one which he erected at Calah for Assur-bani-pal.

AUTHORITIES.—E. A. W. Budge, *History of Esarhaddon* (1880); E. Schrader, *Keilinschriftliche Bibliothek*, ii. (1889) (Abel and Winckler in ii. pp. 120-153); G. Maspero, *Passing of the Empires*, pp. 345 sqq.; F. von Luschan, "Ausgrabungen in Sendschirli," i. (*Mitteilungen aus den orientalischen Sammlungen*, 1893). (A. H. S.)

ESAU, the son of Isaac and Rebecca, in the Bible, and the elder twin brother of Jacob. He was so called because he was red (*admōnī*) and hairy when he was born, and the name Edom (red) was given to him when he sold his birthright to Jacob for a meal of *red* lentil pottage (Gen. xxv. 21-34). Another story of the manner in which Jacob obtained the superiority is related in Gen. xxvii. Here the younger brother impersonated the elder, and succeeded in deceiving his blind father by imitating the hairiness of his brother. He thus gained the blessing intended for the first-born, and Esau, on hearing how he had been forestalled, vowed to kill him. Jacob accordingly fled to his mother's relatives, and on his return, many years later, peace was restored between them (xxxii. sq.). These primitive stories of the relations between the eponymous heads of the Edomites and Israelites are due to the older (Judaean) sources; the late notices of the Priestly school (see GENESIS) preserve a different account of the parting of the two (Gen. xxxvi. 6-8), and lay great stress upon Esau's marriages with the Canaanites of the land, unions which were viewed (from the writer's standpoint) with great aversion (Gen. xxvi. 34 sq., xxvii. 46). For "Esau" as a designation of the Edomites, cf. Jer. xlix. 8, Obad. *vv.* 6, 8, and on their history, see EDOM.

Esau's characteristic hairiness (Gen. xxv. 25, xxvii. 11) has given rise to the suggestion that his name is properly *'ēshaw*, from a root corresponding to the Arab. *'athiya*, to have thick or matted hair. Mt Seir, too, where he resided, etymologically suggests a "shaggy" mountain-land. According to Hommel (*Sud-arab. Chrestom.* p. 39 sq.) the name Esau has S. Arabian analogies. On the possible identity of the name with Usoos, the Phoenician demi-god (Philo of Byblus, ap. Eusebius, *Praep. Evang.* i. 10), see Cheyne, *Ency. Bib.* col. 1333; Lagrange, *Études sur les religions sémitiques*, p. 416 (Paris, 1905); Ed. Meyer, *Israeliten*, 278 sq. (and, on general questions, *ib.* 128 sq., 329 sqq.). (S. A. C.)

ESBJERG, a seaport of Denmark in the *amt* (county) of Ribe, 18 m. from the German frontier on the west coast of Jutland. It has railway communication with the east and north of Jutland, and with Germany. It was granted municipal rights in 1900, having grown with astonishing rapidity from 13 inhabitants in 1868 to 13,355 in 1901. This growth it owes to the construction of a large harbour in 1868–1888. It is the principal outlet westward for S. Jutland; exports pork and meat, butter, eggs, fish, cattle and sheep, skins, lard and agricultural seeds, and has regular communication with Harwich and Grimsby in England. Three miles S.E. is Nordby on the island of Fanö, the northernmost of the North Frisian chain. It is an arid bank of heathland and dunes, but both Nordby and Sönderho in the south are frequented as seaside resorts. The former has a school of navigation. The fisheries are valuable.

ESCANABA, a city and the county-seat of Delta county, Michigan, U.S.A., on Little Bay de Noquette, an inlet of Green Bay, about 60 m. S. of Marquette. Pop. (1890) 6808; (1900) 9549, of whom 3214 were foreign-born, (1910 census) 13,194. It is served by the Chicago & North-Western and the Escanaba & Lake Superior railways. It is built on a picturesque promontory which separates the waters of Green Bay from Little Bay de Noquette, and its delightful summer climate, wild landscape scenery and facilities for boating and trout fishing make it a popular summer resort. Escanaba has a water front of 8 m., and is an important centre for the shipment of iron-ore, for which eight large and well-equipped docks are provided—there is an ore-crushing plant here; considerable quantities of lumber and fish are also shipped, and furniture, flooring (especially of maple) and wooden ware (butter-dishes and clothes-pins) are manufactured. There is a large tie-preserving plant here. Good water power is supplied by the Escanaba river. Escanaba was settled in 1863, was incorporated as a village in 1883, and was first chartered as a city in the same year.

ESCAPE (in mid. Eng. *eschape* or *escape*, from the O. Fr. *eschapper*, modern *échapper*, and *escaper*, low Lat. *escapium*, from *ex*, out of, and *cappa*, cape, cloak; cf. for the sense development the Gr. *ἐκδύεσθαι*, literally to put off one's clothes, hence to slip out of, get away), a verb meaning to get away from, especially from impending danger or harm, to avoid capture, to regain one's liberty after capture. As a substantive, "escape," in law, is the regaining of liberty by one in custody contrary to due process of law. Such escape may be by force, if out of prison it is generally known as "prison-breach" or "prison-breaking," or by the voluntary or negligent act of the custodian. Where the escape is caused by the force or fraud of others it is termed "rescue" (*q.v.*). "Escape" is used in botany of a cultivated plant found growing wild. The word is also used of a means of escape, *e.g.* "fire-escape," and of a loss or leakage of gas, current of electricity or water.

ESCHATOLOGY (Gr. ἔσχατος, last, and λόγος, science; the "doctrine of last things"), a theological term derived from the New Testament phrases "the last day" (ἐν τῇ ἐσχάτῃ ἡμέρᾳ, John vi. 39), "the last times" (ἐπ' ἐσχάτων τῶν χρόνων, 1 Peter i. 20), "the last state" (τὰ ἔσχατα, Matt. xii. 45), a conception taken over from ancient prophecy (Is. ii. 2; Mal. iv. 1). It was the common belief in the apostolic age that the second advent of Christ was near, and would give the divine completion to the world's history. The use of the term, however, has been extended so as to include all that is taught in the Scriptures about the future life of the individual as well as the final destiny of the world. The reasons for the belief in a life after death are discussed in the article IMMORTALITY. The present article, after a brief glance at the conceptions of the future of the individual or the world found in other religions, will deal with the teaching of the Old and New Testaments, the Jewish and the Christian Church regarding the hereafter.

There is a bewildering variety in the views of the future life and world held by different peoples. The future life may be conceived as simply a continuation of the present life in its essential features, although under conditions more or less favourable. It may also be thought of as retributive, as a reversal of present conditions so that the miserable are comforted, and the prosperous laid low, or as a reward or punishment for good or evil desert here. Personal identity may be absorbed, as in the transmigration of souls, or it may even be denied, while the good or bad result of one life is held to determine the weal or woe of another. The scene of the future life may be thought of on earth, in some distant part of it, or above the earth, in the sky, sun, moon or stars, or beneath the earth. The abodes of bliss and the places of torment may be distinguished, or one last dwelling-place may be affirmed for all the dead. Sometimes the good find their abiding home with the gods; sometimes a number of heavens of varying degrees of blessedness is recognized (see F. B. Jevons, *An Introduction to the History of Religion*, chs. xxi. and xxii., 1902; and J. A. MacCulloch's *Comparative Theology*, xiv., 1902).

(1) Confucius, though unwilling to discuss any questions concerning the dead, by approving ancestor-worship recognized a future life. (2) Taoism promises immortality as the reward of

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merit. (3) *The Book of the Dead*—a guide-book for the departed on his long journey in the unseen world to the abode of the blessed—shows the attention the Egyptian religion gave to the state of the dead. (4) Although the Babylonian religion presents a very gloomy view of the world of the dead, it is not without a few faint glimpses of a hope that a few mortals at least may gain deliverance from the dread doom. (5) A characteristic feature of Indian thought is the transmigration of the soul from one mode of life to another, the physical condition of each being determined by the moral and religious character of the preceding. But deliverance from this cycle of existences, which is conceived as misery, is promised by means of speculation and asceticism. Denying the continuance of the soul, Buddhism affirmed a continuity of moral consequences (*Karma*), each successive life being determined by the total moral result of the preceding life. Its doctrine of salvation was a guide to, if not absolute non-existence, yet cessation of all consciousness of existence (*Nirvana*). Later Buddhism has, however, a doctrine of many heavens and hells. (6) In Zoroastrianism not only was continuance of life recognized, but a strict retribution was taught. Heaven and hell were very clearly distinguished, and each soul according to its works passed to the one or to the other. But this faith did not concern itself only with the future lot of the individual soul. It was also interested in the close of the world's history, and taught a decisive, final victory of Ormuzd over Ahriman, of the forces of good over the forces of evil. It is not at all improbable that Jewish eschatology in its later developments was powerfully influenced by the Persian faith. (7) Mahommedanism reproduces and exaggerates the lower features of popular Jewish and Christian eschatology (see the separate articles on these religions).

Old Testament.

In the Old Testament we can trace the gradual development of an ever more definite doctrine of "the final condition of man and the world." This is regarded as the last stage in a moral process, a redemptive purpose of God. The eschatology of the Old Testament is thus closely connected with, but not limited by, Messianic hope, as there are eschatological teachings that are not Messianic. As the Old Testament revelation is concerned primarily with the elect nation, and only secondarily (in the later writings) with the individual persons composing it, we follow the order of importance as well as of time in dealing first with the people. The universalism which marks the promise to the seed of the woman (Gen. iii. 15) appears also in the blessing of Noah (ix. 25). In the promise to Abraham (xii. 3) this universal good is directly related to God's particular purpose for His chosen people; so also in the blessing of Jacob (xlix.) and of Moses (Deut. xxxiii.). David's last words (2 Sam. xxiii.) blend together his desire that his family should retain the kingship, and his aspiration for a kingdom of righteousness on earth. The conception of the "Day of the Lord" is frequent and prominent in the prophets, and the sense given to the phrase by the people and by the prophets throws into bold relief the contrast between popular beliefs and the prophetic faith. The people simply expected deliverance from their miseries and burdens by the intervention of Yahweh, because He had chosen Israel for His people. The prophets had an ethical conception of Yahweh; the sin of His own people and of other nations called for His intervention in judgment as the moral ruler of the world. But judgment they conceived as preparing for redemption. The day of the Lord is always an eschatological conception, as the term is applied to the final and universal judgment, and not to any less decisive intervention of God in the course of human history. In the pre-exilic prophets the judgment of God is "primarily on Israel, although it also embraces the nations"; during the Exile and at the Restoration the judgment is represented as falling on the nations while redemption is being wrought for God's people; after the Restoration the people of God is again threatened, but still the warning of judgment is mainly directed towards the nations and deliverance is promised to Israel As the manifestation of God in grace as well as judgment, the day of the Lord will bring joy to Israel and even to the world. As a day of judgment it is accompanied by terrible convulsions of nature (not to be taken figuratively, but probably intended literally by the prophets in accordance with their view of the absolute subordination of nature to the divine purpose for man). It ushers in the Messianic age. While the moral issues are finally determined by this day, yet the world of the Messianic age is painted with the colours of the prophet's own surroundings. Israel is restored to its own land, and to it the other nations are brought into subjugation, by force or persuasion. The contributions of the Old Testament to Christian eschatology embrace these features: "(1) The manifestation or advent of God; (2) the universal judgment; (3) behind the judgment the coming of the perfect kingdom of the Lord, when all Israel shall be saved and when the nations shall be partakers of their salvation; and (4) the finality and eternity of this condition, that which constitutes the blessedness of the saved people being the Presence of God in the midst of them—this last point corresponding to the Christian idea of heaven" (A. B. Davidson, in Hastings's *Bible Dictionary*, i. p. 738). This hope is for the people on this earth though transfigured.

To the individual it would seem at first only old age is promised (Is. lxv. 20; Zech. viii. 4), but the abolition of death itself is also declared (Is. xxv. 8). The resurrection, which appears at first as a revival of the dead nation (Hos. vi. 2; Ez. xxxvii. 12–14), is afterwards promised for the pious individuals (Is. xxvi. 19), so that they too may share in the national restoration. Only in Daniel xii. 2 is taught a resurrection of the wicked "to shame and everlasting contempt" as well as of the righteous to "everlasting life." It was only at the Exile, when the nation ceased to be, that the worth of the individual came to be recognized, and the hopes given to the nation were claimed for the individual. In dealing with the individual eschatology we must carefully distinguish the popular ideas regarding death and the hereafter which Israel shared with the other Semitic peoples, from the intuitions, inferences, aspirations evoked in the pious by the divine revelation itself. The former have not the moral significance or the religious value of the latter. The starting-point of the development was the common belief that the dead continued to exist in an unsubstantial mode of life, but cut off from fellowship with God and man, but faith left this far behind. Sheol is the common abode of the righteous and the ungodly: life there is shadowy and feeble, but seems to continue in a wavering and dim reflection features of this life. As the present life is, however, determined by moral issues, and as death does not change man's relation to God, moral considerations could not be absolutely excluded from the future life. A forward step had to be taken. Pious men, in fellowship with God, when they faced the fact of death, were led either to challenge its right, or to give a new meaning to it. Either there was a protest against death itself, and a demand for immortality (Ps. xvi. 9–11), or death was conceived as something different for the saint and for the sinner; fellowship with God would not and could not be interrupted (Ps. xlix. 14, 15, lxxiii. 17-28). The vision of God is anticipated after death's sleep (Ps. xvii. 15; Job xix. 25-27). This belief in individual immortality is expressed poetically and obscurely: it is later than the eschatology of the people. It assumes the moral distinction of the righteous and the ungodly, and seeks a solution for the problem of the lack of harmony of present character and condition. Its deepest motive, however, is religious. The soul once in fellowship with God cannot even by death be separated from God. The individual hoped that he would live to share the nation's good, and thus the two streams of Old Testament eschatology at last flow together.

Apocryphal and Apocalyptic books.

It is in the apocryphal and apocalyptic literature of Judaism that the fullest development of eschatology can be traced. Four words may serve to express the difference of the doctrine of these writings and the teaching of the Old Testament. Eschatology was *universalized* (God was recognized as the creator and moral governor of all the world), *individualized* (God's judgment was directed, not to nations in a future age, but to individuals in a future life), *transcendentalized* (the future age was more and more contrasted with the present, and the transition from the one to the other was not expected as the result of historical movements, but of miraculous divine acts), and *dogmatized* (the attempt was made to systematize in some measure the vague and varied prophetic anticipations). Only a very brief summary of the conceptions current in these writings can be given. The coming of the Messiah will be preceded by the Last Woes. The Messiah is very variously conceived: (1) "a passive, though supreme member of the Messianic Kingdom"; (2) "an active warrior who slays his enemies with his own hand"; (3) "one who slays his enemies by the word of his mouth, and rules by virtue of his justice, faith and holiness"; (4) a supernatural person, "eternal Ruler and Judge of Mankind" (R. H. Charles in Hastings's *Bible Dictionary*, i. p. 748). In some of the writings no Messianic kingdom is looked for; in others only a temporal duration on earth is assigned to it; in others still it abides for ever either on earth as it is, or on earth transformed. The dispersion among the nations is to return home. Sometimes the Resurrection is narrowed down to the resurrection of the righteous, at others widened out to the resurrection of all mankind for the last judgment. A blessed immortality after judgment, or even after death itself, is sometimes taught without reference to any resurrection. Retribution in human history is recognized, but attention is specially concentrated on the final judgment, which is usually conceived as taking place in two stages. (1) The Messianic is executed by the Messiah or the saints by victory in war, or by judicial sentence. (2) The final remains in God's hands; but in one writing (the *Ethiopic Enoch*) is represented as Messiah's function. This judgment either closes the Messianic age, if thought of as temporal, or ushers it in, if conceived as eternal, or closes the world's history, if no Messianic age is expected. The place of torment for the wicked was called Gehenna (the valley of Hinnom or the Sons of Hinnom, where the bodies of criminals were cast out, is described in Is. lxvi. 24). Here corporal as well as spiritual punishment was endured; it was inflicted on apostate Jews or the wicked generally; the righteous witnessed its initial stages but not its final form. In later Judaism it was the purgatory of faithless Jews, who at last reached Paradise, but it remained the place of eternal torment for the Gentiles. Paradise was sometimes regarded as the division of Sheol to which the righteous passed after death, but at others it was conceived as the heavenly abode of Moses, Enoch and Elijah, to which other saints would pass after the last judgment.

New Testament.

The eschatology of the New Testament attaches itself not only to that of the Old Testament but also to that of contemporary Judaism, but it avoids the extravagances of the latter. Not at all systematic, it is occasional, practical, poetical and dominantly evangelical, laying stress on the hope of the righteous rather than the doom of the wicked. The teaching of Jesus centres, according to the Synoptists, in the great idea of the "Kingdom of God," which is already present in the teacher Himself, but also future as regards its completion. In some parables a gradual realization of the kingdom is indicated (Matt. xiii.); in other utterances its consummation is connected with Christ's own return, His Parousia (Matt. xxiv. 3, 37, 39), the time of which, however, is unknown even to Himself (Mark xiii. 32). In this eschatological discourse (Matt. xxiv., xxv.) He speaks of the destruction of Jerusalem and of the end of the world as near, and seemingly as one. This is in accordance with the characteristic of prophecy, which sees in "timeless sequence" events which are historically separated from one another. While the Return is represented in the Synoptists as an external event, it is conceived in the fourth gospel as an internal experience in the operation of the Spirit on the believer (John xiv. 16-21); nevertheless here also the Parousia in the synoptic sense is looked for (John xxi. 22; cf. 1 John ii. 28). The object of the Second Coming is the execution of judgment by Christ (Matt. xxv. 31), both individual (xxii. 1-14) and universal (xiii. 36-42). The present subjective judgment, in which men determine their destiny by their attitude to Christ, on which the fourth gospel lays stress (John iii. 17-21, ix. 39), is not inconsistent with the anticipation of a final judgment (John xii. 48, v. 27). This judgment presupposes the resurrection, belief in which was rejected by the Sadducees, but accepted by the Pharisees and the majority of the Jewish people, and confirmed by Christ, not only as an individual spiritual renovation (John v. 25, 26), but as a universal physical resuscitation (28 and 29; Matt. xxii. 30). This resurrection is of the unjust as well as the just (Matt. v. 29, 30, x. 28, Luke xiv. 14). On the *Intermediate State* Jesus does not speak clearly. He uses the term Hades twice metaphorically (Matt. xi. 23, xvi. 18), and once in a parable, the "Rich Man and Lazarus" (Luke xvi. 23), in which he employs the current phrases such as "Abraham's bosom" (verse 22), without any definite doctrinal intention, to unveil the secrets of the hereafter by confirming with His authority the common beliefs of His time. The term Paradise (Luke xxiii. 43) seems to be used "in a large and general sense as a word of hope and comfort," and we need not attach to it any of the more definite associations which it had in Jewish eschatology. When he speaks of death as "sleep" (Luke viii. 52; John xi. 11) it is to give men gentler and sweeter thoughts of it, not to inculcate the doctrine of an intermediate state as an unconscious condition. There are words which suggest rather the hope of an immediate entrance of the just into the Father's house and glory (John xiv. 2, 3, xvii. 24). He spoke frequently and distinctly both of final reward for the righteous and final penalty for the wicked. "The recompense of the righteous is described as an inheritance, entrance into the kingdom, treasure in heaven, an existence like the angelic, a place prepared, the Father's house, the joy of the Lord, life, eternal life and the like; and there is no intimation that the reward is capable of change, that the condition is a terminable one. The retribution of the wicked is described as death, outer darkness, weeping and wailing and gnashing of teeth, the undying worm, the quenchless fire, exclusion from the kingdom, eternal punishment and the like" (S. D. J. Salmond in Hastings's *Bible Dictionary*, p. 752). Degrees of award are recognized (Luke xii. 47, 48). Gehenna is applied to the condition of the lost (Matt. xviii. 9). Two sayings are held to point to a terminable penalty (Matt. v. 25, 26, xii. 31, 32), but the one is so figurative and the other so obscure, that we are not warranted in drawing any such definite conclusion from either of them. The finality of destiny seems to be unmistakably expressed (Matt. vii. 23, x. 33, xiii. 30, xxv. 46, xxvi. 24; Mark ix. 43-48, viii. 36; Luke ix. 26; John iii. 16, viii. 21, 24). No second opportunity for deciding the issue of life or death is recognized by Jesus.

Pharisees and Sadducees.

The apostolic eschatology presents resemblance amid difference. Jude (v. 6), as well as 2 Peter (ii. 4), refers to the judgment of the fallen angels. 2 Peter describes the place of their detention as Tartarus, and teaches that Christ's *Parousia* is to bring the whole present system of things to its conclusion, and the world itself to an end (iii. 10, 13). After the destruction of the existing order by fire, "a new heaven and a new earth" will appear as the abode of righteousness. The question of greatest interest in 1 Peter is the relation of two passages in it, the preaching to the spirits in prison (iii. 18-22) and the preaching of the Gospel to the dead (iv. 6) to the "larger hope." Peter's discourse also contains a phrase which suggests the belief of a descent of Christ into Hades in the interval between His death and His resurrection (Acts ii. 31). No certainty has been reached in the interpretation of these passages, but they may suggest to the Christian mind the expectation that the final destiny of no soul can be fixed until in some way or other, in this life or the next, the opportunity of decision for or against Christ has been given. The phrase "the times of restoration of all things" (iii. 21) is too vague in itself, and is too isolated in its context to warrant the dogmatic teaching of universalism, although there are other passages which seem to point towards the same goal. While John's Apocalypse is distinctly eschatological, the Epistles and the Gospels often give these conceptions an ethical and spiritual import, without, however, excluding the eschatological. Life is present while eternal (1 John v. 12, 13), but it is also future (ii. 25). There is expected a future manifestation of Christ as He is, and what the believer himself will be does not yet appear (iii. 2). The writer speaks of the last hour (ii. 18), the Antichrist that cometh (ii. 22, iv. 3), and the Christian's full reward (2 John v. 8) as well as the Parousia (1 John ii. 28). The Apocalypse reproduces much of the current Jewish eschatology. A millennial reign of Christ on earth is interposed between the first resurrection, confined to the saints and especially the martyrs, and the second resurrection for the rest of the dead. A final outburst of Satan's power is followed by his overthrow and the Last Judgment.

Although Paul sometimes describes the Kingdom of God as present (Rom. xiv. 17; 1 Cor. iv. 20; Col. i. 13), it is usually represented as future. The Parousia fills a large place in his thought, and, if more prominent in his earlier writings, is not altogether absent from his later, although the expectation of personal survival does seem to grow less confident (cf. 1 Cor. xv. 51 and Phil. i. 20-24). The doctrines of the Resurrection, the Last Judgment, the Reward of the Righteous and the Punishment of the Wicked are not less distinctly expressed than in the other apostolic writings. Peculiar elements in Paul's eschatology are the doctrines of the Rapture of the Saints (1 Thess. iv. 17) and the Man of Sin (2 Thess. ii. 3-6), but these have affinities elsewhere. A reference to the millennial reign of Christ in the period between the two resurrections is sometimes sought in 1 Cor. xv. 22-24; but it is not a chronology of the last things Paul is here giving. So also a justification for the doctrine of purgatory is sought in iii. 12-15; but the day and the fire are of the last judgment. A descent of Christ into Hades, implying an extension of the opportunity of grace such as is supposed to be taught in 1 Peter, is also discovered in the obscure statements in Rom. x. 7 (where Paul is freely quoting Deut. xxx. 11-14), and Eph. iv. 10 (where he is commenting on Ps. lxviii. 18). Universal restoration is inferred from 1 Cor. xv. 24-28, "God all in all," Phil. ii. 10-11, every knee bowing to, and every tongue confessing Jesus Christ, Eph. i. 9, 10, the summing up of all things in Christ, Col. i. 20, God reconciling all things unto Himself in Christ. These passages inspire a hope, but do not sustain a certainty. Paul's shrinking from the disembodied state and longing to be clothed upon at death in 2 Cor. v. 1-8, cannot be regarded as a proof of an *interim* body prior to and preparatory for the resurrection body. Paul links the human resurrection with a universal renovation (Rom. viii. 19-23). Paul's eschatology is not free of obscurities and ambiguities; and in the New Testament eschatology generally we are forced to recognize a mixture of inherited Jewish and original Christian elements (see ANTICHRIST).

During the first century of the existence of the Gentile Christian Church, "the hope of the approaching end of the world and the glorious kingdom of Christ" was dominant, although warnings had to be given against doubt and indifference. Redemption was thought of as still future, as the power of the devil had not been broken but rather increased by the First Advent, and the Second Advent was necessary to his complete overthrow. The expectations were often grossly materialistic, as is evidenced by Papias's quotation as the words of the Lord of a group of sayings from the Apocalypse of Baruch, setting forth the amazing fruitfulness of the earth in the Messianic time.

Gnostics.

Montanism.

The Gnostics rejected this eschatology as in their view the enlightened spirit already possessed immortality. Marcion expected that the Church would be assailed by Antichrist; a visible return of Christ he did not teach, but he recognized that human history would issue in a separation of the good from the bad. Montanism sought to form a new Christian commonwealth which, separated from the world, should prepare itself for the descent of the Jerusalem from above, and its establishment in the spot which by the direction of the Spirit had been chosen in Phrygia. While Irenaeus held fast the traditional eschatological beliefs, yet his conception of the Christian salvation as a deification of man tended to weaken their hold on Christian thought. The Alogi in the 2nd century rejected the Apocalypse on account of its chiliasm, its teaching of a visible reign of Christ on earth for a thousand years. Montanism also brought these apocalyptic expectations into discredit in orthodox ecclesiastical circles. The Alexandrian theology strengthened this movement against chiliasm. Clement of Alexandria taught that justice is not merely retributive, that punishment is remedial, that probation continues after death till the final judgment, that Christ and the apostles preached the Gospel in Hades to those who lacked knowledge, but whose heart was right, that a spiritual body will be raised. Origen taught that a germ of the spiritual body is in the present body, and its development depends on the character, that perfect bliss is reached only by stages, that the evil are purified by pain, conscience being symbolized by fire, and that all, even the devil himself, will at last be saved. Both regarded chiliasm with aversion. But in the 5th century there were rejected as heretical (1) "the doctrine of universalism, and the possibility of the redemption of the devil, (2) the doctrine of the complete annihilation of evil; (3) the conception of the penalties of hell as tortures of conscience; (4) the spiritualizing version of the resurrection of the body; (5) the idea of the continued creation of new worlds" (A. Harnack, *History of Dogma*, iii. p. 186).

Epiphanius, following Methodius, insisted on the most perfect identity between the resurrection body and the material body; and this belief, enforced in the West by Jerome, soon established itself as alone orthodox. Augustine made experiments on the flesh of a peacock in order to find physical evidence for the doctrine. He held fast to eternal punishment, but allowed the possibility of mitigations. Some believers, he taught, may pass through purgatorial fires; and this middle class may be helped by the sacraments and the alms of the living. "There are many souls not good enough to dispense with this provision, and not bad enough to be benefited by it" (*op. cit.* v. 233). This doctrine was sanctioned and developed by Gregory the Great. "After God has changed eternal punishments into temporary, the justified must expiate these temporary penalties for sin in purgatory" (p. 268). This view was inferred indirectly from Matt. xii. 31, and directly from 1 Cor. iii. 12-15. Afterwards purgatory took more and more the place of hell, and was subject to the control of the church. As regards the saints, different degrees of blessedness were recognized; they were supposed to wait in Hades for the return of Christ, but gradually the belief gained ground, especially in regard to the martyrs, that their souls at once entered Paradise. The primitive Christian eschatology was preserved in the West as it was not in the East, and in times of exceptional distress the expectation of Antichrist emerged again and again. In the middle ages there was an extravagance of speculation on this subject, which may be seen in the last division of Aquinas' *Summa Theologiae*. He proposes thirty questions on these matters, among which are the following: "whether souls are conducted to heaven or hell immediately after death"; "whether the limbus of hell is the same as Abraham's bosom"; "whether the sun and moon will be really obscured at the day of judgment"; "whether all the members of the human body will rise with it"; "whether the hair and nails will reappear"; could thought become "more lawless and uncertain"?

In Protestant Theology.

While rejecting purgatory, Protestantism took over this eschatology. Souls passed at once to heaven or to hell; a doctrine even less adequate to the complex quality of human life. Luther himself looked for the passing away of the present evil world. Socinianism taught a new spiritual body, an intermediate state in which the soul is near non-existence, an annihilation of the wicked, as immortality is the gift of God. Swedenborg discards a physical resurrection, as at death the eyes of men are opened to the spiritual world in which we exist now, and they continue to live essentially as they lived here, until by their affinities they are drawn to heaven or hell. The doctrine of *eternal punishment* has been opposed on many grounds, such as the disproportion between the offence and the penalty, the moral and religious immaturity of the majority of men at death, the diminution of the happiness of heaven involved in the knowledge of the endless suffering of others (Schleiermacher), the defeat of the divine purpose of righteousness and grace that the continued antagonism of any of God's creatures would imply, the dissatisfaction God as Father must feel until His whole family is restored. It has been argued that the term "eternal" has reference not to duration of time but quality of being (Maurice); but it does seem certain that the writers in the Holy Scriptures who used it did not foresee an end either to the life or to the death to which they applied the term. The contention should not be based on the meaning of a single word, but on such broader considerations as have been indicated above. The doctrine of *conditional* immortality taught by Socinianism was accepted by Archbishop Whately, and has been most persistently advocated by Edward White, who "maintains that immortality is a truth, not of reason, but of revelation, a gift of God" bestowed only on believers in Christ; but he admits a continued probation after death for such as have not hardened their hearts by a rejection of Christ. According to Albrecht Ritschl "the *wrath* of God means the resolve of God to annihilate those men who finally oppose themselves to redemption, and the final purpose of the kingdom of God." He thus makes immortality conditional on inclusion in the kingdom of God. The doctrine of *universal restoration* was maintained by Thomas Erskine of Linlathen on the ground of the Fatherhood of God, and Archdeacon Wilson anticipates such discipline after death as will restore all souls to God. C. I. Nitzsch argues against the doctrine of the annihilation of the wicked, regards the teaching of Scripture about eternal damnation as hypothetical, and thinks it possible that Paul reached the hope of universal restoration. I. A. Dorner maintains that hopeless perdition can be the penalty only of the deliberate rejection of the Gospel, that those who have not had the opportunity of choice fairly and fully in this life will get it hereafter, but that the right choice will in all cases be made we cannot be confident. The attitude of theologians generally regarding individual destiny is well expressed by Dr James Orr, "The conclusion I arrive at is that we have not the elements of a complete solution, and we ought not to attempt it. What visions beyond there may be, what larger hopes, what ultimate harmonies, if such there are in store, will come in God's good time; it is not for us to anticipate them, or lift the veil where God has left it down" (*The Christian View of God and the World*, 1893, p. 397).

Although in recent theological thought attention has been mainly directed to individual destiny, yet the other elements of Christian eschatology must not be altogether passed over. History has offered the authoritative commentary on the prophecy of the Parousia of Christ. The presence and power of His Spirit, the spread of His Gospel, the progress of His kingdom have been as much a fulfilment of the eschatological teaching of the New Testament as His life and work on earth were a fulfilment of Messianic prophecy, for fulfilment always transcends prophecy. Even if the common beliefs of the apostolic age have not modified the evangelist's reports of Jesus' teaching, it must be remembered that He used the common prophetic phraseology, the literal fulfilment of which is not to be looked for. Some parables (the leaven, the mustard seed) suggest a gradual progressive realization of His kingdom. The Fourth Gospel interprets both judgment and resurrection spiritually. Accordingly the general resurrection and the last judgment may be regarded as the temporal and local forms of thought to express the universal permanent truths that life survives death in the completeness of its necessary organs and essential functions, and that the character of that continued life is determined by personal choice of submission or antagonism to God's purpose of grace in Christ, the perfect realization of which is the Christian's hope for himself, mankind and the world.

Bibliography.—In addition to the works referred to above the following will be found useful: S. D. F. Salmond, *The Christian Doctrine of Immortality* (4th ed., 1901); R. H. Charles, *A Critical History of the Doctrine of a Future Life in Israel, in Judaism, and in Christianity* (1899); L. N. Dahle, *Life after Death and the Future of the Kingdom of God* (Eng. tr. by J. Beveridge, 1895); J. A. Beet, *The Last Things* (new ed., 1905); W. G. T. Shedd, *Doctrine of Endless Punishment* (New York, 1886); F. W. Farrar, *The Eternal Hope* (1892); E. Pétavel, *The Problem of Immortality* (Eng. tr. by F. A. Freer, 1892); E. White, *Life in Christ* (3rd ed., 1878); also the relevant sections in books on biblical and systematic theology. (A. E. G.*)

ESCHEAT (O. Fr. *eschete*, from *escheoir*, to fall to one's share; Lat. *excidere*, to fall out), in English law, the reversion of lands to the next lord on the failure of heirs of the tenant. "When the tenant of an estate in fee simple dies without having alienated his estate in his lifetime or by his will, and without leaving any heirs either lineal or collateral, the lands in which he held his estate escheat, as it is called, to the lord of whom he held them" (Williams on the *Law of Real Property*). This rule is explained by the conception of a freehold estate as an interest in lands held by the freeholder from some lord, the king being lord paramount. (See Estate.) The granter retains an interest in the land similar to that of the donor of an estate for life, to whom the land reverts after the life estate is ended. As there are now few freehold estates traceable to any mesne or intermediate lord, escheats, when they do occur, fall to the king as lord paramount. Besides escheat for defect of heirs, there was formerly also escheat *propter delictum tenentis*, or by the corruption of the blood of the tenant through attainder consequent on conviction and sentence for treason or felony. The blood of the tenant becoming corrupt by attainder was decreed no longer inheritable, and the effect was the same as if the tenant had died without heirs. The land, therefore, escheated to the next heir, subject to the superior right of the crown to the forfeiture of the lands,—in the case of treason for ever, in the case of felony for a year and a day. All this was abolished by the Felony Act 1870, which provided for the appointment of an administrator to the property of the convict. Escheat is also an incident of copyhold tenure. Trust estates were not subject to escheat until the Intestates' Estates Act 1884, but now by that act the law of escheat applies in the same manner as if the estate or interest were a legal estate in corporeal hereditament

ESCHENBURG, JOHANN JOACHIM (1743–1820), German critic and literary historian, was born at Hamburg on the 7th of December 1743. After receiving his early education in his native town, he studied at Leipzig and Göttingen. In 1767 he was appointed tutor, and subsequently professor, at the Collegium Carolinum in Brunswick. The title of "Hofrat" was conferred on him in 1786, and in 1814 he was made one of the directors of the Carolinum. He is best known by his efforts to familiarize his countrymen with English literature. He published a series of German translations of the principal English writers on aesthetics, such as J. Brown, D. Webb, Charles Burney, Joseph Priestley and R. Hurd; and Germany owes also to him the first complete translation (in prose) of Shakespeare's plays (*William Shakespear's Schauspiele*, 13 vols., Zürich, 1775–1782). This is virtually a revised edition of the incomplete translation published by Wieland between 1762 and 1766. Eschenburg died at Brunswick on the 29th of February 1820.

Besides editing, with memoirs, the works of Hagedorn, Zachariä and other German poets, he was the author of a *Handbuch der klassischen Literatur* (1783); *Entwurf einer Theorie und Literatur der schönen Wissenschaften* (1783); *Beispielsammlung zur Theorie und Literatur der schönen Wissenschaften* (8 vols., 1788–1795); *Lehrbuch der Wissenschaftskunde* (1792); and *Denkmäler altdeutscher Dichtkunst* (1799). Most of these works have passed through several editions. Eschenburg was also a poet of some pretensions, and some of his religious hymns, *e.g.* *Ich will dich noch im Tod erheben* and *Dir trau' ich, Gott, und wanke nicht*, are contained in many hymnals to this day.

ESCHENMAYER, ADAM KARL AUGUST VON (1768–1852), German philosopher and physicist, was born at Neuenburg in Württemberg in July 1768. After receiving his early education at the Caroline academy of Stuttgart, he entered the university of Tübingen, where he received the degree of doctor of medicine. He practised for some time as a physician at Sulz, and then at Kirchheim, and in 1811 he was chosen extraordinary professor of philosophy and medicine at Tübingen. In 1818 he became ordinary professor of practical philosophy, but in 1836 he resigned and took up his residence at Kirchheim, where he devoted his whole attention to philosophical studies. Eschenmayer's views are largely identical with those of Schelling, but he differed from him in regard to the knowledge of the absolute He believed that in order to complete the arc of truth philosophy must be supplemented by what he called "non-philosophy," a kind of mystical illumination by which was obtained a belief in God that could not be reached by mere intellectual effort (see Höffding, *Hist. of Mod. Phil.*, Eng. trans. vol. 2, p. 170) He carried this tendency to mysticism into his physical researches, and was led by it to take a deep interest in the phenomena of animal magnetism. He ultimately became a devout believer in demoniacal and spiritual possession; and his later writings are all strongly impregnated with the lower supernaturalism.

His principal works are—*Die Philosophie in ihrem Übergange zur Nichtphilosophie* (1803); *Versuch die scheinbare Magie des thierischen Magnetismus aus physiol. und psychischen Gesetzen zu erklären* (1816); *System der Moralphilosophie* (1818); *Psychologie in drei Theilen, als empirische, reine, angewandte* (1817, 2nd ed. 1822); *Religionsphilosophie* (3 vols., 1818–1824); *Die Hegel'sche Religionsphilosophie verglichen mit dem christl. Princip* (1834); *Der Ischariotismus unserer Tage* (1835) (directed against Strauss's *Life of Jesus*); *Konflikt zwischen Himmel und Hölle, an dem Dämon eines besessenen Mädchens beobachtet* (1837), *Grundriss der Naturphilosophie* (1832); *Grundzüge der christl. Philosophie* (1840); and *Betrachtungen über den physischen Weltbau* (1852).

ESCHER VON DER LINTH, ARNOLD (1807–1872), Swiss geologist, the son of Hans Conrad Escher (1767–1823), was born at Zürich on the 8th of June 1807. In 1856 he became professor of geology at the École Polytechnique at Zürich. His researches led him to be regarded as one of the founders of Swiss geology With B Studer he produced (1852–1853) the first elaborate geological map of Switzerland. He was the author also of *Geologische Bemerkungen über das nördliche Vorarlberg und einige angrenzenden Gegenden*, published at Zürich in 1853. He died on the 12th of July 1872

ESCHSCHOLTZ, JOHANN FRIEDRICH (1793–1831), Russian traveller and naturalist, was born in November 1793, at Dorpat, where he died in May 1831. He was naturalist and physician to Otto von Kotzebue's exploring expedition during 1815–1818. On his return he was appointed extraordinary professor of anatomy (1819) and director of the zoological museum of the university at Dorpat (1822), and in 1823–1826 he accompanied Kotzebue on his second voyage of discovery. He became ordinary professor of anatomy at Dorpat in 1828. Among his publications were the *System der Akalephen* (1829), and the *Zoologischer Atlas* (1829–1833) The botanical genus *Eschscholtzia* was named by Adelbert von Chamisso in his honour.

ESCHWEGE, a town of Germany, in the Prussian province of Hesse-Nassau, on the Werra, and the railway Treysa-Leinefelde, 28 m. S.E. of Cassel. Pop. (1905) 11,113. It consists of the old town on the left, the new town on the right, bank of the Werra, and Brückenhausen on a small island connected with the old and new town by bridges. It is a thriving manufacturing town, its chief industries being leather-making, yarn-spinning, cotton- and linen-weaving, the manufactures of cigars, brushes, liquors and oil, and glue and soap-boiling. It has two ancient buildings, the Nikolai-turm, built in 1455, and the old castle. After being part of Thuringia, Eschwege passed to Hesse in 1263. It was recovered by the landgrave of Thuringia in 1388, but soon reverted to Hesse, and it became the residence of one of the branches of the Hessian royal house, a branch which died out in 1655.

ESCHWEILER, a town of Germany, in the Prussian Rhine province, on the Inde, and the railways Cologne-Herbesthal and Munich-Gladbach-Stolberg, about 8 m. E.N.E. from Aix-la-Chapelle. Pop. (1905) 20,643. The town has an Evangelical and four Roman Catholic churches, a gymnasium and an orphanage. The manufacture of iron and steel goods is carried on, other industries include the manufacture of zinc wares, tanning, distilling and brewing. In the neighbourhood there are valuable coal mines.

See Koch, *Geschichte der Stadt Eschweiler* (Frankfort, 1890)

ESCOBAR Y MENDOZA, ANTONIO (1589–1669), Spanish churchman of illustrious descent, was born at Valladolid in 1589. He was educated by the Jesuits, and at the age of fifteen took the habit of that order. He soon became a famous preacher, and his facility was so great that for fifty years he preached daily, and sometimes twice a day. In addition he was a voluminous writer, and his works fill eighty-three volumes. His first literary efforts were Latin verses in praise of Ignatius Loyola (1613) and the Virgin Mary (1618); but he is best known as a writer on casuistry. His principal works belong to the fields of exegesis and moral theology Of the latter the best known are *Summula casuum conscientiae* (1627); *Liber theologiae moralis* (1644), and *Universae theologiae moralis problemata* (1652–1666). The first mentioned of these was severely criticised by Pascal in the fifth and sixth of his *Provincial Letters*, as tending to inculcate a loose system of morality. It contains the famous maxim that purity of intention may be a justification of actions which are contrary to the moral code and to human laws; and its general tendency is to find excuses for the majority of human frailties. His doctrines were disapproved of by many Catholics, and were mildly condemned by Rome. They were also ridiculed in witty verses by Molière, Boileau and La Fontaine, and gradually the name Escobar came to be used in France as a synonym for a person who is adroit in making the rules of morality harmonize with his own interests. Escobar himself is said to have been simple in his habits, a strict observer of the rules of his order, and unweariedly zealous in his efforts to reform the lives of those with whom he had to deal. It has been said of him that "he purchased heaven dearly for himself, but gave it away cheap to others." He died on the 4th of July 1669.

ESCOIQUIZ, JUAN (1762–1820), Spanish ecclesiastic, politician and writer, was born in Navarre in 1762. His father was a general officer and he began life as a page in the court of King Charles III. He entered the church and was provided for by a prebend at Saragossa. Godoy in his memoirs asserts that Escoiquiz sought to gain his favour by flattery There is every reason to believe that this is an accurate statement of the case. The mere fact that he was selected to be the tutor of the heir-apparent, Ferdinand, afterwards King Ferdinand VII., is of itself a proof that he exerted himself to gain the goodwill of the reigning favourite. In 1797 he published a translation of Young's *Night Thoughts*, which does not of itself show that he was well acquainted with English, for the version may have been made with the help of the French. In 1798 he published a long and worthless so-called epic on the conquest of Mexico. Escoiquiz was in fact a busy and pushing member of the literary clique which looked up to Godoy as its patron. But his position as tutor to the heir to the throne excited his ambition. He began to hope that he might play the part of those court ecclesiastics who had often had an active share in the government of Spain. As Ferdinand grew up, and after his marriage with a Neapolitan princess, he became the centre of a court opposition to Godoy and to his policy of alliance with France. Escoiquiz was the brains, as far as there were any brains, of the intrigue. His activity was so notorious that he was exiled from court, but was consoled by a canonry at Toledo. This half measure was as ineffective as was to have been expected. Escoiquiz continued to be in constant communication with the prince. Toledo is close to Madrid, and the correspondence was easily maintained. He had a large share in the conspiracy of the Escorial which was detected on the 28th of October 1807. He was imprisoned and sent for trial with other conspirators. But as they had appealed to Napoleon, who would not suffer his name to be mentioned, the government had to allow the matter to be hushed up, and the prisoners were acquitted. After the outbreak at Aranjuez on the 17th of March 1808, in which he had a share, he became one of the most trusted advisers of Ferdinand. The new king's decision to go to meet Napoleon at Bayonne was largely inspired by him. In 1814 Escoiquiz published at Madrid his *Idea Sencilla de las razones que motivaron el viage del Rey Fernando VII à Bayona* (Honest representation of the causes which inspired the journey of King Ferdinand VII. to Bayonne).

It is a valuable historical document, and contains a singularly vivid account of an interview with Napoleon. Escoiquiz was far too firmly convinced of his ingenuity and merits to conceal the delusions and follies of himself and his associates. He displays his own vanity, frivolity and futile cleverness with much unconscious humour, but, it is only fair to allow, with some literary dexterity. When the Spanish royal family was imprisoned by Napoleon, Escoiquiz remained with Ferdinand at Valençay. In 1813 he published at Bourges a translation of Milton's *Paradise Lost*. When Ferdinand was released in 1814 he came back to Madrid in the hope that his ambition would now be satisfied, but the king was tired of him, and was moreover resolved never to be subjected by any favourite. After a very brief period of office in 1815 he was sent as a prisoner to Murcia. Though he was afterwards recalled, he was again exiled to Ronda, where he died on the 27th of November 1820.

ESCOMBE, HARRY (1838–1899), South African statesman, a member of a Somersetshire family, was born at Notting Hill, London, on the 25th of July 1838, and was educated at St Paul's school. After four years in a stockbroker's office, he emigrated, in 1859, to the Cape. The following year he moved to Natal, and, after trying other occupations, qualified as an attorney. He became recognized as the ablest pleader in the colony, and, in 1872, was elected for Durban as a member of the legislative council, and subsequently was also placed on the executive council. In 1880 he secured the appointment of a harbour board for Natal, and was himself made chairman. The transformation of the port of Durban into a harbour available for ocean liners was due entirely to his energy. In 1888–1889 he defended Dinizulu and other Zulu chiefs against a charge of high treason. For several years he opposed the grant of responsible government to Natal, but by 1890 had become convinced of its desirability, and on its conferment in 1893 he joined the first ministry formed, serving under Sir John Robinson as attorney-general. In February 1897, on Sir John's retirement, Escombe became premier, remaining attorney-general and also holding the office of minister of education and minister of defence. In the summer of that year he was in London with the other colonial premiers at the celebration of the Diamond Jubilee of Queen Victoria, and was made a member of the privy council. Cambridge University conferred upon him the honorary degree of LL.D. The election that followed his return to Natal proved unfavourable to his policy, and he resigned office (October 1897). Throughout his life he took an active interest in national defence. He had served in the Zulu War of 1879, was commander of the Natal Naval Volunteers and received the volunteer long service decoration. In October 1899 he went to the northern confines of the colony to take part in preparing measures of defence against the invasion by the Boers. He died on the 27th of December 1899.

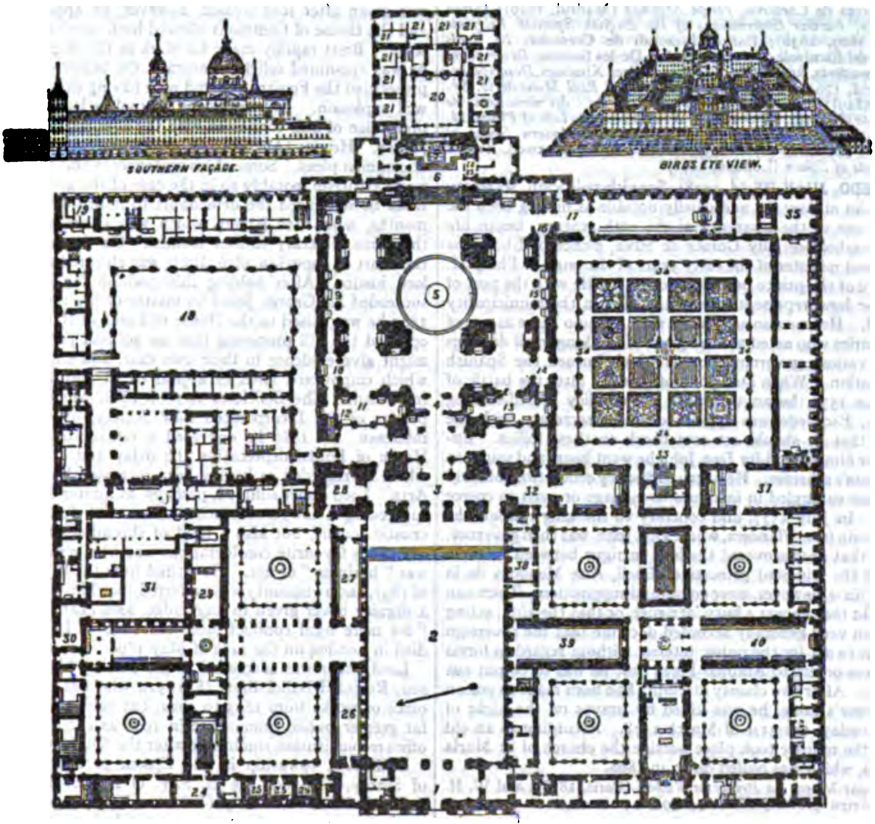
The *Speeches of the late Right Hon. Harry Escombe* (Maritzburg, 1903), edited by J. T Henderson, contains brief biographical notes by Sir John Robinson and the editor.

ESCORIAL, or ESCURIAL, in Spain, one of the most remarkable buildings in Europe, comprising at once a convent, a church, a palace and a mausoleum. The Escorial is situated 3432 ft. above the sea, on the south-western slopes of the Sierra de Guadarrama, and thus within the borders of the province of Madrid and the kingdom of New Castile. By the Madrid-Avila railway it is 31 m. N.W. of Madrid. The surrounding country is a sterile and gloomy wilderness exposed to the cold and blighting blasts of the Sierra.

According to the usual tradition, which there seems no sufficient reason to reject, the Escorial owes its existence to a vow made by Philip II. of Spain (1556–1598), shortly after the battle of St Quentin, in which his forces succeeded in routing the army of France. The day of the victory, the 10th of August 1557, was sacred to St Laurence; and accordingly the building was dedicated to that saint, and received the title of *El real monasterio de San Lorenzo del Escorial*. The last distinctive epithet was derived from the little hamlet in the vicinity which furnished shelter, not only to the workmen, but to the monks of St Jerome who were afterwards to be in possession of the monastery; and the hamlet itself is generally but perhaps erroneously supposed to be indebted for its name to the *scorias* or dross of certain old iron mines. The preparation of the plans and the superintendence of the work were entrusted by the king to Juan Bautista de Toledo, a Spanish architect who had received most of his professional education in Italy. The first stone was laid in April 1563; and under the king's personal inspection the work rapidly advanced. Abundant supplies of *berroqueña*, a granite-like stone, were obtained in the neighbourhood, and for rarer materials the resources of both the Old and the New World were put under contribution. The death of Toledo in 1567 threatened a fatal blow at the satisfactory completion of the enterprise, but a worthy successor was found in Juan Herrera, Toledo's favourite pupil, who adhered in the main to his master's designs. On the 13th of September 1584 the last stone of the masonry was laid, and the works were brought to a termination in 1593. Each successive occupant of the Spanish throne has done something, however slight, to the restoration or adornment of Philip's convent-palace, and Ferdinand VII. (1808–1833) did so much in this way that he has been called a second founder. In all its principal features, however, the Escorial remains what it was made by the genius of Toledo and Herrera working out the grand, if abnormal, desires of their master

The ground plan of the building is estimated to occupy an area of 396,782 sq. ft., and the total area of all the storeys would form a causeway 1 metre in breadth and 95 m. in length. There are seven towers, fifteen gateways and, according to Los Santos, no fewer than 12,000 windows and doors. The general arrangement is shown by the accompanying plan. Entering by the main entrance the visitor finds himself in an atrium, called the Court of the Kings (*Patio de los reyes*), from the 16th-century statues of the kings of Judah, by Juan Bautista Monegro, which adorn the facade of the church. The sides of the atrium are unfortunately occupied by plain ungainly buildings five storeys in height, awkwardly accommodating themselves to the upward slope of the ground. Of the grandeur of the church itself, however, there can be no question: it is the finest portion of the whole Escorial, and, according to Fergusson, deserves to rank as one of the great Renaissance churches of Europe. It is about 340 ft. from east to west by 200 from north to south, and thus occupies an area of about 70,000 sq. ft. The dome is 60 ft. in diameter, and its height at the centre is about 320 ft. In glaring contrast to the bold and simple forms of the architecture, which belongs to the Doric style, were the bronze and marbles and pictures of the high altar, the masterpiece of the Milanese Giacomo Trezzo, almost ruined by the French in 1808. Directly under the altar is situated the pantheon or royal mausoleum, a richly decorated octagonal chamber with upwards of twenty niches, occupied by black marble *urnas* or sarcophagi, kept sacred for the dust of kings or mothers of kings. There are the remains of Charles V. (1516–1556), of Philip II., and of all their successors on the Spanish throne down to Ferdinand VII., with the exception of Philip V. (1700–1746) and Ferdinand VI. (1746–1759). Several of the sarcophagi are still empty. For the other members of the royal family there is a separate vault, known as the *Panteon de los Infantes*, or more familiarly by the dreadfully suggestive name of *El Pudridero*. The most interesting room in the palace is Philip II.'s cell, from which through an opening in the wall he could see the celebration of mass while too ill to leave his bed.

The library, situated above the principal portico, was at one time one of the richest in Europe, comprising the king's own collection, the extensive bequest of Diego de Mendoza, Philip's ambassador to Rome, the spoils of the emperor of Morocco, Muley Zidan (1603–1628) and various contributions from convents, churches and cities. It suffered greatly in the fire of 1671, and has since been impoverished by plunder and neglect. Among its curiosities still extant are two New Testament Codices of the 10th century and two of the 11th; various works by Alphonso the Wise (1252–1284), a Virgil of the 14th century, a Koran of the 15th, &c. Of the Arabic manuscripts which it contained in the 17th century a catalogue was given in J. H. Hottinger's



Views and Plan of the Escorial.[1]

CHURCH

1. Principal entrance and portico.
2. Court of the kings (*Patio de los reyes*).
3. Vestibule of the church.
4. Choir of the seminarists.
5. Centre of the church and projection of the dome.
6. Greater chapel.
7. High altar.
8. Chapel of St John.
9. Chapel of St Michael.
10. Chapel of St Maurice.
11. Chapel of the Rosary.
12. Tomb of Louisa Carlota.
13. Chapel of the *Patrocinio*.
14. Chapel of the *Cristo de la buena muerte*.
15. Chapel of the Eleven Thousand Virgins.
16. Former Chapel of the *Patrocinio*.
17. Sacristy.

PALACE

18. Principal court of the palace.
19. Ladies' tower.
20. Court of the masks.
21. Apartments of the royal children.
22. Royal oratory.
23. Oratory where Philip II. died.

SEMINARY

24. Entrance to seminary.
25. Classrooms.
26. Old philosophical hall.
27. Old theological hall.
28. Chamber of secrets.
29. Old refectory.
30. Entrance to the college.
31. College yard.

CONVENT

32. Clock tower.
33. Principal cloister.
34. Court of the evangelists.
35. Prior's cell.
36. Archives.
37. Old church.
38. Visitors' hall.
39. Manuscript library.
40. Convent refectory.

Promptuarium sive bibliotheca orientalis, published at Heidelberg in 1658, and another in the 18th, in M. Casiri's *Bibliotheca Arabico-Hispanica* (2 vols., Madrid, 1760–1770). Of the artistic treasures with which the Escorial was gradually enriched, it is sufficient to mention the frescoes of Peregrin or Pellagrino Tibaldi, Luis de Carbajal, Bartolommeo Carducci or Carducho, and Luca Giordano, and the pictures of Titian, Tintoretto and Velasquez. These paintings all date from the 15th or the 17th century. Many of those that are movable have been transferred to Madrid, and many others have perished by fire or sack. The conflagration of 1671, already mentioned, raged for fifteen days, and only the church, a part of the palace, and two towers escaped uninjured. In 1808 the whole building was exposed to the ravages of the French soldiers under General La Houssaye. On the night of the 1st of October 1872, the college and seminary, a part of the palace and the upper library were devastated by fire; but the damage was subsequently repaired. In 1885 the conventual buildings were occupied by Augustinian monks.

The reader will find a remarkable description of the emotional influence of the Escorial in E. Quinet's *Vacances en Espagne* (Paris, 1846), and for historical and architectural details he may consult the following works:—Fray Juan de San Geronimo, *Memorias sobre la fundacion del Escorial y su fabrica*, in the *Coleccion de documentos ineditos para la historia de España*, vol. vii.; Y. de Herrera, *Sumario y breve declaracion de los diseños y estampas de la fab. de S. Lorencio el Real del Escurial* (Madrid, 1589); José de Siguenza, *Historia de la orden de San Geronymo*, &c. (Madrid, 1590)

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[1] Reduced from a large plan of the Escorial in the British Museum *Monasterio del Escorial*, published at Madrid in 1876.

L. de Cabrera de Cordova, *Felipe Segundo* (Madrid, 1619); James Wadsworth, *Further Observations of the English Spanish Pilgrime* (London, 1629, 1630); Ilario Mazzorali de Cremona, *Le Reali Grandezze del Escuriale* (Bologna, 1648), De los Santos, *Descripcion del real monasterio*, &c. (Madrid, 1657); Andres Ximenes, *Descripcion*, &c. (Madrid, 1764); Y. Quevedo, *Historia del Real Monasterio*, &c. (Madrid, 1849); A. Rotondo, *Hist. artistica, . . . del monasterio de San Lorenzo* (Madrid, 1856–1861); W. H. Prescott, *Life of Philip II.* (London, 1887); J Fergusson, *History of the Modern Styles of Architecture* (London, 1891–1893); Sir W. Stirling-Maxwell, *Annals of the Artists of Spain* (London, 1891).

ESCOVEDO, JUAN DE (*d* 1578), Spanish politician, secretary of Don John of Austria, and chiefly notable as having been the victim of one of the mysteries of the 16th century, began life in the household of Ruy Gomez de Silva, prince of Eboli, the most trusted minister of the early years of the reign of Philip II. By the will of the prince he was endowed for life with the post of *Regidor*, or legal representative of the king in the municipality of Madrid. He was also associated with Antonio Perez as one of the secretaries who acted as the agents of the king in all dealings with the various governing boards which formed the Spanish administration. When Don John of Austria, after the battle of Lepanto in 1571, began to launch on a policy of self-seeking adventure, Escovedo was appointed as his secretary with the intention that he should act as a check on these follies. Unhappily for himself and for Don John he went heart and soul into all the prince's schemes. He began to disobey orders from Madrid and became entangled in intrigues to manage or even to coerce the king. In July 1577, and contrary to the king's orders, he came to Spain from Flanders, where Don John was then governor. It is said that he discovered the love intrigue between Antonio Perez and the widowed princess of Eboli, Ana Mendoza de la Cerda. This is, however, mere gossip and supposition. There can be no doubt that he was a busy intriguer, or that the king, acting on the then very generally accepted doctrine that the sovereign has a right to act for the public interest without regard to forms of law, gave orders to Antonio Perez that he was to be put out of the way. After two clumsy attempts had been made to poison him at Perez's table, he was killed by bravos on the night of Easter Monday, the 31st of March 1578. According to an old tradition the murder took place outside the church of St Maria in Madrid, which was pulled down in 1868.

See Gaspar Muro, *La Princesse d'Eboli* (Paris, 1878); and W. H. Prescott, *Reign of Philip II.* (1855–59).

ESCUINTLA, the capital of the department of Escuintla, Guatemala; on the southern slope of the Sierra Madre, 45 m. S.W of Guatemala city. Pop. (1905) about 12,000. Escuintla is locally celebrated for its hot mineral springs. It is the commercial centre of a fertile district, which produces coffee, cane-sugar and cocoa, it has also a brisk transit trade in most of the products of Guatemala, owing to its position on the interoceanic railway between Puerto Barrios on the Atlantic and San José (30 m. S.) on the Pacific. A branch railway which goes westward to San Augustin meets this line at Escuintla.

ESCUTCHEON (O. Fr. *escucheon*, *escusson*, modern *écusson*, through a Late Lat. form from Lat. *scutum*, shield), an heraldic term for a shield with armorial bearings displayed (see Heraldry). The word is also applied to the shields used on tombs, in the spandrils of doors or in string-courses, and to the ornamented plates from the centre of which door-rings, knockers, &c., are suspended, or which protect the wood of the key-hole from the wear of the key. In medieval times these were often worked in a very beautiful manner.

ESHER, WILLIAM BALIOL BRETT, 1st Viscount (1817–1899), English lawyer and master of the rolls, was a son of the Rev Joseph G. Brett, of Chelsea, and was born on the 13th of August 1817. He was educated at Westminster and at Caius College, Cambridge. Called to the bar in 1840, he went the northern circuit, and became a Q.C. in 1861 On the death of Richard Cobden he unsuccessfully contested Rochdale as a Conservative, but in 1866 was returned for Helston in unique circumstances. He and his opponent polled exactly the same number of votes, whereupon the mayor, as returning officer, gave his casting vote for the Liberal candidate. As this vote was given after four o'clock, however, an appeal was lodged, and the House of Commons allowed both members to take their seats Brett rapidly made his mark in the House, and in 1868 he was appointed solicitor-general. On behalf of the crown he prosecuted the Fenians charged with having caused the Clerkenwell explosion. In parliament he took a leading part in the promotion of bills connected with the administration of law and justice. He was (August 1868) appointed a justice in the court of common pleas. Some of his sentences in this capacity excited much criticism, notably so in the case of the gas stokers' strike, when he sentenced the defendants to imprisonment for twelve months, with hard labour, which was afterwards reduced by the home secretary to four months. On the reconstitution of the court of appeal in 1876, Brett was elevated to the rank of a lord justice. After holding this position for seven years, he succeeded Sir George Jessel as master of the rolls in 1883. In 1885 he was raised to the House of Lords as Baron Esher. He opposed the bill proposing that an accused person or his wife might give evidence in their own case, and supported the bill which empowered lords of appeal to sit and vote after their retirement. The Solicitors Act of 1888, which increased the powers of the Incorporated Law Society, owed much to his influence. In 1880 he delivered a remarkable speech in the House of Lords, deprecating the delay and expense of trials, which he regarded as having been increased by the Judicature Acts. Lord Esher suffered, perhaps, as master of the rolls from succeeding a lawyer of such eminence as Jessel. He had a caustic tongue, but also a fund of shrewd common sense, and one of his favourite considerations was whether a certain course was "business" or not. He retired from the bench at the close of 1897, and a viscounty was conferred upon him on his retirement, a dignity never given to any judge, lord chancellors excepted, "for mere legal conduct since the time of Lord Coke." He died in London on the 24th of May 1899.

Lord Esher was succeeded in the title by his only surviving son, Reginald Baliol Brett (*b.* 1852), who was secretary to the office of works from 1895 to 1902, but subsequently came into far greater public prominence in 1904 as chairman of the war office reconstitution committee after the South African War.

ESHER, a township in the Epsom parliamentary division of Surrey, England, 14½ m. S.W. of London by the London & South Western railway (Esher and Claremont station). It is pleasantly situated on rising ground above the river Mole, 3 m. from its junction with the Thames. To the north-west lie the grounds of Esher Place. Of the mansion-house founded by William of Waynflete, bishop of Winchester (*c.* 1450), in which Cardinal Wolsey resided for three or four weeks after his sudden fall from power in 1529, only the gatehouse remains. It is known as Wolsey's Tower, but is apparently part of Waynflete's foundation. A new mansion was erected in 1803. To the south is Claremont Palace, built by the great Lord Clive (1769) on the site of a mansion of Sir John Vanbrugh. In 1816 it was the residence of Princess Charlotte, wife of Prince (afterwards King) Leopold. She died here in 1817, and on the death of her husband in 1865 the property passed to the crown. Louis Philippe, ex-king of the French, resided here from 1848 until his death in 1850. In 1882 Claremont became the private property of Queen Victoria. Christ Church, Esher, contains fine memorials of King Leopold and others, and one of its three bells is said to have been brought from San Domingo by Sir Francis Drake. To the north near the railway station is Sandown Park, where important race meetings are held. Esher is included in the urban district of Esher and The Dittons, of which Thames Ditton is a favourite riverside resort. The whole district is largely residential. Pop. (1901) 9489.

ESKER (O. Irish *eiscir*), a local name for long mounds of glacial gravel frequently met with in Ireland. Eskers (the Swedish *åsar*) are among the occasionally puzzling relics of the British glacial period. They wind from side to side across glaciated country and have evidently been formed by channels upon or under the ice. "Where streams of considerable size form tunnels under or in the ice these may become more or less filled with wash, and when the ice melts the aggraded channels appear as long ridges of gravel and sand known as *eskers*. It has been thought that similar ridges are sometimes formed in valleys cut in the ice from top to bottom, and even that they rise from gravel and sand lodged in super-glacial channels. The latter at least is probably rare, as the surface streams have usually high gradients, swift currents and smooth bottoms, and hence give little opportunity for lodgment. In the case of ice-sheets, too, in which eskers are chiefly developed, there is usually no surface material except at the immediate edge, where the ice is thin and its layers upturned" (T. C. Chamberlin and R. D. Salisbury, *Geology, Processes and their Results*). Eskers are to be distinguished from kames (*q.v.*).

ESKILSTUNA, a town of Sweden in the district (*län*) of Södermanland, on the Hjelmar river, which unites lakes Hjelmar and Mälar, 65 m. W. of Stockholm by rail. Pop. (1900) 13,663. The place is mentioned in the 13th century, and is said to derive its name from Eskil, an English missionary who suffered martyrdom on the spot. It rose into importance in the reign of Charles X., who bestowed on it considerable privileges, and gave the first impulse to its manufacturing activity. It is the chief seat in Sweden of the iron and steel industries, its cutlery being especially noted, while damascened work is a specialty. There is a technical school for the metal industries. There are, in the town or its neighbourhood, great engineering, gun-making, and rolling and polishing works and breweries. The largest mechanical works are those of Munktell and Tunafors. The Karl Gustaf Stads rifle factory was established in 1814.

ESKIMO, Eskimos or Esquimaux (a corruption of the Abnaki Indian *Eskimantsic* or the Ojibway *Ashkimeq*, both terms meaning "those who eat raw flesh": they call themselves "Innuit," "the people"), a North American Indian people, inhabiting the arctic coast of America from Greenland to Alaska, and a small portion of the Asiatic shore of Bering Strait. On the American shores they are found, in broken tribes, from East Greenland to the western shores of Alaska—never far inland, or south of the region where the winter ice allows seals to congregate. Even on hunting expeditions they never travel more than 30 m. from the coast. Save a slight admixture of European settlers, they are the only inhabitants of both sides of Davis Strait and Baffin Bay. They extend as far south as about 50° N. lat. on the eastern side of America, and in the west to 60° on the eastern shore of Bering Strait, while 55° to 60° are their southern limits on the shore of Hudson Bay. Throughout all this range there are no other tribes save where the Kennayan and Ugalenze Indians (of western America) come down to the shore to fish. The Aleutians are closely allied to the Eskimo in habits and language. H. J. Rink divides the Eskimo into the following groups, the most eastern of which would have to travel nearly 5000 m. to reach the most western: (1) The East Greenland Eskimo, few in number, every year advancing farther south, and coming into contact with the next section. (2) The West Greenlanders, civilized, living under the Danish crown, and extending from Cape Farewell to 74° N. lat. (3) The Northernmost Greenlanders—the Arctic Highlanders of Sir John Ross—confined to Smith, Whale, Murchison and Wolstenholme Sounds, north of the Melville Bay glaciers. These—the most isolated and uncivilized of all the Eskimo—had no boats or bows and arrows until about 1868. (4) The Labrador Eskimo, mostly civilized. (5) The Eskimo of the middle regions, occupying the coasts from Hudson Bay to Barter Island, beyond Mackenzie river, inhabiting a stretch of country 2000 m. in length and 800 in breadth. (6) The Western Eskimo, from Barter Island to the western limits in America. (7) The Asiatic Eskimo.

The Eskimo are not a tall race, their height varying from 5 ft. 4 in. to 5 ft. 10 in., but men of 6 ft. are met. Both men and women are muscular and active, the former often inclining to fat. The faces of both have a pleasing, good-humoured expression, and not infrequently are even handsome. The typical face is broadly oval, flat, with fat cheeks; forehead not high, and rather retreating; teeth good, though, owing to the character of the food, worn down to the gums in old age; nose very flat; eyes rather obliquely set, small, black and bright; head largish, and covered with coarse black hair, which the women fasten up into a knot on the top, and the men clip in front and allow to hang loose and unkempt behind. Their skulls are of the mesocephalic type, the height being greater than the breadth; according to Davis, 75 is the index of the latter and 77 of the former. Some of the tribes slightly compress the skulls of their new-born children laterally (Hall), but this practice is a very local one. The men have usually a slight moustache, but no whiskers, and rarely any beard. The skin has generally a "bacony" feel, and when cleaned of the smoke, grease and other dirt—the accumulation of which varies according to the age of the individual—is only so slightly brown that red shows in the cheeks of the children and young women. The hands and feet are small and well formed. The Eskimo dress entirely in skins of the seal, reindeer, bear, dog, or even fox, the first two being, however, the most common. The men's and women's dress is much the same, a jacket suit, the trousers tucked into seal-skin boots. The jacket has a hood, which in cold weather is used to cover the head, leaving only the face exposed. The women's jacket has a large hood for carrying a child and an absurd-looking tail behind, which is, however, usually tucked up. The women's trousers are usually ornamented with eider-duck neck feathers or embroidery of native dyed leather; their boots, which are of white leather, or (in Greenland) dyed of various colours, reach over the knees, and in some tribes are very wide at the top, thus giving them an awkward appearance and a clumsy waddling walk. In winter two suits are worn, one with the hair inside, the other with it outside. They also sometimes wear shirts of bird-skins, and stockings of dog or young reindeer skins. Their clothes are very neatly made, fit beautifully, and are sewn with "sinew-thread," with a bone needle if a steel one cannot be had. In person the Eskimo are usually filthy, and never wash. Infants are, however, sometimes cleaned by being licked by their mother before being put into the bag of feathers which serves as their bed, cradle and blankets.

In summer the Eskimo live in conical skin tents, and in winter usually in half-underground huts of stone, turf, earth and bones, entered by a long tunnel-like passage, which can only be traversed on all fours. Sometimes, if residing temporarily at a place, they will erect neat round huts of blocks of snow with a sheet of ice for a window. In the roof are deposited their spare harpoons, &c.; and from it is suspended the steatite basin-like lamp, the flame of which, the wick being of moss, serves as fire and light. On one side of the hut is the bench which is used as sofa, seats and common sleeping place. The floor is usually very filthy, a pool of blood or a dead seal being often to be seen there. Ventilation is almost non-existent; and after the lamp has blazed for some time, the heat is all but unbearable. In the summer the wolfish-looking dogs lie outside on the roof of the huts, in the winter in the tunnel-like passage just outside the family apartment. The Western Eskimo build their houses chiefly of planks, merely covered on the outside with green turf. The same Eskimo have, in the more populous places, a public room for meetings. "Council chambers" are also said to exist in Labrador, but are only known in Greenland by tradition. Sometimes in south Greenland and in the Western Eskimo country the houses are made to accommodate several families, but as a rule each family has a house to itself.

The Eskimo are solely hunters and fishers, and derive most of their food from the sea. Their country allows of no cultivation; and beyond a few berries, roots, &c., they use no vegetable food. The seal, the reindeer and the whale supply the bulk of their food, as well as their clothing, light, fuel, and frequently also, when driftwood is scarce or unavailable, the material for various articles of domestic economy. Thus the Eskimo canoe is made of seal-skin stretched on a wooden or whalebone frame, with a hole in the centre for the paddler. It is driven by a bone-tipped double-bladed paddle. A waterproof skin or entrail dress is tightly fastened round the mouth of the hole so that, should the canoe overturn, no water can enter. A skilful paddler can turn a complete somersault, boat and all, through the water.

The Eskimo women use a flat-bottomed skin luggage-boat. The Eskimo sledge is made of two runners of wood or bone—even, in one case on record, of frozen salmon (Maclure)—united by cross bars tied to the runners by hide thongs, and drawn by from 4 to 8 dogs harnessed abreast. Some of their weapons are ingenious—in particular, the harpoon, with its detachable point to which an inflated sealskin is fastened. When the quarry is struck, the floating skin serves to tire it out, marks its course, and buoys it up when dead. The bird-spears, too, have a bladder attached, and points at the sides which strike the creature should the spear-head fail to wound. An effective bow is made out of whale's rib. Altogether, with meagre material the Eskimo show great skill in the manufacture of their weapons. Meat is sometimes boiled, but, when it is frozen, it is often eaten raw. Blood, and the half-digested contents of the reindeer's paunch, are also eaten; and sometimes, but not habitually, blubber. As a rule this latter is too precious: it must be kept for winter fuel and light. The Eskimo are enormous eaters; two will easily dispose of a seal at a sitting; and in Greenland, for instance, each individual has for his daily consumption, on an average, 2½ lb of flesh with blubber, and 1 lb of fish, besides mussels, berries, sea-weed, &c., to which in the Danish settlements may be added 2 oz. of imported food. Ten pounds of flesh, in addition to other food, is not uncommonly consumed in a day in time of plenty. A man will lie on his back and allow his wife to feed him with tit-bits of blubber and flesh until he is unable to move.

The Eskimo cannot be strictly called a wandering race. They are nomadic only in so far that they have to move about from place to place during the fishing and shooting season, following the game in its migrations. They have, however, no regular property. They possess only the most necessary utensils and furniture, with a stock of provisions for less than one year; and these possessions never exceed certain limits fixed upon by tradition or custom. Long habit and the necessities of their life have also compelled those having food to share with those having none—a custom which, with others, has conduced to the stagnant conditions of Eskimo society and to their utter improvidence.

Their intelligence is considerable, as their implements and folk-tales abundantly prove. They display a taste for music, cartography and drawing, display no small amount of humour, are quick at picking up peculiar traits in strangers, and are painfully acute in detecting the weak points or ludicrous sides of their character. They are excellent mimics and easily learn the dances and songs of the Europeans, as well as their games, such as chess and draughts. They gamble a little—but in moderation, for the Eskimo, though keen traders, have a deep-rooted antipathy to speculation. When they offer anything for sale—say at a Danish settlement in Greenland—they always leave it to the buyer to settle the price. They have also a dislike to bind themselves by contract. Hence it was long before the Eskimo in Greenland could be induced to enter into European service, though when they do they pass to almost the opposite extreme—they have no will of their own. Public licentiousness or indecency is rare among them. In their private life their morality is, however, not high. The women are especially erring; and in Greenland, at places where strangers visit, their extreme laxity of morals, and their utter want of shame, are not more remarkable than the entire absence of jealousy or self-respect on the part of their countrymen and relatives. Theft in Greenland is almost unknown; but the wild Eskimo make very free with strangers' goods—though it must be allowed that the value they attach to the articles stolen is some excuse for the thieves. Among themselves, on the other hand, they are very honest—a result of their being so much under the control of public opinion. Lying is said to be as common a trait of the Eskimo as of other savages in their dealings with Europeans. They have naturally not made any figure in literature. Their folk-lore is, however, extensive, and that collected by Dr Rink shows considerable imagination and no mean talent on the part of the story-tellers. In Greenland and Labrador most of the natives have been taught by the missionaries to read and write in their own language. Altogether, the literature published in the Eskimo tongue is considerable. Most of it has been printed in Denmark, but some has been "set up" in a small printing-office in Greenland, from which about 280 sheets have issued, beside many lithographic prints. A journal (*Atuagagdliutit nalinginarmik tusaruminásassumik univkat*, *i.e.* "something for reading, accounts of all entertaining subjects") has been published since 1861.

The Eskimo in Greenland and Labrador are, with few exceptions, nominally at least, Christians. The native religion is a vague animism, and consists of a belief in good and evil spirits, limited each to its own sphere; in a Heaven and Hell; and a childish faith is placed in the native wizards, who are regarded as intermediaries between mankind and the spirit-powers. The worship of the whale-spirit, so important a factor in their daily economy, is prevalent.

As regards language, the idiom spoken from Greenland to north-eastern Siberia is, with a few exceptions, the same; any difference is only that of dialect. It differs from the whole group of European languages, not merely in the sound of the words, but more especially, according to Rink, in the construction. Its most remarkable feature is that a sentence of a European language is expressed in Eskimo by a single word constructed out of certain elements, each of which corresponds in some degree to one of our words. One specimen commonly given to visitors to Greenland may suffice: *Savigiksiniariartokasuaromaryotittogog*, which is equivalent to "He says that you also will go away quickly in like manner and buy a pretty knife." Here is one word serving in the place of 17. It is made up as follows: *Savig* a knife, *ik* pretty, *sini* buy, *ariartok* go away, *asuar* hasten, *omar* wilt, *y* in like manner, *otit* thou, *tog* also, *og* he says.

The Eskimo have no chiefs or political and military rulers. Fabricius concisely described them in his day: "*Sine Deo, domino, reguntur consuetudine.*" The government is mainly a family one, though a man distinguished for skill in the chase, and for strength and shrewdness, often has considerable power in the village. No political or social tie is recognized between the villages, though general good-fellowship seems to mark their relations. They never go to war with each other; and though revengeful and apt to injure an enemy secretly, they rarely come to blows, and are morbidly anxious not to give offence. Indeed, in their intercourse with each other, all Eskimo indulge in much hyperbolical compliment. But they are not without courage. On the Coppermine and Mackenzie rivers, where they sometimes come into collision with their American-Indian kinsmen, they fight fiercely. Polygamy is rare, but the rights of divorce and re-marriage are unrestricted. The Eskimo have intricate rules governing the ownership of property and the rights of the hunter. As a race they are singularly undemonstrative. When they met each other they used to rub noses together, but this, though a common custom still among the wild Eskimo, is entirely abandoned in Greenland except for the petting of children. There is, in Greenland at least, no national mode of salutation, either on meeting or parting. When a guest enters a house, commonly not the least sign is made either by him or his host. On leaving a place they sometimes say "inúvdluaritse," *i.e.* live well, and to a European "aporniakinatit," *i.e.* do not hurt thy head, viz. against the upper part of the doorway. The Eskimo, excluding the few on the Asiatic coast, are estimated at about 29,000.

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ESKI-SHEHR, a town of Asia Minor, in the Kutaiah sanjak of the Brusa (Khudavendikiar) vilayet. It is a station on the Haidar Pasha-Angora railway, 194½ m. from the former and 164 m. from Angora, and the junction for Konia; and is situated on the right bank of the Pursak Su (*Tembris*), a tributary of the Sakaria, at the foot of the hills that border the broad treeless valley. Pop. 20,000 (Moslems 15,000, Christians 5000). Eski-Shehr, *i.e.* "the old town," lies about a mile from the ruins of the ancient Phrygian Dorylaeum. The latter is mentioned in connexion with the wars of Lysimachus and Antigonus (about 302 B.C.), and frequently figures in Byzantine history as an imperial residence and military rendezvous. It was the scene of the defeat of the Turks under Kilij-Arslan by the crusaders in 1097, and fell finally to the Turks of Konia in 1176. The town is divided by a small stream into a commercial quarter on low ground, in which are the bazaars, khans and the hot sulphur springs (122° F.) which are mentioned as early as the 3rd century by Athenaeus; and a residential quarter on the higher ground. The town is noted for its good climate, the Pursak Su for the abundance of its fish, and the plain for its fertility. About 18 m. to the E. are extensive deposits of meerschaum. The clay is partly manufactured into pipes in the town, but the greater proportion finds its way to Europe and especially to Germany. The annual output is valued at £272,000.

See Murray's *Hdbk. to Asia Minor* (1893); V. Cuinet, *Turquie d'Asie* (Paris, 1894).

ESMARCH, JOHANNES FRIEDRICH AUGUST VON (1823–1908), German surgeon, was born at Tönning, in Schleswig-Holstein, on the 9th of January 1823. He studied at Kiel and Göttingen, and in 1846 became B. R. K. von Langenbeck's assistant at the Kiel surgical hospital. He served in the Schleswig-Holstein War of 1848 as junior surgeon, and this directed his attention to the subject of military surgery. He was taken prisoner, but afterwards exchanged, and was then appointed as surgeon to a field hospital. During the truce of 1849 he qualified as *Privatdocent* at Kiel, but on the fresh outbreak of war he returned to the troops and was promoted to the rank of senior surgeon. In 1854 he became director of the surgical clinic at Kiel, and in 1857 head of the general hospital and professor at the university. During the Schleswig-Holstein War of 1864 Esmarch rendered good service to the field hospitals of Flensburg, Sundewitt and Kiel. In 1866 he was called to Berlin as member of the hospital commission, and also to take the superintendence of the surgical work in the hospitals there. When the Franco-German War broke out in 1870 he was appointed surgeon-general to the army, and afterwards consulting surgeon at the great military hospital near Berlin. In 1872 he married Princess Henrietta of Schleswig-Holstein-Sonderburg-Augustenburg, aunt of the Empress Auguste Victoria. In 1887 a patent of nobility was conferred on him. He died at Kiel on the 23rd of February 1908. Esmarch was one of the greatest authorities on hospital management and military surgery. His *Handbuch der kriegschirurgischen Technik* was written for a prize offered by the empress Augusta, on the occasion of the Vienna Exhibition of 1877, for the best handbook for the battlefield of surgical appliances and operations. This book is illustrated by admirable diagrams, showing the different methods of bandaging and dressing, as well as the surgical operations as they occur on the battlefield. Esmarch himself invented an apparatus, which bears his name, for keeping a limb nearly bloodless during amputation. No part of Esmarch's work is more widely known than that which deals with "First Aid," his *First Aid on the Battlefield* and *First Aid to the Injured* being popular manuals on the subject. The latter is the substance of a course of lectures delivered by him in 1881 to a "Samaritan School," the first of the kind in Germany, founded by Esmarch in 1881, in imitation of the St John's Ambulance classes which had been organized in England in 1878. These lectures were very generally adopted as a manual for first aid students, edition after edition having been called for, and they have been translated into numerous languages, the English version being the work of H.R.H. Princess Christian. No ambulance course would be complete without a demonstration of the Esmarch bandage. It is a three-sided piece of linen or cotton, of which the base measures 4 ft. and the sides 2 ft. 10 in. It can be used folded or open, and applied in thirty-two different ways. It answers every purpose for temporary dressing and field-work, while its great recommendation is that the means for making it are always at hand.

ESNA, or ESNEH, a town of Upper Egypt on the W. bank of the Nile, 454 m. S.S.E. of Cairo by rail, the railway station being on the opposite side of the river. Pop. (1897) 16,000, mostly Copts. Esna, one of the healthiest towns in Egypt, is noted for its manufactures of pottery and its large grain and live stock markets. It formerly had a large trade with the Sudan. A caravan road to the south goes through the oasis of Kurkur. The trade, almost stopped by the Mahdist Wars, is now largely diverted by railway and steamboat routes. There is, however, considerable traffic with the oasis of Kharga, which lies almost due west of the town. Nearly in the centre of the town is the Ptolemaic and Roman temple of the ram-headed Khnûm, almost buried in rubbish and houses. The interior of the pronaos is accessible to tourists, and contains the latest known hieroglyphic inscription, dating from the reign of Decius (A.D. 249–251). With Khnum are associated the goddesses Sati and Neith. In the neighbourhood are remains of Coptic buildings, including a subterranean church (discovered 1895) in the desert half a mile beyond the limits of cultivation. The name Esna is from the Coptic *Sne*. By the Greeks the place was called Latopolis, from the worship here of the latus fish. In the persecutions under Diocletian A.D. 303, the Christians of Esna, a numerous body, suffered severely. In later times the town frequently served as a place of refuge for political exiles. The so-called Esna barrage across the Nile (built 1906–1908) is 30 m. higher up stream at Edfu.

ESOTERIC, having an inner or secret meaning. This term, and its correlative "exoteric," were first applied in the ancient Greek mysteries to those who were initiated (ἔσω, within) and to those who were not (ἔξω, outside), respectively. It was then transferred to a supposed distinction drawn by certain philosophers between the teaching given to the whole circle of their pupils and that containing a higher and secret philosophy which was reserved for a select number of specially advanced or privileged disciples. This distinction was ascribed by Lucian (*Vit. Auct.* 26) to Aristotle (*q.v.*), who, however, uses ἐξωτερικοὶ λόγοι (*Nic. Ethics*) merely of "popular treatises." It was probably adopted by the Pythagoreans and was also attributed to Plato. In the sense of mystic it is used of a secret doctrine of theosophy, supposed to have been traditional among certain disciples of Buddhism.

ESPAGNOLS SUR MER, LES, the name given to the naval victory gained by King Edward III. of England over a Spanish fleet off Winchelsea, on the 29th of August 1350. Spanish ships had fought against England as the allies or mercenaries of France, and there had been instances of piratical violence between the trading ships of both nations. A Spanish merchant fleet was loading cargoes in the Flemish ports to be carried to the Basque coast. The ships were armed and had warships with them. They were all under the command of Don Carlos de la Cerda, a soldier of fortune who belonged to a branch of the Castilian royal family. On its way to Flanders the Spanish fleet had captured a number of English trading ships, and had thrown the crews overboard. Piratical violence and massacre of this kind was then universal on the sea. On the 10th of August, when the king was at Rotherhithe, he announced his intention of attacking the Spaniards on their way home. The rendezvous of his fleet was at Winchelsea, and thither the king went by land, accompanied by his wife and her ladies, by his sons, the Black Prince and John of Gaunt, as well as by many nobles. The ladies were placed in a convent and the king embarked on his flagship, the "Cog Thomas," on the 28th of August. The English fleet did not put to sea but remained at anchor, waiting for the appearance of the Spaniards. Its strength is not known with certainty, but Stow puts it at 50 ships and pinnaces. Carlos de la Cerda was obviously well disposed to give the king a meeting.

He might easily have avoided the English if he had kept well out in the Channel. But he relied on the size and strength of his 40 large ships, and in expectation of an encounter had recruited a body of mercenaries—mostly crossbowmen—in the Flemish ports. In the afternoon of the 29th of August he bore down boldly on King Edward's ships at anchor at Winchelsea. When the Spaniards hove in sight, the king was sitting on the deck of his ship, with his knights and nobles, listening to his minstrels who played German airs, and to the singing of Sir John Chandos. When the look-out in the tops reported the enemy in sight, the king and his company drank to one another's health, the trumpet was sounded, and the whole line stood out. All battles at that time, whether on land or sea, were finally settled by stroke of sword. The English steered to board the Spaniards. The king's own ship was run into by one of the enemy with such violence that both were damaged, and she began to sink. The Spaniard stood on, and the "Cog Thomas" was laid alongside another, which was carried by boarding. It was high time, for the king and his following had barely reached the deck of the Spaniard before the "Cog Thomas" went to the bottom. Other Spaniards were taken, but the fight was hot. La Cerda's crossbowmen did much execution, and the higher-built Spaniards were able to drop bars of iron or other weights on the lighter English vessels, by which they were damaged. The conflict was continued till twilight. At the close the large English vessel called "La Salle du Roi," which carried the king's household, and was commanded by the Fleming, Robert of Namur, afterwards a knight of the Garter, was grappled by a big Spaniard, and was being dragged off by him. The crew called loudly for a rescue, but were either not heard or, if heard, could not be helped. The "Salle du Roi" would have been taken if a Flemish squire of Robert of Namur, named Hannequin, had not performed a great feat of arms. He boarded the Spaniard and cut the halyards of her mainsail with his sword. The Spanish ship was taken. King Edward is said to have captured 14 of the enemy. What his own loss was is not stated, but as his own vessel, and also the vessel carrying the Black Prince, were sunk, and from the peril of "La Salle du Roi," we may conclude that the English fleet suffered heavily. There was no pursuit, and a truce was made with the Basque towns the next year.

The battle with "the Spaniards on the sea" is a very typical example of a medieval sea-fight, when the ships were of the size of a small coaster or a fishing smack, were crowded with men, and when the personal prowess of a single knight or squire was an important element of strength.

The only real authority for the battle is Froissart, who was at different times in the service of King Edward or of his wife, Philippa of Hainaut, and of the counts of Namur. He repeated what was told him by men who had been present, and dwells as usual on the "chivalry" of his patrons. See his *Chroniques*, iv. 91. (D. H.)

ESPALIER (a French word, derived from the Ital. *spalliera*, something to rest the *spalla* or shoulder against; the word is ultimately the same as *épaulière*, a shoulder-piece), a lattice-work or row of stakes, originally shoulder high, on which fruit trees, shrubs and flowers, particularly roses and creepers, are trained. Espaliers are usually made of larch or other wood, iron and metal rails being too great conductors of heat and cold. The advantage of this method of training is that the fruit, &c., is more easily got at, and while protected from wind, is freely exposed to sun and air, and not so open to extreme changes of temperature as when trained on a wall. (See HORTICULTURE.)

ESPARTERO, BALDOMERO (1792–1879), duke of Vitoria, duke of Morella, prince of Vergara, Count Luchana, knight of the Toison d'Or, &c. &c., Spanish soldier and statesman, was born at Granatulu, a town of the province of Ciudad Real, on the 27th of February 1792. He was the ninth child of a carter, who wanted to make him a priest, but the lad at fifteen enlisted in a battalion of students to fight against the armies of Napoleon I. In 1811 Espartero was appointed a lieutenant of Engineers in Cadiz, but having failed to pass his examination he entered a line regiment. In 1815 he went to America as a captain under General Morillo, who had been made commander-in-chief to quell the risings of the colonies on the Spanish Main. For eight years Espartero distinguished himself in the struggle against the colonists. He was several times wounded, and was made major and colonel on the battlefields of Cochabamba and Sapachni. He had to surrender to Sucre at the final battle of Ayacucho, which put an end to Castilian rule. He returned to Spain, and, like most of his companions in arms, remained under a cloud for some time. He was sent to the garrison town of Logrono, where he married the daughter of a rich landowner, Doña Jacinta Santa Cruz, who eventually survived him. Henceforth Logroño became the home of the most prominent of the Spanish political generals of the 19th century. Espartero became in 1832, on the death of King Ferdinand VII., one of the most ardent defenders of the rights of his daughter, Isabella II. The government sent him to the front, directly the Carlist War broke out, as commandant of the province of Biscay, where he severely defeated the Carlists in many encounters. He was quickly promoted to a divisional command, and then made a lieutenant-general. At times he showed qualities as a *guerillero* quite equal to those of the Carlists, like Zumalacarregui and Cabrera, by his daring marches and surprises. When he had to move large forces he was greatly superior to them as an organizer and strategist, and he never disgraced his successes by cruelty or needless severity. Twice he obliged the Carlists to raise the siege of Bilbao before he was appointed commander-in-chief of the northern army on the 17th of September 1836, when the tide of war seemed to be setting in favour of the pretender in the Basque provinces and Navarre, though Don Carlos had lost his ablest lieutenant, the Basque Zumalacarregui. His military duties at the head of the principal national army did not prevent Espartero from showing for the first time his political ambition. He displayed such radical and reforming inclinations that he laid the foundations of his popularity among the lower and middle classes, which lasted more than a quarter of a century, during which time the Progressists, Democrats and advanced Liberals ever looked to him as a leader and adviser. In November 1836 he again forced the Carlists to raise the siege of Bilbao. His troops included the British legion under Sir de Lacy Evans. This success turned the tide of war against Don Carlos, who vainly attempted a raid towards Madrid. Espartero was soon at his heels, and obliged him to hurry northwards, after several defeats. In 1839 Espartero carefully opened up negotiations with Maroto and the principal Carlist chiefs of the Basque provinces. These ended in their accepting his terms under the famous convention of Vergara, which secured the recognition of their ranks and titles for nearly 1000 Carlist officers. Twenty thousand Carlist volunteers laid down their arms at Vergara; only the irreconcilables led by Cabrera held out for a while in the central provinces of Spain. Espartero soon, however, in 1840, stamped out the last embers of the rising, which had lasted seven years. He was styled "El pacificador de España," was made a grandee of the first class, and received two dukedoms.

During the last three years of the war Espartero, who had been elected a deputy, exercised from his distant headquarters such influence over Madrid politics that he twice hastened the fall of the cabinet, and obtained office for his own friends. At the close of the war the queen regent and her ministers attempted to elbow out Espartero and his followers, but a *pronunciamiento* ensued in Madrid and other large towns which culminated in the marshal's accepting the post of prime minister. He soon became virtually a dictator, as Queen Christina took offence at his popularity and resigned, leaving the kingdom very soon afterwards. Directly the Cortes met they elected Espartero regent by 179 votes to 103 in favour of Arguelles, who was appointed guardian of the young queen. For two years Espartero ruled Spain in accordance with his Radical and conciliatory dispositions, giving special attention to the reorganization of the administration, taxation and finances, declaring all the estates of the church, congregations and religious orders to be national property, and suppressing the *diezma*, or tenths. He suppressed the Republican risings with as much severity as he did the military *pronunciamientos* of

Generals Concha and Diego de Leon. The latter was shot in Madrid. Espartero crushed with much energy a revolutionary rising in Barcelona, but on his return to Madrid was so coldly welcomed that he perceived that his prestige was on the wane. The advanced Progressists coalesced with the partisans of the ex-regent Christina to promote *pronunciamientos* in Barcelona and many cities. The rebels declared Queen Isabel of age, and, led by General Narvaez, marched upon Madrid. Espartero, deeming resistance useless, embarked at Cadiz on the 30th of July 1843 for England, and lived quietly apart from politics until 1848, when a royal decree restored to him all his honours and his seat in the senate. He retired to his house in Logroño, which he left six years later, in 1854, when called upon by the queen to take the lead of the powerful Liberal and Progressist movement which prevailed for two years. The old marshal vainly endeavoured to keep his own Progressists within bounds in the Cortes of 1854–1856, and in the great towns, but their excessive demands for reforms and liberties played into the hands of a clerical and reactionary court and of the equally retrograde governing classes. The growing ambition of General O'Donnell constantly clashed with the views of Espartero, until the latter, in sheer disgust, resigned his premiership and left for Logroño, after warning the queen that a conflict was imminent between O'Donnell and the Cortes, backed by the Progressist militia. O'Donnell's *pronunciamiento* in 1856 put an end to the Cortes, and the militia was disarmed, after a sharp struggle in the streets of the capital. After 1856 Espartero resolutely declined to identify himself with active politics, though at every stage in the onward march of Spain towards more liberal and democratic institutions he was asked to take a leading part. He refused to allow his name to be brought forward as a candidate when the Cortes of 1868, after the Revolution, sought for a ruler. Espartero, strangely enough, adopted a laconic phrase when successive governments on their advent to power invariably addressed themselves to the venerable champion of liberal ideas. To all—to the Revolution of 1868, the Constituent Cortes of 1869, King Amadeus, the Federal Republic of 1873, the nameless government of Marshal Serrano in 1874, the Bourbon restoration in 1875—he simply said: "Cumplase la voluntad nacional" ("Let the national will be accomplished"). King Amadeus made him prince of Vergara. The Restoration raised a statue to him near the gate of the Retiro Park in Madrid. Spaniards of all shades, except Carlists and Ultramontanes, paid homage to his memory when he passed away at his Logroño residence on the 8th of January 1879. His tastes were singularly modest, his manners rather reserved, but always kind and considerate for humble folk. He was a typical Spanish soldier-politician, though he had more of the better traits of the soldier born and bred than of the arts of the statesman. His military instincts did not always make it easy for him to accommodate himself to courtiers and professional politicians. (A. E. H.)

ESPARTO, or Spanish Grass, *Stipa tenacissima*, a grass resembling the ornamental feather-grass of gardens. It is indigenous to the south of Spain and the north of Africa (where it is known as Halfa or Alfa), and is especially abundant in the sterile and rugged parts of Murcia and Valencia, and in Algeria, flourishing best in sandy, ferruginous soils, in dry, sunny situations on the sea coast. Pliny (*N.H.* xix. 2) described what appears to have been the same plant under the name of *spartum*, whence the designation *campus spartarius* for the region surrounding New Carthage. It attains a height of 3 or 4 ft. The stems are cylindrical, and clothed with short hair, and grow in clusters of from 2 to 10 ft. in circumference; when young they serve as food for cattle, but after a few years' growth acquire great toughness of texture. The leaves vary from 6 in. to 3 ft. in length, and are grey-green in colour; on account of their tenacity of fibre and flexibility they have for centuries been employed for the making of ropes, sandals, baskets, mats and other articles. Ships' cables of esparto, being light, have the quality of floating on water, and have long been in use in the Spanish navy.

Esparto leaves contain 56% by weight of fibre, or about 10% more than straw, and hence have come into requisition as a substitute for linen rags in the manufacture of paper. For this purpose they were first utilized by the French, and in 1857 were introduced into Great Britain. When required for paper-making the leaves should be gathered before they are quite matured; if, however, they are obtained too young, they furnish a paper having an objectionable semi-transparent appearance. The leaves are gathered by hand, and from 2 to 3 cwt. may be collected in a day by a single labourer. They are generally obtained during the dry summer months, as at other times their adherence to the stems is so firm as often to cause the uprooting of the plants in the attempt to remove them. Esparto may be raised from seed, but cannot be harvested for twelve or fifteen years after sowing.

Another grass, *Lygeum Spartum*, with stiff rush-like leaves, growing in rocky soil on the high plains of countries bordering on the Mediterranean, especially of Spain and Algeria, is also a source of esparto.

For the processes of the paper manufacturer esparto is used in the dry state, and without cutting; roots and flowers and stray weeds are first removed, and the material is then boiled with caustic soda, washed, and bleached with chlorine solution. Sundry experiments have been made to adapt esparto for use in the coarser textile fabrics. Messrs A. Edger and B. Proctor in 1877 directed attention to the composition of the slag resulting from the burning of esparto, which they found to be strikingly similar to that of average medical bottle glass, the latter yielding on analysis 66·3% of silica and 25·1% of alkalies and alkaline earths, and the slag 64.6 and 27·45% of the same respectively.

ESPERANCE, a small seaport on a fine natural harbour on the south coast of West Australia, 275 m. north-east from Albany. It is a summer resort, and in the neighbourhood are interesting caves. Its importance as a seaport is due to its being on the high road between the eastern states and the gold-fields, and the nearest place for the shipment of gold from the Coolgardie fields.

ESPERANTO, an artificial international auxiliary language (see Universal Languages), first published in 1887, seven years after the appearance of its predecessor Volapük (*q.v.*), which it has now completely supplanted. Its author was a Russian physician, Dr L. Zamenhof, born in 1859 at Bielostok, where the spectacle of the feuds of the four races—each speaking different languages—which inhabit it (Russians, Poles, Germans and Jews) at an early date suggested to him the idea of remedying the evil by the introduction of a neutral language, standing apart from the existing national languages. His first idea was to resuscitate some dead language. Then he tried to construct a new language on an a priori basis. At the same time he made what he appears to have considered the great discovery that the bulk of the vocabulary of a language consists not of independent roots, but of compounds and derivatives formed from a comparatively small number of roots.

At first he tried to construct his roots a priori by arbitrary combinations of letters. Then he fell back on the plan of taking his roots ready-made from existing languages, as the inventor of Volapük had done before him. But instead of taking them mainly from one language, he has selected them from the chief European languages, but not impartially. Like all inventors of artificial languages, he is more ready to experiment with foreign languages than with his own; and hence the Slavonic roots in Esperanto are much less numerous than those taken from the other European languages. Here his choice has been to some extent guided by considerations of internationality, although he has not fully grasped the importance of the principle of maximum internationality, so well worked out in the latest rival of Esperanto—Idiom Neutral (see Universal Languages). Thus he adopts a large number of international words—generally unaltered except in spelling—such as *teatr*, *tabak*, even when it would be easy to form equivalent terms from the roots already existing in the language. Where there is no one international word, he selects practically at random, keeping, however, a certain balance between the Romance words, taken chiefly from Latin (*tamen*) and French (*trotuar*), on the one hand, and the Germanic on the other hand, the latter being taken sometimes from German (*nur*, "only"), sometimes from English, the words being generally written more or less phonetically (*rajt*=right). Most of the Germanic words are badly chosen from the international point of view. Thus the German word quoted above would not be intelligible to any one ignorant of German. Indeed, from the international point of view all specially German words ought to be excluded, or else reduced to the common Germanic form; thus *trink* ought to be made into *drink*, the *t* being a specially German modification of the *d*, preserved not only in English but in all the remaining Germanic languages. This incongruous mixture of languages is not only jarring and repulsive, but adds greatly to the difficulty of mastering the vocabulary for the polyglot as well as the monolingual learner.

The inventor has taken great pains to reduce the number of his roots to a minimum; there are 2642 of them in his dictionary, the *Universala Vortaro* (from Ger. *Wort*, "word"), which does not include such international words as *poezio*, *telefono*; these the learner is supposed to recognize and form without help. The most eccentric feature of the vocabulary, and the one to which it owes much of its brevity, is the extensive use of the prefix *mal-* to reverse the meaning of a word, as in *malamiko*, "enemy," and even *malbona*, "bad."

The phonology of the language is very simple. The vowels are only five in number, *a*, *e*, *i*, *o*, *u*, used without any distinction of quantity, as in Russian. There are six diphthongs, expressed by an unnecessarily complicated notation. The consonant-system is simple enough in itself, but is greatly complicated in writing by the excessive and mostly unnecessary use made of diacritical letters not only for simple sounds but also for consonant-groups. *c* is used for *ts*, as in Polish.

The grammar is, like that of Volapük, partly borrowed from existing languages, partly *a priori* and arbitrary. The use of the final vowels belongs to the latter category. The use of *-a* to indicate adjectives and of *-o* to indicate nouns as in *kara amiko*, "dear (male) friend," is a source of confusion to those familiar with the Romance languages, and has proved a bar to the diffusion of Esperanto among the speakers of these languages. On the other hand, the following paradigm will show how faithfully Esperanto can reproduce the defects of conventional European grammar:—

	Singular.	Plural.
Nominative . .	*la bona patro*	*la bonaj patroj*
Accusative . .	*la bonan patron*	*la bonajn patrojn.*

It is difficult to see why the accusative should be kept when all the other cases are replaced by prepositions.

The verb is better than the noun. Its inflections are *-as* present, *-is* preterite, *-os* future, *-us* conditional, *-u* imperative and subjunctive, *-i* infinitive, together with the following participles:—

	Active.	Passive.
Present . . .	*-anta*	*-ata*
Preterite . . .	*-inta*	*-ita*
Future . . .	*-onta*	*-ota*

The inventor has followed the good example of his native language in using *esti*, "to be," as the auxiliary verb both in the passive, where it is combined with passive participles, and in the secondary tenses of the active (perfect, pluperfect, &c.), where it is of course combined with the active participles. The participles can be made into nouns and adverbs by changing the final *-a* into *-o* and *-e* respectively: thus *tenonto*, "the future holder," *perdinte*, "through having lost."

The table of the forty-five correlative pronouns, adjectives and adverbs is also elaborate and ingenious.

Much ingenuity is displayed in the syntax, as well as some happy simplifications. But, on the other hand, there is much in it that is fanciful, arbitrary and vague, as in the use of the definite article—where the author has unfortunately followed French rather than English usage—and in the moods of the verb.

The following specimens will show the general character of this easy-flowing but somewhat heavy and monotonous language—"bad Italian," as it is called by its detractors:—

Patro nia, kiu estas en la ĉielo, sankta estu via nomo; venu regeco via; estu volo via, kiel en la ĉielo, tiel ankaŭ sur la tero. Panon nian ĉiutagan donu al ni hodiaŭ; kaj pardonu al ni ŝuldojn niajn, kiel ni ankaŭ pardonas al niaj ŝuldantoj; kaj ne konduku nin en tenton, sed liberigu nin de la malbono.

Estimata Sinjoro. Per tiu ĉi libreto mi havas la honoron prezenti al vi la lingvon internacian Esperanto. Esperanto tute ne havas la intencon malfortigi la lingvon naturan de la popolo. Ĝi devas nur servi por la rilatoj internaciaj kaj por tiuj verkoj aŭ produktoj, kiuj interesas egale la tutan mondon.

In summing up the merits and defects of Esperanto we must begin by admitting that it is the most reasonable and practical artificial language that has yet appeared. Its inventor has had the double advantage of being able to profit by the mistakes of his predecessors, and of being himself, by force of circumstances, a better linguist. It must further be admitted that he has made as good a use of these advantages as was perhaps possible without systematic training in scientific philology in its widest sense. This last defect explains why the enthusiasm which his work has excited in the great world of linguistic dilettantes has not been shared by the philologists: in spite of its superiority to Volapük, they see in it the same radical defects. Whether they are rash or not in predicting for it a similar fate, remains to be seen. The Esperantists, warned by the fate of Volapük, have adopted the wise policy of suppressing all internal disunion by submitting to the dictatorship of the inventor, and so presenting a united front to the enemy. One thing is clear: either Esperanto must be taken as it is without change, or else it must crumble to pieces; its failure to work out consistently the principle of the maximum of internationality for its root-words is alone enough to condemn it as hopelessly antiquated even from the narrow point of view which regards "international" as synonymous with "European"—a view which political development in the Far East has made equally obsolete. (H. Sw.)

ESPINAY, TIMOLÉON D' (1580–1644), French soldier, was the eldest of the four sons of François d'Espinay, seigneur de Saint Luc (1554–1597), and was himself marquis de Saint Luc. In 1603 he accompanied Sully in his embassy to London. In 1622, in his capacity as vice-admiral of France, he gained some advantages over the defenders of La Rochelle, obliging the Huguenot commander, Benjamin de Rohan, seigneur de Soubise, to evacuate the islands of Ré and Oléron. In 1627 he was named lieutenant-general of Guienne and marshal of France.

ESPINEL, VICENTE MARTINEZ (1551–1624), Spanish poet and novelist, was baptized on the 28th of December 1551, and educated at Salamanca. He was expelled from the university in 1572, and served as a soldier in Flanders, returning to Spain in 1584 or thereabouts. He took orders in 1587, and four years later became chaplain at Ronda, absented himself from his living, and was deprived of his cure; but his musical skill obtained for him the post of choirmaster at Plasencia. His *Diversas Rimas* (1591) are undeniably good examples of technical accomplishment and caustic wit. Espinel, however, survives as the author of a clever picaresque novel entitled *Relaciones de la vida del Escudero Marcos de Obregón* (1618). It is, in many passages, an autobiography of Espinel with picturesque embellishments. Marcos is not a chivalresque "esquire," but an adventurer who seeks his fortune by attaching himself to great men; and the object of the author is to warn young men against such a life. Apart from the unedifying confessions of the hero, the book contains curious anecdotes concerning prominent contemporaries, and the episodical stories are told with great spirit; the style is extremely correct, though somewhat diffuse. Le Sage has not scrupled to borrow from *Marcos de Obregón* many of the incidents and characters in *Gil Blas*—a circumstance which induced Isla to give to his Spanish translation of Le Sage's work the jesting title, *Gil Blas restored to his Country and his Native Tongue*. In the 1775 edition of the *Siècle de Louis XIV*. Voltaire grossly exaggerates in saying that *Gil Blas* is taken entirely from *Marcos de Obregón*. Espinel was a clever musician and added a fifth string to the guitar. He revived the measure known as *décimas* or *espinelas*, consisting of a stanza of ten octosyllabic lines. Most of the poems which he left in manuscript remain unpublished owing to their licentious character.

BIBLIOGRAPHY.—J. Perez de Guzmán's edition of *Marcos de Obregón* (Barcelona, 1881) includes a valuable introduction; Léo Claretie, *Le Sage romancier* (Paris, 1890), discusses exhaustively the question of Le Sage's indebtedness to Espinel. For some previously unpublished poems see Pedro Salvá y Mallén, *Catálogo de la biblioteca de Salvá* (Valencia, 1872).

ESPIRITO SANTO, a maritime state of Brazil, bounded N. by Bahia, E. by the Atlantic Ocean, S. by Rio de Janeiro, and W. by Minas Geraes. Pop. (1890) 135,997; (1900) 209, 783; area, 17,316 sq. m. With the exception of Sergipe it is the smallest of the Brazilian states. The western border of the state is traversed by low ranges of mountains forming a northward continuation of the Serra do Mar. The longest and most prominent of these ranges, which are for the most part the eastern escarpments of the great Brazilian plateau, is the Serra dos Aymores, which extends along fully two-thirds of the western frontier. Farther S. the ranges are much broken and extend partly across the state toward the seaboard; the more prominent are known as the Serra do Espigão, Serra da Chibata, Serra dos Pilões and Serra dos Purys. The eastern and larger part of the state belongs to the coastal plain, in great part low and swampy, with large areas of sand barrens, and broken by isolated groups and ranges of hills. With the exception of these sandy plains the country is heavily forested, even the mountain sides being covered with vegetation to their summits. The northern and southern parts are fertile, but the central districts are comparatively poor. The coastal plain comprises a sandy, unproductive belt immediately on the coast, back of which is a more fertile tertiary plain, well suited, near the higher country, to the production of sugar and cotton. The inland valleys and slopes are very fertile and heavily forested, and much of the Brazilian export of rosewood and other cabinet woods is drawn from this state. There is only one good bay on the coast, that of Espirito Santo, on which the port of Victoria is situated. The river-mouths are obstructed by sand bars and admit small vessels only. The principal rivers of the state are the Mucury, which rises in Minas Geraes and forms the boundary line with Bahia, the Itaunas, São Domingos, São Matheus, Doce, Timbuhy, Santa Maria, Jucú, Benevente, Itapemirim, and Itabapoana, the last forming the boundary line with Rio de Janeiro. The Doce, São Matheus, and Itapemirim rise in Minas Geraes and flow entirely across the state. The lower courses of these rivers are generally navigable, that of the Rio Doce for a distance of 90 m. The climate of the coastal zone and deeper valleys is hot, humid and unhealthy, malarial fevers being prevalent. In the higher country the temperature is lower and the climate is healthy. Espirito Santo is almost exclusively agricultural, sugar-cane, coffee, rice, cotton, tobacco, mandioca and tropical fruits being the principal products. Agriculture is in a very backward condition, however, and the state is classed as one of the poorest and most unprogressive in the republic. The rivers and shallow coast waters are well stocked with fish, but there are no fishing industries worthy of mention. There are three railway lines in operation in the state—one running from Victoria to Cachoeira do Itapemirim (50 m.), and thence, by another line, to Santo Eduardo in Rio de Janeiro (58 m.), where connexion is made with the Leopoldina system running into the national capital, and a third running north-westerly from Victoria to Diamantina, Minas Geraes, about 450 m. The chief cities and towns of the state, with their populations in 1890, are Victoria, São Matheus (municipality, 7761) on a river of the same name 16 m. from the sea, Serra (municipality, 6274), Guarapary (municipality, 5310), a small port S. by W. of the capital, Conceicão da Barra (municipality, 5628), the port of São Matheus and Cachoeira do Itapemirim (4049), an important commercial centre in the south.

Espirito Santo formed part of one of the original captaincies which were given to Vasco Fernandes Coutinho by the Portuguese crown. The first settlement (1535) was at the entrance to the bay of Espirito Santo, and its name was afterwards given to the bay and captaincy. It once included the municipality of Campos, now belonging to the state of Rio de Janeiro.

The islands of Trinidade and Martim Vaz, which lie about 715 m. E. of Victoria, belong politically to this state. They are uninhabited, but considerable importance is attached to the former because Great Britain has twice attempted to take possession of it. It rises 1200 ft. above sea-level and is about 6 m. in circumference, but it has no value other than that of an ocean cable station. An excellent description of this singular island is to be found in E. F. Knight's *Cruise of the "Alerte"* (London, 1895).

ESPRONCEDA, JOSÉ IGNACIO JAVIER ORIOL ENCARNACIÓN DE (1808–1842), Spanish poet, son of an officer in the Bourbon regiment, was born at or near Almendralejo de los Barros on the 25th of March 1808. On the close of the war he was sent to the preparatory school of artillery at Segovia, and later became a pupil of the poet Lista, then professor of literature at St Matthew's College in Madrid. In his fourteenth year he had attracted his master's attention by his verses, and had joined a secret society. Sentenced to five years' seclusion in the Franciscan convent at Guadalajara, he began an epic poem entitled *Pelayo*, of which fragments survive. He escaped to Portugal and thence to England, where he found the famous Teresa whom he had met at Lisbon; here, too, he became a student of Shakespeare, Milton and Byron. In 1830 he eloped with Teresa to Paris, took part in the July revolution, and soon after joined the raid of Chapalangarra on Navarre. In 1833 he returned to Spain and obtained a commission in the queen's guards. This, however, he soon forfeited by a political song, and he was banished to Cuéllar, where he wrote a poor novel entitled *Sancho Saldaña ó el Castellano de Cuéllar* (1834). He took an active part in the revolutionary risings of 1835 and 1836, and, on the accession to power of the Liberal party in 1840, was appointed secretary of legation at the Hague; in 1842 he was elected deputy for Almería, and seemed likely to play a great part in parliamentary life. But his constitution was undermined, and, after a short illness, he died at Madrid on the 23rd of May 1842. His poems, first published in 1840, at once gained for him a reputation which still continues undiminished. The influence of Byron pervades Espronceda's life and work. It is present in an ambitious variant on the Don Juan legend, *El Estudiante de Salamanca*, Elvira's letter being obviously modelled on Julia's letter in *Don Juan*; the *Canción del Pirata* is suggested by *The Corsair*; and the Byronic inspiration is not wanting even in the noble fragment entitled *El Diablo Mundo*, based on the story of Faust. But in *El Mendigo*, in *El Reo de Muerte*, in *El Verdugo*, and in the sombre vehement lines, *A Jarifa en una orgia*, Espronceda approves himself the most potent and original lyrical poet produced by Spain during the 19th century.

BIBLIOGRAPHY.—*Obras poéticas y escritos en prosa* (Madrid, 1884), edited by Blanca Espronceda de Escosura, the poet's daughter (the second volume has not been published); E. Rodriguez Solís, *Espronceda; su tiempo, su vida, y sus obras* (Madrid, 1883); E. Piñeyro, *El Romanticismo en España* (Paris, 1904).

ESQUIRE (O. Fr. *escuyer*, Mod. Fr. *écuyer*, derived through the form *escudier* from Med. Lat. *scutarius*, "shield-bearer"), originally the attendant on a knight, whose helm, shield and lance he carried at the tournament or in the field of battle. The esquire ranked immediately below the knight bachelor, and his office was regarded as the apprentice stage of knighthood. The title was regarded as one of function, not of birth, and was not hereditary. In time, however, its original significance was lost sight of, and it came to be a title of honour, implying a rank between that of knight and valet or gentleman, as it technically still remains. Thus in the later middle ages esquire (*armiger*) was the customary description of holders of knight's fees who had not taken up their knighthood, whence the surviving custom of entitling the principal landowner in a parish "the squire" (see SQUIRE). Camden, at the close of the 16th century, distinguished four classes entitled to bear the style: (1) The eldest sons of knights, and their eldest sons, in perpetual succession; (2) the eldest sons of the younger sons of peers, and their eldest sons, in like perpetual succession; (3) esquires created by royal letters patent or other investiture, and their eldest sons; (4) esquires by office, *e.g.* justices of the peace and others who bear any office of trust under the crown. To these the writer in the 3rd edition of the *Encyclopaedia Britannica* (1797) added Irish peers and the eldest sons of British peers, who, though they bear courtesy titles, have in law only the right to be styled esquires. Officers of the king's courts, and of the royal household, counsellors at law and justices of the peace he described as esquires only "by reputation"; and justices of the peace have the title only as long as they are in commission; while certain heads of great landed families are styled "esquires" by prescription. "But the meaner ranks of people," he adds indignantly, "who know no better, do often basely prostitute this title; and, to the great confusion of all rank and precedence, every man who makes a decent appearance, far from thinking himself in any way ridiculed by finding the superscription of his letters thus decorated, is fully gratified by such an address."

It is clear, however, that the title of esquire was very loosely used at a much earlier date. On this point Selden is somewhat scornfully explicit. "To whomsoever, either by blood, place in the State or other eminency, we conceive some higher attribute should be given, than that sole Title of Gentleman, knowing yet that he hath no other honorary title legally fixed upon him, we usually style him an *Esquire*, in such passages as require legally that his degree or state be mentioned; as especially in Indictments and Actions whereupon he may be outlawed. Those of other nations who are Barons or great Lords in their own Countries, and no knights, are in legal proceedings stiled with us, Esquires only. Some of our greatest Heralds have their divisions of Esquires applied to this day. I leave them as I see them, where they may easily be found." Coke, too, says that every one is entitled to be termed esquire who has the legal right to call himself a gentleman (2. *Institutes*, 688).

At the present time the following classes are recognized as esquires on occasions of ceremony or for legal purposes:—(1) All sons of peers and lords of parliament during their fathers' lives, and the younger sons of such peers, &c., after their fathers' deaths; the eldest sons of peers' younger sons, and their eldest sons for ever. (2) Noblemen of all other nations. (3) The eldest sons of baronets and knights. (4) Persons bearing arms and the title of esquire by letters patent. (5) Esquires of the Bath and their eldest sons. (6) Barristers-at-law. (7) Justices of the peace and mayors while in commission or office. (8) The holders of any superior office under the crown. (9) Persons styled esquires by the sovereign in their patents, commissions or appointments.[1] (10) Attorneys in colonies where the functions of counsel and attorney are united (in England solicitors are "gentlemen," not "esquires").

In practice, however, the title of esquire, now to all intents and purposes meaningless, is given to any one who "can bear the port, charge and countenance of a gentleman." The word has followed the same course as that of "gentleman" (*q.v.*), and for very similar reasons. It is still not customary in Great Britain to address *e.g.* a well-to-do person engaged in trade as esquire at his shop; it would be offensive not to do so at his private residence. In America, on the other hand, the use of the word "esquire" is practically obsolete, "Mr" ("Mister" or "Master," at one time the title special to a "gentleman") being the general form of address.

See Selden, *Titles of Honor* (1672); Camden, *Britannia* (ed. London, 1594); Coke, *Institutes*; *Enc. of the Laws of England*, s. "Esquire"; Du Cange, *Glossarium* (ed. 1886), s. "Scutarius," "Scutifer" and "Armiger"; *New English Dictionary*, s. "Esquire." (W. A. P.)

ESQUIROL, JEAN ÉTIENNE DOMINIQUE (1772–1840), French alienist, was born at Toulouse on the 3rd of February 1772. In 1794 he became a pupil of the military hospital of Narbonne, and subsequently studied in Paris at the Salpêtrière under P. Pinel, whose assistant he became. In 1811 he was chosen physician to the Salpêtrière, and in 1817 he began a course of lectures on the treatment of the insane, in which he made such revelations of the abuses existing in the lunatic asylums of France that the government appointed a commission to inquire into the subject. Esquirol in this and other ways greatly assisted Pinel's efforts for the introduction of humaner methods. The asylums of Rouen, Nantes and Montpellier were built in accordance with his plans. In 1823 he became inspector-general of the university of Paris for the faculties of medicine, and in 1826 chief physician of the asylum at Charenton. He died at Paris on the 13th of December 1840. Besides contributing to the *Dictionnaire des sciences médicales* and the *Encyclopédie des gens du monde*, Esquirol wrote *Des maladies mentales, considérées sous les rapports médical, hygiénique, et médico-légal* (2 vols., Paris, 1838).

ESQUIROS, HENRI FRANÇOIS ALPHONSE (1812–1876), French writer, was born in Paris on the 23rd of May 1812. After some minor publications he produced *L'Évangile du peuple* (1840), an exposition of the life and character of Jesus as a social reformer. This work was considered an offence against religion and decency, and Esquiros was fined and imprisoned. He was elected in 1850 as a social democrat to the Legislative Assembly, but was exiled in 1851 for his opposition to the Empire. Returning to France in 1869 he was again a member of the Legislative Assembly, and in 1876 was elected to the senate. He died at Versailles on the 12th of May 1876. He turned to account his residence in England in *L'Angleterre et la vie anglaise* (5 vols., 1859–1869). Among his numerous works on social subjects may be noted:—*Histoire des Montagnards* (2 vols., 1847); *Paris, ou les sciences, les institutions et les mœurs au XIX^{e} siècle* (2 vols., 1847); and *Histoire des martyrs de la liberté* (1851).

ESS, JOHANN HEINRICH VAN (1772–1847), German Catholic theologian, was born at Warburg, Westphalia, on the 15th of February 1772. He was educated at the Dominican gymnasium of his native town, and in 1790 entered, as a novice, the Benedictine abbey of Marienmünster, in the bishopric of Paderborn. His Benedictine name was Leander. He was priest at Schwalenberg from 1799 to 1812, after which he became extraordinary professor of theology and joint-director of the teachers' seminary at Marburg. In 1818 he received the doctorate of theology and of canonical law. In 1807, in conjunction with his cousin Karl van Ess, he had published a German translation of the New Testament, and, as its circulation was discountenanced by his superiors, he published in 1808 a defence of his views, entitled *Auszüge aus den heiligen Vätern und anderen Lehrern der katholischen Kirche über das nothwendige und nützliche Bibellesen*. An improved edition of this tractate was published in 1816, under the title *Gedanken über Bibel und Bibellehre*, and in the same year appeared *Was war die Bibel den ersten Christen?* In 1822 he published the first part of a German translation of the Old Testament, which was completed in 1836. In 1822 he resigned his offices at Marburg in order to devote his whole time to the defence of his views regarding Bible reading by the people, and to endeavour to promote the circulation of the scriptures. He was associated first with the Catholic Bible Society of Regensburg, and then with the British and Foreign Bible Society. He died at Affolderbach in the Odenwald on the 13th of October 1847.

ESSAY, ESSAYIST (Fr. *essai*, Late Lat. *exagium*, a weighing or balance; *exigere*, to examine; the term in general meaning any trial or effort). As a form of literature, the essay is a composition of moderate length, usually in prose, which deals in an easy, cursory way with the external conditions of a subject, and, in strictness, with that subject only as it affects the writer. Dr Johnson, himself an eminent essayist, defines an essay as "an irregular, undigested piece"; the irregularity may perhaps be admitted, but want of thought, that is to say lack of proper mental digestion, is certainly not characteristic of a fine example. It should, on the contrary, always be the brief and light result of experience and profound meditation, while "undigested" is the last epithet to be applied to the essays of Montaigne, Addison or Lamb. Bacon said that the Epistles of Seneca were "essays," but this can hardly be allowed. Bacon himself goes on to admit that "the word is late, though the thing is ancient." The word, in fact, was invented for this species of writing by Montaigne, who merely meant that these were experiments in a new kind of literature. This original meaning, namely that these pieces were attempts or endeavours, feeling their way towards the expression of what would need a far wider space to exhaust, was lost in England in the course of the eighteenth century. This is seen by the various attempts made in the nineteenth century to coin a word which should express a still smaller work, as distinctive in comparison with the essay as the essay is by the side of the monograph; none of these linguistic experiments, such as *essayette*, *essaykin* (Thackeray) and *essaylet* (Helps) have taken hold of the language. As a matter of fact, the journalistic word *article* covers the lesser form of essay, although not exhaustively, since the essays in the monthly and quarterly reviews, which are fully as extended as an essay should ever be, are frequently termed "articles," while many "articles" in newspapers, dictionaries and encyclopaedias are in no sense essays. It may be said that the idea of a detached work is combined with the word "essay," which should be neither a section of a disquisition nor a chapter in a book which aims at the systematic development of a story. Locke's *Essay on the Human Understanding* is not an essay at all, or cluster of essays, in this technical sense, but refers to the experimental and tentative nature of the inquiry which the philosopher was undertaking. Of the curious use of the word so repeatedly made by Pope mention will be made below.

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[1] In practice this means every one receiving such a patent, commission or appointment.

The essay, as a species of literature, was invented by Montaigne, who had probably little suspicion of the far-reaching importance of what he had created. In his dejected moments, he turned to rail at what he had written, and to call his essays "inepties" and "sottises." But in his own heart he must have been well satisfied with the new and beautiful form which he had added to literary tradition. He was perfectly aware that he had devised a new thing; that he had invented a way of communicating himself to the world as a type of human nature. He designed it to carry out his peculiar object, which was to produce an accurate portrait of his own soul, not as it was yesterday or will be to-morrow, but as it is to-day. It is not often that we can date with any approach to accuracy the arrival of a new class of literature into the world, but it was in the month of March 1571 that the essay was invented. It was started in the second story of the old tower of the castle of Montaigne, in a study to which the philosopher withdrew for that purpose, surrounded by his books, close to his chapel, sheltered from the excesses of a fatiguing world. He wrote slowly, not systematically; it took nine years to finish the two first books of the essays. In 1574 the manuscript of the work, so far as it was then completed, was nearly lost, for it was confiscated by the pontifical police in Rome, where Montaigne was residing, and was not returned to the author for four months. The earliest imprint saw the light in 1580, at Bordeaux, and the Paris edition of 1588, which is the fifth, contains the final text of the great author. These dates are not negligible in the briefest history of the essay, for they are those of its revelation to the world of readers. It was in the delightful chapters of his new, strange book that Montaigne introduced the fashion of writing briefly, irregularly, with constant digressions and interruptions, about the world as it appears to the individual who writes. The *Essais* were instantly welcomed, and few writers of the Renaissance had so instant and so vast a popularity as Montaigne. But while the philosophy, and above all the graceful stoicism, of the great master were admired and copied in France, the exact shape in which he had put down his thoughts, in the exquisite negligence of a series of essays, was too delicate to tempt an imitator. It is to be noted that neither Charron, nor Mlle de Gournay, his most immediate disciples, tried to write essays. But Montaigne, who liked to fancy that the Eyquem family was of English extraction, had spoken affably of the English people as his "cousins," and it has always been admitted that his genius has an affinity with the English. He was early read in England, and certainly by Bacon, whose is the second great name connected with this form of literature. It was in 1597, only five years after the death of Montaigne, that Bacon published in a small octavo the first ten of his essays. These he increased to 38 in 1612 and to 58 in 1625. In their first form, the essays of Bacon had nothing of the fulness or grace of Montaigne's; they are meagre notes, scarcely more than the headings for discourses. It is possible that when he wrote them he was not yet familiar with the style of his predecessor, which was first made popular in England, in 1603, when Florio published that translation of the *Essais* which Shakespeare unquestionably read. In the later editions Bacon greatly expanded his theme, but he never reached, or but seldom, the freedom and ease, the seeming formlessness held in by an invisible chain, which are the glory of Montaigne, and distinguish the typical essayist. It would seem that at first, in England, as in France, no lesser writer was willing to adopt a title which belonged to so great a presence as that of Bacon or Montaigne. The one exception was Sir William Cornwallis (d. 1631), who published essays in 1600 and 1617, of slight merit, but popular in their day. No other English essayist of any importance appeared until the Restoration, when Abraham Cowley wrote eleven "Several Discourses by way of Essays," which did not see the light until 1668. He interspersed with his prose, translations and original pieces in verse, but in other respects Cowley keeps much nearer than Bacon to the form of Montaigne. Cowley's essay "Of Myself" is a model of what these little compositions should be. The name of Bacon inspires awe, but it is really not he, but Cowley, who is the father of the English essay; and it is remarkable that he has had no warmer panegyrists than his great successors, Charles Lamb and Macaulay. Towards the end of the century, Sir George Mackenzie (1636–1691) wrote witty moral discourses, which were, however, essays rather in name than form. Whenever, however, we reach the eighteenth century, we find the essay suddenly became a dominant force in English literature. It made its appearance almost as a new thing, and in combination with the earliest developments of journalism. On the 12th of April 1709 appeared the first number of a penny newspaper, entitled the *Tatler*, a main feature of which was to amuse and instruct fashionable readers by a series of short papers dealing with the manifold occurrences of life, *quicquid agunt homines*. But it was not until Steele, the founder of the *Tatler*, was joined by Addison that the eighteenth-century essay really started upon its course. It displayed at first, and indeed it long retained, a mixture of the manner of Montaigne with that of La Bruyère, combining the form of the pure essay with that of the character-study, as modelled on Theophrastus, which had been so popular in England throughout the seventeenth century. Addison's early *Tatler* portraits, in particular such as those of "Tom Folio" and "Ned Softly," are hardly essays. But Steele's "Recollections of Childhood" is, and here we may observe the type on which Goldsmith, Lamb and R. L. Stevenson afterwards worked. In January 1711 the *Tatler* came to an end, and was almost immediately followed by the *Spectator*, and in 1713 by the *Guardian*. These three newspapers are storehouses of admirable and typical essays, the majority of them written by Steele and Addison, who are the most celebrated eighteenth-century essayists in England. Later in the century, after the publication of other less successful experiments, appeared Fielding's essays in the *Covent Garden Journal* (1752) and Johnson's in the *Rambler* (1750), the *Adventurer* (1752) and the *Idler* (1759). There followed a great number of polite journals, in which the essay was treated as "the bow of Ulysses in which it was the fashion for men of rank and genius to try their strength." Goldsmith reached a higher level than the Chesterfields and Bonnel Thorntons had dreamed of, in the delicious sections of his *Citizen of the World* (1760). After Goldsmith, the eighteenth-century essay declined into tamer hands, and passed into final feebleness with the pedantic Richard Cumberland and the sentimental Henry Mackenzie. The *corpus* of eighteenth-century essayists is extremely voluminous, and their reprinted works fill some fifty volumes. There is, however, a great sameness about all but the very best of them, and in no case do they surpass Addison in freshness, or have they ventured to modify the form he adopted for his lucubrations. What has survived of them all is the lightest portion, but it should not be forgotten that a very large section of the essays of that age were deliberately didactic and "moral." A great revival of the essay took place during the first quarter of the nineteenth century, and foremost in the history of this movement must always be placed the name of Charles Lamb. He perceived that the real business of the essay, as Montaigne had conceived it, was to be largely personal. The famous *Essays of Elia* began to appear in the *London Magazine* for August 1820, and proceeded at fairly regular intervals until December 1822; early in 1823 the first series of them were collected in a volume. The peculiarity of Lamb's style as an essayist was that he threw off the Addisonian and still more the Johnsonian tradition, which had become a burden that crushed the life out of each conventional essay, and that he boldly went back to the rich verbiage and brilliant imagery of the seventeenth century for his inspiration. It is true that Lamb had great ductility of style, and that, when he pleases, he can write so like Steele that Steele himself might scarcely know the difference, yet in his freer flights we are conscious of more exalted masters, of Milton, Thomas Browne and Jeremy Taylor. He succeeded, moreover, in reaching a poignant note of personal feeling, such as none of his predecessors had ever aimed at; the essays called "Dream Children" and "Blakesmoor" are examples of this, and they display a degree of harmony and perfection in the writing of the pure essay such as had never been attempted before, and has never since been reached. Leigh Hunt, clearing away all the didactic and pompous elements which had overgrown the essay, restored it to its old *Spectator* grace, and was the most easy nondescript writer of his generation in periodicals such as the *Indicator* (1819) and the *Companion* (1828). The sermons, letters and pamphlets of Sydney Smith were really essays of an extended order. In Hazlitt and Francis Jeffrey we see the form and method of the essay beginning to be applied to literary criticism. The writings of De Quincey are almost exclusively essays, although many of the most notable of them, under his vehement pen, have far outgrown the limits of the length laid down by the most indulgent formalist. His biographical and critical essays are interesting, but they are far from being trustworthy models in form or substance. In a sketch, however rapid, of the essay in the nineteenth century, prominence must be given to the name of Macaulay. His earliest essay, that on Milton, appeared in the *Edinburgh Review* in 1825, very shortly after the revelation of Lamb's genius in "Elia." No two products cast in the same mould could, however, be more unlike in substance. In the hands of Macaulay the essay ceases to be a confession or an autobiography; it is strictly impersonal, it is literary, historical or controversial, vigorous, trenchant and full of party prejudice. The periodical publication of Macaulay's Essays in the *Edinburgh Review* went on until 1844; when we cast our eyes over this mass of brilliant writing we observe with surprise that it is almost wholly contentious. Nothing can be more remarkable than the difference in this respect between Lamb and Macaulay, the former for ever demanding, even cajoling, the sympathy of the reader, the latter scanning the horizon for an enemy to controvert. In later times the essay in England has been cultivated in each of these ways, by a thousand journalists and authors. The "leaders" of a daily newspaper are examples of the popularization of the essay, and they point to the danger which now attacks it, that of producing a purely ephemeral or even momentary species of effect. The essay, in its best days, was intended to be as lasting as a poem or a historical monograph; it aimed at being one of the most durable and precious departments of literature. We still occasionally see the production of essays which have this more ambitious aim; within the last quarter of the nineteenth century the essays of R. L. Stevenson achieved it. His *Familiar Studies* are of the same class as those of Montaigne and Lamb, and he approached far more closely than any other contemporary to their high level of excellence. We have seen that the tone of the essay should be personal and confidential; in Stevenson's case it was characteristically so. But the voices which please the public in a strain of pure self-study are few at all times, and with the cultivation of the analytic habit they tend to become less original and attractive. It is possible that the essay may die of exhaustion of interest, or may survive only in the modified form of accidental journalism.

The essay, although invented by a great French writer, was very late in making itself at home in France. The so-called *Essais* of Leibnitz, Nicole, Yves Marie André and so many others were really treatises. Voltaire's famous *Essai sur les mœurs des nations* is an elaborate historical disquisition in nearly two hundred chapters. Later, the voluminous essays of Joseph de Maistre and of Lamennais were not essays at all in the literary sense. On the other hand, the admirable *Causeries du lundi* of Sainte-Beuve (1804–1869) are literary essays in the fulness of the term, and have been the forerunners of a great army of brilliant essay-writing in France. Among those who have specially distinguished themselves as French essayists may be mentioned Théophile Gautier, Paul de Saint-Victor, Anatole France, Jules Lemaître, Ferdinand Brunetière and Émile Faguet. All these are literary critics, and it is in the form of the analysis of manifestations of intellectual energy that the essay has been most successfully illustrated in France. All the countries of Europe, since the middle of the 19th century, have adopted this form of writing; such monographs or reviews, however, are not perfectly identical with the essay as it was conceived by Addison and Lamb. This last, it may be supposed, is a definitely English thing, and this view is confirmed by the fact that in several European languages the word "essayist" has been adopted without modification.

In the above remarks it has been taken for granted that the essay is always in prose. Pope, however, conceived an essay in heroic verse. Of this his *Essay on Criticism* (1711) and his *Essay on Man* (1732–1734) are not good examples, for they are really treatises. The so-called *Moral Essays* (1720–1735), on the contrary, might have been contributed, if in prose, either to the *Spectator* or the *Guardian*. The idea of pure essays, in verse, however, did not take any root in English literature. (E. G.)

ESSEG, Essegg or Essek (Hung. *Eszék*; Croatian *Osjek*), a royal free town, municipality, and capital of the county of Virovitica (*Verőcze*), in Croatia-Slavonia, on the right bank of the Drave, 9 m. W. of its confluence with the Danube, and 185 m. S. of Buda-Pest by rail. Pop. (1900) 24,930; chiefly Magyars and Croats, with a few Germans and Jews. At Esseg the Drave is crossed by two bridges, and below these it is navigable by small steamers. The upper town, with the fortress, is under military authority; the new town and the lower town, which is the headquarters of commerce, are under civil authority. The only buildings of note are the Roman Catholic and Orthodox churches, Franciscan and Capuchin monasteries, synagogue, gymnasium, modern school, hospital, chamber of commerce, and law-courts. Esseg has a thriving trade in grain, fruit, live-stock, plum-brandy and timber. Tanning, silk-weaving and glass-blowing are also carried on.

Esseg owes its origin to its fortress, which existed as early as the time of the Romans under the name of *Mursia*; though the present structure dates only from 1720. At the beginning of the Hungarian revolution of 1848 the town was held by the Hungarians, but on the 4th of February 1849 it was taken by the Austrians under General Baron Trebersberg.

ESSEN, a manufacturing town of Germany, in the Prussian Rhine province, 22 m. N.E. from Düsseldorf, on the main line of railway to Berlin, in an undulating and densely populated district. Pop. (1849) 8813; (1875) 54,790; (1905) 229,270. It lies at the centre of a network of railways giving it access to all the principal towns of the Westphalian iron and coal fields. Its general aspect is gloomy; it possesses few streets of any pretensions, though those in the old part, which are mostly narrow, present, with their grey slate roofs and green shutters, a picturesque appearance. Of its religious edifices (twelve Roman Catholic, one Old Catholic, six Protestant churches, and a synagogue) the minster, dating from the 10th century, with fine pictures, relics and wall frescoes, is alone especially remarkable. This building is very similar to the Pfalz-Kapelle (*capella* *in palatio*) at Aix-la-Chapelle. Among the town's principal secular buildings are the new Gothic town-hall, the post office and the railway station. There are several high-grade (classical and modern) schools, technical, mining and commercial schools, a theatre, a permanent art exhibition, and hospitals. Essen also has a beautiful public park in the immediate vicinity. The town originally owed its prosperity to the large iron and coal fields underlying the basin in which it is situated. Chief among its industrial establishments are the famous iron and steel works of Krupp (*q.v.*), and the whole of Essen may be said to depend for its livelihood upon this firm, which annually expends vast sums in building and supporting churches, schools, clubs, hospitals and philanthropic institutions, and in other ways providing for the welfare of its employees. There are also manufactories of woollen goods and cigars, dyeworks and breweries.

Essen was originally the seat of a Benedictine nunnery, and was formed into a town about the middle of the 10th century by the abbess Hedwig. The abbess of the nunnery, who held from 1275 the rank of a princess of the Empire, was assisted by a chapter of ten princesses and countesses; she governed the town until 1803, when it was secularized and incorporated with Prussia. In 1807 it came into the possession of the grand dukes of Berg, but was transferred to Prussia in 1814.

See Funcke, *Geschichte des Fürstenthums und der Stadt Essen* (Elberfeld, 1851); Kellen, *Die Industriestadt Essen in Wort und Bild* (Essen, 1902); and A. Shadwell, *Industrial Efficiency* (London, 1906).

ESSENES, a monastic order among the Jews prior to Christianity. Their first appearance in history is in the time of Jonathan the Maccabee (161–144 B.C.). How much older they may have been we have no means of determining, but our authorities agree in assigning to them a dateless antiquity. The name occurs in Greek, in the two forms 'Εσσηνοί and 'Εσσαῖοι. 'Εσσηνοί is used by Josephus fourteen times, 'Εσσαῖοι six, but the latter is the only form used by Philo (ii. 457, 471, 632). 'Εσσηνοί is also used by Synesius and Hippolytus, and its Latin equivalent by Pliny and Solinus; 'Εσσαιοι by Hegesippus and Porphyry. In Epiphanius we find the forms 'Οσσαῖοι, 'Οσσηνοί, and 'Ιεσσαῖοι. There is a place named Essa mentioned by Josephus (*Ant.* xiii. 15, § 3), from which the name may have been formed, just as the Christians were originally called Ναζαρηνοί or Ναζωραῖοι, from Nazara. This etymology, however, is not much in favour now. Lightfoot explains the name as meaning "the silent ones," others as meaning "physicians." Perhaps there is most authority in favour of deriving it from the Syriac חסי, which in the emphatic state becomes חסיא, so that we have a Semitic correspondence to both the Greek forms 'Εσσηνοί and 'Εσσαῖοι. This etymology makes the word mean "pious." It has also been urged in excuse for Philo's absurd derivation from ὅσιος.

The original accounts we have of them are confined to three authors—Philo, Pliny the Elder, and Josephus. Philo describes them in his treatise known as *Quod omnis probus liber* (§§ 12, 13; ii. 457–460), and also in his "Apology for the Jews," a fragment of which has been preserved by Eusebius (*Praep. Ev.* viii. 11, 12). Pliny (*N.H.* v. 17) has a short but striking sketch of them, derived in all probability from Alexander Polyhistor, who is mentioned among the authorities for the fifth book of his *Natural History*. This historian, of whom Eusebius had a very high opinion (*Praep. Ev.* ix. 17, §1), lived in the time of Sulla. Josephus treats of them at length in his *Jewish War* (ii. 8), and more briefly in two passages of his *Antiquities* (xiii. 5, § 9; xviii. 1, § 5). He has also interesting accounts of the prophetic powers possessed by three individual members of the sect—Judas (*B.J.* i. 3, § 5; *Ant.* xiii. 11, § 2), Menahem (*Ant.* xv. 10, § 5), and Simon (*B.J.* ii. 7, § 3; *Ant.* xvii. 13, § 3). Besides this he mentions an Essene Gate in Jerusalem (*B.J.* v. 4, § 2) and a person called John the Essene, one of the bravest and most capable leaders in the war against the Romans (*B.J.* ii. 20, § 4; iii. 2, § 1). Josephus himself made trial of the sect of Essenes in his youth; but from his own statement it appears that he must have been a very short time with them, and therefore could not have been initiated into the inner mysteries of the society (*De vita sua*, 2). After this the notices that we have of the Essenes from antiquity are mere reproductions, except in the case of Epiphanius (died A.D. 402), who, however, is so confused a writer as to be of little value. Solinus, who was known as "Pliny's Ape," echoed the words of his master about a century after that writer's death, which took place in A.D. 79. Similarly Hippolytus, who lived in the reign of Commodus (A.D. 180–192), reproduced the account of Josephus, adding a few touches of his own. Porphyry (A.D. 233–306) afterwards did the same, but had the grace to mention Josephus in the context. Eusebius quoted the account as from Porphyry, though he must have known that *he* had derived it from Josephus (*Praep. Ev.* ix. 3, §§ 1, 13). But Porphyry's name would impress pagan readers. There is also a mention of the Essenes by Hegesippus (Eus. *H.E.* iv. 22) and by Synesius in his life of Dio Chrysostom. It has been conjectured that the Clementine literature emanated from Essenes who had turned Christian. (See EBIONITES.)

The Essenes were an exclusive society, distinguished from the rest of the Jewish nation in Palestine by an organization peculiar to themselves, and by a theory of life in which a severe asceticism and a rare benevolence to one another and to mankind in general were the most striking characteristics. They had fixed rules for initiation, a succession of strictly separate grades within the limits of the society, and regulations for the conduct of their daily life even in its minutest details. Their membership could be recruited only from the outside world, as marriage and all intercourse with women were absolutely renounced. They were the first society in the world to condemn slavery both in theory and practice; they enforced and practised the most complete community of goods. They chose their own priests and public office-bearers, and even their own judges. Though their prevailing tendency was practical, and the tenets of the society were kept a profound secret, it is perfectly clear from the concurrent testimony of Philo and Josephus that they cultivated a kind of speculation, which not only accounts for their spiritual asceticism, but indicates a great deviation from the normal development of Judaism, and a profound sympathy with Greek philosophy, and probably also with Oriental ideas. At the same time we do our Jewish authorities no injustice in imputing to them the patriotic tendency to idealize the society, and thus offer to their readers something in Jewish life that would bear comparison at least with similar manifestations of Gentile life.

There is some difficulty in determining how far the Essenes separated themselves locally from their fellow-countrymen. Josephus informs us that they had no single city of their own, but that many of them dwelt in every city. While in his treatise *Quod omnis*, &c., Philo speaks of their avoiding towns and preferring to live in villages, in his "Apology for the Jews" we find them living in many cities, villages, and in great and prosperous towns. In Pliny they are a perennial colony settled on the western shore of the Dead Sea. On the whole, as Philo and Josephus agree in estimating their number at 4000 (Philo, *Q.O.P.L.* § 12; Jos. *Ant.* xviii. 1, § 5), we are justified in suspecting some exaggeration as to the many cities, towns and villages where they were said to be found. As agriculture was their favourite occupation, and as their tendency was to withdraw from the haunts and ordinary interests of mankind, we may assume that with the growing confusion and corruption of Jewish society they felt themselves attracted from the mass of the population to the sparsely peopled districts, till they found a congenial settlement and free scope for their peculiar view of life by the shore of the Dead Sea. While their principles were consistent with the neighbourhood of men, they were better adapted to a state of seclusion.

The Essenes did not renounce marriage because they denied the validity of the institution or the necessity of it as providing for the continuance of the human race, but because they had a low opinion of the character of women (Jos. *B.J.* ii. 8, § 2; Philo, "Apol. for the Jews" in Eus. *Praep. Ev.* viii. 11, § 8). They adopted children when very young, and brought them up on their own principles. Pleasure generally they rejected as evil. They despised riches not less than pleasure; neither poverty nor wealth was observable among them; at initiation every one gave his property into the common stock; every member in receipt of wages handed them over to the funds of the society. In matters of dress the asceticism of the society was very pronounced. They regarded oil as a defilement, even washing it off if anointed with it against their will. They did not change their clothes or their shoes till they were torn in pieces or worn completely away. The colour of their garments was always white. Their daily routine was prescribed for them in the strictest manner. Before the rising of the sun they were to speak of nothing profane, but offered to it certain traditional forms of prayer as if beseeching it to rise. Thereafter they went about their daily tasks, working continuously at whatever trade they knew till the fifth hour, when they assembled, and, girding on a garment of linen, bathed in cold water. They next seated themselves quietly in the dining hall, where the baker set bread in order, and the cook brought each a single dish of one kind of food. Before meat and after it grace was said by a priest. After dinner they resumed work till sunset. In the evening they had supper, at which guests of the order joined them, if there happened to be any such present. Withal there was no noise or confusion to mar the tranquillity of their intercourse; no one usurped more than his share of the conversation; the stillness of the place oppressed a stranger with a feeling of mysterious awe. This composure of spirit was owing to their perfect temperance in eating and drinking. Not only in the daily routine of the society, but generally, the activity of the members was controlled by their presidents. In only two things could they take the initiative, helpfulness and mercy; the deserving poor and the destitute were to receive instant relief; but no member could give anything to his relatives without consulting the heads of the society. Their office-bearers were elected. They had also their special courts of justice, which were composed of not less than a hundred members, and their decisions, which were arrived at with extreme care, were irreversible. Oaths were strictly forbidden; their word was stronger than an oath. They were just and temperate in anger, the guardians of good faith, and the ministers of peace, obedient to their elders and to the majority. But the moral characteristics which they most earnestly cultivated and enjoined will best appear in their rules of initiation. There was a novitiate of three years, during which the intending member was tested as to his fitness for entering the society. If the result was satisfactory, he was admitted, but before partaking of the common meal he was required to swear awful oaths, that he would reverence the deity, do justice to men, hurt no man voluntarily or at the command of another, hate the unjust and assist the just, and that he would render fidelity to all men, but especially to the rulers, seeing that no one rules but of God. He also vowed, if he should bear rule himself, to make no violent use of his power, nor outshine those set under him by superior display, to make it his aim to cherish the truth and unmask liars, to be pure from theft and unjust gain, to conceal nothing from his fellow-members, nor to divulge any of their affairs to other men, even at the risk of death, to transmit their doctrines unchanged, and to keep secret the books of the society and the names of the angels.

Within the limits of the society there were four grades so distinct that if any one touched a member of an inferior grade he required to cleanse himself by bathing in water; members who had been found guilty of serious crimes were expelled from the society, and could not be received again till reduced to the very last extremity of want or sickness. As the result of the ascetic training of the Essenes, and of their temperate diet, it is said that they lived to a great age, and were superior to pain and fear. During the Roman war they cheerfully underwent the most grievous tortures rather than break any of the principles of their faith. In fact, they had in many respects reached the very highest moral elevation attained by the ancient world; they were just, humane, benevolent, and spiritually-minded; the sick and aged were the objects of a special affectionate regard; and they condemned slavery, not only as an injustice, but as an impious violation of the natural brotherhood of men (Philo ii. 457). There were some of the Essenes who permitted marriage, but strictly with a view to the preservation of the race; in other respects they agreed with the main body of the society.

It will be apparent that the predominant tendency of the society was practical. Philo tells us expressly that they rejected logic as unnecessary to the acquisition of virtue, and speculation on nature as too lofty for the human intellect. Yet they had views of their own as to God, Providence, the soul, and a future state, which, while they had a practical use, were yet essentially speculative. On the one hand, indeed, they held tenaciously by the traditional Judaism: blasphemy against their lawgiver was punished with death, the sacred books were preserved and read with great reverence, though not without an allegorical interpretation, and the Sabbath was most scrupulously observed. But in many important points their deviation from the strait path of Judaic development was complete. They rejected animal sacrifice as well as marriage; the oil with which priests and kings were anointed they accounted unclean; and the condemnation of oaths and the community of goods were unmistakable innovations for which they found no hint or warrant in the old Hebrew writings. Their most singular feature, perhaps, was their reverence for the sun. In their speculative hints respecting the soul and a future state, we find another important deviation from Judaism, and the explanation of their asceticism. They held that the body is mortal, and its substance transitory; that the soul is immortal, but, coming from the subtlest ether, is lured as by a sorcery of nature into the prison-house of the body. At death it is released from its bonds, as from long slavery, and joyously soars aloft. To the souls of the good there is reserved a life beyond the ocean, and a country oppressed by neither rain, nor snow, nor heat, but refreshed by a gentle west wind blowing continually from the sea (cf. Hom. *Od.* iv. 566-568), but to the wicked a region of wintry darkness and of unceasing torment. Josephus tells us too that the Essenes believed in fate; but in what sense, and what relation it bore to Divine Providence, does not appear.

The above evidence has left students in doubt as to whether Essenism is to be regarded as a pure product of the Jewish mind or as due in part to some foreign influence. On the one hand it might be maintained that the Essenes out-Pharisee'd the Pharisees. They had in common with that sect their veneration for Moses and the Law, their Sabbatarianism, their striving after ceremonial purity, and their tendency towards fatalism. But if the Pharisees abstained from good works on the Sabbath, the Essenes abstained even from natural necessities (Jos. *B.J.* ii. 8, § 9); if the Pharisees washed, the Essenes bathed before dinner; if the Pharisees ascribed some things to Fate, the Essenes ascribed all (Jos. *Ant.* xiii. 5, § 9). But on the other hand the Essenes avoided marriage, which the Pharisees held in honour; they offered no animal-sacrifices in the Temple; they refrained from the use of oil, which was customary among the Pharisees (Luke vii. 46); above all, they offered prayers to the sun, after the manner denounced in Ezekiel (viii. 16). These and other points of divergences are not explained by Ritschl's interesting theory that Essenism was an organized attempt to carry out the idea of "a kingdom of priests and an holy nation" (Ex. xix. 6).

Granting then that some foreign influence was at work in Essenism, we have four theories offered to us—that this influence was Persian, Buddhist, Pythagorean, or lastly, as maintained by Lipsius, that of the surrounding Syrian heathenism. Each of these views has had able advocates, but it must not be supposed that they are mutually exclusive. If we consider how Philo, while remaining a devout Jew in religion, yet managed to assimilate the whole Stoic philosophy, we can well believe that the Essenes might have been influenced, as Zeller maintained that they were, by Neo-Pythagoreanism. But as Pythagoras himself came from Samos, and his doctrines have a decidedly Oriental tinge, it may very well be that both he and the Essenes drew from a common source; for there is no need to reject, as is so commonly done, the statements of our authorities as to the antiquity of the Essenes. This common source we may believe with Lightfoot to have been the Persian religion, which we know to have profoundly influenced that of Israel, independently of the Essenes.

The fact that the Pharisees and Sadducees so often figure in the pages of the New Testament, while the Essenes are never mentioned, might plausibly be interpreted to show that the New Testament emanated from the side of the Essenes. So far as concerns the Epistle of St James this interpretation would probably be correct. That work contains the doctrine common to the Essenes with Plato, and suggestive of Persian Dualism, that God is the author of good only. There are also certain obvious points of resemblance between the Essenes and the early Christians. Both held property in common; both had scattered communities which received guests one from the other; both avoided a light use of oaths; both taught passive obedience to political authority. The list might be enlarged, but it would not necessarily prove more than that the early Christians shared in the ideas of their age. Christianity was to some extent a popularization of Essenism, but there is little reason for believing that Jesus himself was an Essene. De Quincey's contention that there were no Essenes but the early Christians is now a literary curiosity.

The original sources of our knowledge of the Essenes have been mentioned at the beginning of this paper; the best modern discussions of them are to be found in such works as Zeller's *Philosophie der Griechen*, vol. iii.; Ewald, *Geschichte d. V. Israël*, iii. 419-428; Reuss, *La Théologie chrétienne au siècle apostolique*, i. 122-131; Keim, *Life of Jesus of Nazara*, vol. i.; Lightfoot on the Colossians; Lucius, *Der Essenismus in seinem Verhältniss zum Judenthum*; Wellhausen, *Israelitische und jüdische Geschichte*; Ed. Schürer, *The Jewish People in the Time of Jesus Christ*, div. ii. vol. ii. § 30. The copious bibliography in Conybeare's edition of Philo's *De vita contemplativa* bears upon the Essenes as well as upon the Therapeutes. For a specially Jewish view of the Essenes see Kohler's article in the *Jewish Encyclopaedia*. They are there regarded as being "simply the rigorists among the Pharisees." But we are also told that "the Pharisees characterized the Essene as 'a fool who destroyed the world.'" (T. K.; St G. S.)

ESSENTUKI, a watering-place of south Russia, in the government of Terek, 11 m. by rail W. from Pyatigorsk; altitude, 2096 ft. Its alkaline and sulphur-alkaline mineral waters, similar to those of Ems, Selters and Vichy, are much visited in summer. The climate shows great variations in temperature. Pop. (1897) 9974.

ESSEQUIBO, or **ESSEQUEBO**, one of the three settlements of British Guiana, taking its name from the river Essequibo. (See Guiana.)

ESSEX, EARLS OF. The first earl of Essex was probably Geoffrey de Mandeville (*q.v.*), who became earl about 1139, the earldom being subsequently held by his two sons, Geoffrey and William, until the death of the latter in 1189. In 1199 Geoffrey Fitzpeter or Fitzpiers (d. 1213), who was related to the Mandevilles through his wife Beatrice, became earl of Essex, and on the death of Geoffrey's son William in 1227 the earldom reverted for the second time to the crown. Then the title to the earldom passed by marriage to the Bohuns, earls of Hereford, and before 1239 Humphrey de Bohun (d. 1275) had been recognized as earl of Essex. With the earldom of Hereford the earldom of Essex became extinct in 1373; afterwards it was held by Thomas of Woodstock, duke of Gloucester, a son of Edward III. and the husband of Eleanor de Bohun; and from Gloucester it passed to the Bourchiers, Henry Bourchier (d. 1483), who secured the earldom in 1461, being one of Gloucester's grandsons. The second and last Bourchier earl was Henry's grandson Henry, who died early in 1540. A few weeks before his execution in 1540 Thomas Cromwell (*q.v.*) was created earl of Essex; then in 1543 William Parr, afterwards marquess of Northampton, obtained the earldom by right of his wife Anne, a daughter of the last Bourchier earl. Northampton lost the earldom when he was attainted in 1553; and afterwards it passed to the famous family of Devereux, Walter Devereux, who was created earl of Essex in 1572, being related to the Bourchiers. Robert, the 3rd and last Devereux earl, died in 1646. In 1661 Arthur Capel was created earl of Essex, and the earldom is still held by his descendants.

ESSEX, ARTHUR CAPEL, 1st[1] EARL OF (1632–1683), English statesman, son of Arthur, 1st Baron Capel of Hadham (*c.* 1641), executed in 1649, and of Elizabeth, daughter and heir of Sir Charles Morrison of Cashiobury in Hertfordshire, was baptized on the 28th of January 1632. In June 1648, then a sickly boy of sixteen, he was taken by Fairfax's soldiers from Hadham to Colchester, which his father was defending, and carried every day round the works with the hope of inducing Lord Capel to surrender the place. At the restoration he was created Viscount Malden and earl of Essex (20th of April 1661), with special remainder to the male issue of his father, and was made lord-lieutenant of Hertfordshire and a few years later of Wiltshire.[2]

He early showed himself antagonistic to the court, to Roman Catholicism, and to the extension of the royal prerogative, and was coupled by Charles II. with Holles as "stiff and sullen men," who would not yield against their convictions to his solicitations. In 1669 he was sent as ambassador to King Christian V. of Denmark, in which capacity he gained credit by refusing to strike his flag to the governor of Kronborg. In 1672 he was made a privy councillor and lord-lieutenant of Ireland. He remained in office till 1677, and his administration was greatly commended by Burnet and Ormonde,[3] the former describing it "as a pattern to all that come after him." He identified himself with Irish interests, and took immense pains to understand the constitution and the political necessities of the country, appointing men of real merit to office, and maintaining an exceptional independence from solicitation and influence. He held a just balance between the Roman Catholics, the English Church and the Presbyterians, protecting the former as far as public opinion in England would permit, and governing the native Irish with firmness and moderation. The purity and patriotism of his administration were in strong contrast to the hopeless corruption prevalent in that at home and naturally aroused bitter opposition, as an obstacle to the unscrupulous employment of Irish revenues for the satisfaction of the court and the king's expenses. In particular he came into conflict with Lord Ranelagh, to whom had been assigned the Irish revenues on condition of his supplying the requirements of the crown, and whose accounts Essex refused to pass. He opposed strongly the lavish gifts of forfeited estates to court favourites and mistresses, prevented the grant of Phoenix Park to the duchess of Cleveland, and refused to encumber the administration by granting reversions. Finally the intrigues of his enemies at home, and Charles's continual demands for money, which Ranelagh undertook to satisfy, brought about his recall in April 1677. He immediately joined the country party and the opposition to Danby's government, and on the latter's fall in 1679 was appointed a commissioner of the treasury, and the same year a member of Sir William Temple's new-modelled council. He followed the lead of Halifax, who advocated not the exclusion of James, but the limitation of his sovereign powers, and looked to the prince of Orange rather than to Monmouth as the leader of Protestantism, incurring thereby the hostility of Shaftesbury, but at the same time gaining the confidence of Charles. He was appointed by Charles together with Halifax to hear the charges against Lauderdale. In July he wrote a wise and statesmanlike letter to the king, advising him to renounce his project of raising a new company of guards. Together with Halifax he urged Charles to summon the parliament, and after his refusal resigned the treasury in November, the real cause being, according to one account,[4] a demand upon the treasury by the duchess of Cleveland for £25,000, according to another "the niceness of touching French money," "that makes my Lord Essex's squeasy stomach that it can no longer digest his employment."[5]

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[1] *i.e.* in the Capel line.

[2] *Hist. MSS. Comm. ser.*; *Duke of Beaufort's MSS.* 45.

[3] *Life of Ormonde*, by T. Carte, viii. 468 (1851), vol. iv. p. 529.

[4] *Hist. MSS. Comm.* 7th Rep. app. 477b.

[5] *Ib.* 6th Rep. app. 741b.

Subsequently his political attitude underwent a change, the exact cause of which is not clear—probably a growing conviction of the dangers threatened by a Roman Catholic sovereign of the character of James. He now, in 1680, joined Shaftesbury's party and supported the Exclusion Bill, and on its rejection by the Lords carried a motion for an association to execute the scheme of expedients promoted by Halifax. On the 25th of January 1681 at the head of fifteen peers he presented a petition to the king, couched in exaggerated language, requesting the abandonment of the session of parliament at Oxford. He was a jealous prosecutor of the Roman Catholics in the popish plot, and voted for Stafford's attainder, on the other hand interceding for Archbishop Plunket, implicated in the pretended Irish plot. He, however, refused to follow Shaftesbury in his extreme courses, declined participation in the latter's design to seize the Tower in 1682, and on Shaftesbury's consequent departure from England became the leader of Monmouth's faction, in which were now included Lord Russell, Algernon Sidney, and Lord Howard of Escrick. Essex took no part in the wilder schemes of the party, but after the discovery of the Rye House Plot in June 1683, and the capture of the leaders, he was arrested at Cashiobury and imprisoned in the Tower. His spirits and fortitude appear immediately to have abandoned him, and on the 13th of July he was discovered in his chamber with his throat cut. His death was attributed, quite groundlessly, to Charles and James, and the evidence points clearly if not conclusively to suicide, his motive being possibly to prevent an attainder and preserve his estate for his family. He, was, however, undoubtedly a victim of the Stuart administration, and the antagonism and tragic end of men like Essex, deserving men, naturally devoted to the throne, constitutes a severe indictment of the Stuart rule.

He was a statesman of strong and sincere patriotism, just and unselfish, conscientious and laborious in the fulfilment of public duties, blameless in his official and private life. Evelyn describes him as "a sober, wise, judicious and pondering person, not illiterate beyond the rule of most noblemen in this age, very well versed in English history and affairs, industrious, frugal, methodical and every way accomplished"; and declares he was much deplored, few believing he had ever harboured any seditious designs.[1] He married Lady Elizabeth Percy, daughter of Algernon, 10th earl of Northumberland, by whom, besides a daughter, he had an only son Algernon (1670–1710), who succeeded him as 2nd earl of Essex.

BIBLIOGRAPHY.—See the Lives in the *Dict. of Nat. Biography* and in *Biographia Britannica* (Kippis), with authorities there collected; Essex's Irish correspondence is in the *Stow Collection* in the British Museum, Nos. 200-217, and selections have been published in *Letters written by Arthur Capel, Earl of Essex* (1770) and in the *Essex Papers* (Camden Society, 1890), to which can now be added the *Calendars of State Papers, Domestic*, which contain a large number of his letters and which strongly support the opinion of his contemporaries concerning his unselfish patriotism and industry; see also *Somers Tracts* (1813), x., and for other pamphlets relating to his death the catalogue of the British Museum.

ESSEX, ROBERT DEVEREUX, 2ND[2] EARL OF (1566–1601), son of the 1st Devereux earl, was born at Netherwood, Herefordshire, on the 19th of November 1566. He entered the university of Cambridge and graduated in 1581. In 1585 he accompanied his stepfather, the earl of Leicester, on an expedition to Holland, and greatly distinguished himself at the battle of Zutphen. He now took his place at court, where so handsome a youth soon found favour with Queen Elizabeth, and in consequence was on bad terms with Raleigh. In 1587 he was appointed master of the horse, and in the following year was made general of the horse and installed knight of the Garter. On the death of Leicester he succeeded him as chief favourite of the queen, a position which injuriously affected his whole subsequent life, and ultimately resulted in his ruin. While Elizabeth was approaching the mature age of sixty, Essex was scarcely twenty-one. Though well aware of the advantages of his position, and somewhat vain of the queen's favour, his constant attendance on her at court was irksome to him beyond all endurance; and when he could not make his escape to the scenes of foreign adventure after which he longed, he varied the monotony of his life at court by intrigues with the maids of honour He fought a duel with Sir Charles Blount, a rival favourite of the queen, in which the earl was disarmed and slightly wounded in the thigh.

In 1589, without the queen's consent, he joined the expedition of Drake and Sir John Norris against Spain, but in June he was compelled to obey a letter enjoining him at his "uttermost peril" to return immediately. In 1590 Essex married the widow of Sir Philip Sidney, but in dread of the queen's anger he kept the marriage secret as long as possible. When it was necessary to avow it, her rage at first knew no bounds, but as the earl did "use it with good temper," and "for her majesty's better satisfaction was pleased that my lady should live retired in her mother's house," he soon came to be "in very good favour." In 1591 he was appointed to the command of a force auxiliary to one formerly sent to assist Henry IV. of France against the Spaniards; but after a fruitless campaign he was finally recalled from the command in January 1592. For some years after this most of his time was spent at court, where he held a position of unexampled influence, both on account of the favour of the queen and from his own personal popularity. In 1596 he was, after a great many "changes of humour" on the queen's part, appointed along with Lord Howard of Effingham, Raleigh and Lord Thomas Howard, to the command of an expedition, which was successful in defeating the Spanish fleet, capturing and pillaging Cadiz, and destroying 53 merchant vessels. It would seem to have been shortly after this exploit that the beginnings of a change in the feelings of the queen towards him came into existence. On his return she chided him that he had not followed up his successes, and though she professed great pleasure at again seeing him in safety, and was ultimately satisfied that the abrupt termination of the expedition was contrary to his advice and remonstrances, she forbade him to publish anything in justification of his conduct. She doubtless was offended at his growing tendency to assert his independence, and jealous of his increasing popularity with the people; but it is also probable that her strange infatuation regarding her own charms, great as it was, scarcely prevented her from suspecting either that his professed attachment had all along been somewhat alloyed with considerations of personal interest, or that at least it was now beginning to cool. Francis Bacon, at that time his most intimate friend, endeavoured to prevent the threatened rupture by writing him a long letter of advice; and although perseverance in a long course of feigned action was for Essex impossible, he for some time attended pretty closely to the hints of his mentor, so that the queen "used him most graciously." In 1597 he was appointed master of the ordnance, and in the following year he obtained command of an expedition against Spain, known as the Islands or Azores Voyage. He gained some trifling successes, but as the Plate fleet escaped him he failed of his main purpose; and when on his return the queen met him with the usual reproaches, he retired to his home at Wanstead. This was not what Elizabeth desired, and although she conferred on Lord Howard of Effingham the earldom of Nottingham for services at Cadiz, the main merit of which was justly claimed by Essex, she ultimately held out to the latter the olive branch of peace, and condescended to soothe his wounded honour by creating him earl marshal of England. That, nevertheless, the irritated feelings neither of Essex nor of the queen were completely healed was manifested shortly afterwards in a manner which set propriety completely at defiance. In a discussion on the appointment of a lord deputy to Ireland, Essex, on account of some taunting words of Elizabeth, turned his back upon her with a gesture indicative not only of anger but of contempt, and when she, unable to control her indignation, slapped him on the face, he left her presence swearing that such an insult he would not have endured even from Henry VIII.

In 1599, while Ulster was in rebellion under the earl of Tyrone, the office of lieutenant and governor-general of Ireland was conferred on Essex, and a large force put at his command.

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[1] *Diary and Corresp.* (1850), ii. 141, 178.

[2] *i.e.* in the Devereux line.

His campaign was an unsuccessful one, and by acting in various ways in opposition to the commands of the queen and the council, agreeing with Tyrone on a truce in September, and suddenly leaving the post of duty with the object of privately vindicating himself before the queen, he laid himself open to charges more serious than that of mere incompetency. For these misdemeanours he was brought in June 1600 before a specially constituted court, deprived of all his high offices, and ordered to live a prisoner in his own house during the queen's pleasure. Chiefly through the intercession of Bacon his liberty was shortly afterwards restored to him, but he was ordered not to return to court. For some time he hoped for an improvement in his prospects, but when he was refused the renewal of his patent for sweet wines, hope was succeeded by despair, and half maddened by wounded vanity, he made an attempt (Feb. 7, 1601) to incite a revolution in his behalf, by parading the streets of London with 300 retainers, and shouting, "For the queen! a plot is laid for my life!" These proceedings awakened, however, scarcely any other feelings than mild perplexity and wonder; and finding that hope of assistance from the citizens was vain, he returned to Essex House, where after defending himself for a short time he surrendered. After a trial—in which Bacon, who prosecuted, delivered a speech against his quondam friend and benefactor, the bitterness of which was quite unnecessary to secure a conviction entailing at least very severe punishment—he was condemned to death, and notwithstanding many alterations in Elizabeth's mood, the sentence was carried out on the 25th of February 1601.

Essex was in person tall and well proportioned, with a countenance which, though not strictly handsome, possessed, on account of its bold, cheerful and amiable expression, a wonderful power of fascination. He was a patron of literature, and himself a poet. His carriage was not very graceful, but his manners are said to have been "courtly, grave and exceedingly comely." He was brave, chivalrous, impulsive, imperious sometimes with his equals, but generous to all his dependants and incapable of secret malice; and these virtues, which were innate and which remained with him to the last, must be regarded as somewhat counterbalancing, in our estimation of him, the follies and vices created by temptations which were exceptionally strong.

See Hon. W. B. Devereux, *Lives of the Earls of Essex* (1853); and *Bacon and Essex*, by E. A. Abbott (1877). Also the article BACON, FRANCIS, and authorities there.

ESSEX, ROBERT DEVEREUX, 3RD[1] EARL OF (1591–1646), son of the preceding, was born in 1591. He was educated at Eton and at Merton College, Oxford. Shortly after the arrival of James I. in London, Essex (whose title was restored, and the attainder on his father removed, in 1604) was placed about the prince of Wales, as a sharer both in his studies and amusements. At the early age of fifteen he was married to Frances Howard, daughter of the earl of Suffolk, but she was his wife only in name; during his absence abroad (1607–1609) she fell in love with Sir Robert Carr (afterwards earl of Somerset), and on her charging her husband with physical incapacity, the marriage was annulled in 1613. A second marriage which he contracted in 1631 with Elizabeth, daughter of Sir William Paulet, also ended unhappily. From 1620 to 1623 he served in the wars of the Palatinate, and in 1625 he was vice-admiral of a fleet which made an unsuccessful attempt to capture Cadiz. In 1639 he was lieutenant-general of the army sent by Charles against the Scottish Covenanters; but on account of the irresolution of the king no battle occurred, and the army was disbanded at the end of the year. Essex was discharged "without ordinary ceremony," and refused an office which at that time fell vacant, "all which," says Clarendon, "wrought very much upon his rough, proud nature, and made him susceptible of some impressions afterwards which otherwise would not have found such easy admission." Having taken the side of the parliament against Charles, he was, on the outbreak of the civil war in 1642, appointed to the command of the parliamentary army. At the battle of Edgehill he remained master of the field, and in 1643 he captured Reading, and relieved Gloucester; but in the campaign of the following year, on account of his hesitation to fight against the king in person, nearly his whole army fell into the hands of Charles. In 1645, on the passing of the self-denying ordinance, providing that no member of parliament should hold a public office, he resigned his commission; but on account of his past services his annuity of £10,000 was continued to him for life. He died on the 14th of September 1646, of a fever brought on by over-exertion in a stag-hunt in Windsor Forest; his line becoming extinct.

See the "Life of Robert Earl of Essex," by Robert Codrington, M.A., printed in *Harl. Misc.*; Clarendon's *History of the Rebellion*; and Hon. W. B. Devereux, *Lives of the Earls of Essex* (1853).

ESSEX, WALTER DEVEREUX, 1ST[2] EARL OF (1541–1576), the eldest son of Sir Richard Devereux, was born in 1541. His grandfather was the 2nd Baron Ferrers, who was created Viscount Hereford in 1550 and by his mother was a nephew of Henry Bourchier, a former earl of Essex. Walter Devereux succeeded as 2nd Viscount Hereford in 1558, and in 1561 or 1562 married Lettice, daughter of Sir Francis Knollys. In 1569 he served as high marshal of the field under the earl of Warwick and Lord Clinton, and materially assisted them in suppressing the northern insurrection. For his zeal in the service of Queen Elizabeth on this and other occasions, he in 1572 received the Garter and was created earl of Essex, the title which formerly belonged to the Bourchier family. Eager to give proof of "his good devotion to employ himself in the service of her majesty," he offered on certain conditions to subdue and colonize, at his own expense, a portion of the Irish province of Ulster, at that time completely under the dominion of the rebel O'Neills, under Sir Brian MacPhelim and Tirlogh Luineach, with the Scots under their leader Sorley Boy MacDonnell. His offer, with certain modifications, was accepted, and he set sail for Ireland in July 1573, accompanied by a number of earls, knights and gentlemen, and with a force of about 1200 men. The beginning of his enterprise was inauspicious, for on account of a storm which dispersed his fleet and drove some of his vessels as far as Cork and the Isle of Man, his forces did not all reach the place of rendezvous till late in the autumn, and he was compelled to entrench himself at Belfast for the winter. Here, by sickness, famine and desertions, his troops were diminished to little more than 200 men. Intrigues of various sorts, and fighting of a guerilla type, followed with disappointing results, and Essex had difficulties both with the deputy Fitzwilliam and with the queen. Essex was in straits himself, and his offensive movements in Ulster took the form of raids and brutal massacres among the O'Neills; in October 1574 he treacherously captured MacPhelim at a conference in Belfast, and after slaughtering his attendants had him and his wife and brother executed at Dublin. Elizabeth, instigated apparently by Leicester, after encouraging Essex to prepare to attack the Irish chief Tirlogh Luineach, suddenly commanded him to "break off his enterprise"; but, as she left him a certain discretionary power, he took advantage of it to defeat Tirlogh Luineach, chastise Antrim, and massacre several hundreds of Sorley Boy's following, chiefly women and children, discovered hiding in the caves of Rathlin. He returned to England in the end of 1575, resolved "to live henceforth an untroubled life"; but he was ultimately persuaded to accept the offer of the queen to make him earl marshal of Ireland. He arrived in Dublin in September 1576, and three weeks afterwards died of dysentery. There were suspicions that he had been poisoned by Leicester, who shortly after his death married his widow, but these were not confirmed by the post-mortem examination. The endeavours of Essex to better the condition of Ireland were a dismal failure; and the massacres of the O'Neills and of the Scots of Rathlin leave a dark stain on his reputation.

See Sidney Lee's article in the *Dict. Nat. Biog.*; *Lives of the Devereux Earls of Essex*, by Hon. Walter B. Devereux (1853); Froude's *History of England*, vol. x.; J. S. Brewer, *Athenaeum* (1870), part i. pp. 261, 326.

ESSEX, an eastern county of England, bounded N. by Cambridgeshire and Suffolk, E. by the North Sea, S. by the Thames, dividing it from Kent, W. by the administrative county of London and by Hertfordshire. Its area is 1542 sq. m. Its configuration is sufficiently indicated by the direction of its rivers. Except that in the N.W. the county includes the heads of a few valleys draining northward to the Cam and so to the Great Ouse, all the streams, which are never of great size, run southward and eastward, either into the Thames, or into the North Sea by way of the broad, shallow estuaries which ramify through the flat coast lands. The highest ground lies consequently in the north-west, between the Cam basin and the rivers of the county. Its principal southward extension is that between the Lea (which with its tributary the Stort forms a great part of the western boundary) and the Roding, and east of the Roding valley. The other chief rivers may be specified according to their estuaries, following the coast northward from Shoeburyness at the Thames mouth. That of the Roach ramifies among several islands of which Foulness is the largest, but its main branch joins the Crouch estuary. Next follows the Blackwater, which receives the Chelmer, the Brain and other streams. Following a coast of numerous creeks and islets, with the large island of Mersea, the Colne estuary is reached. The Colne and Blackwater may be said to form one large estuary, as they enter the sea by a well-marked common mouth, 5 m. in width, between Sales Point and Colne Point. There is a great irregular inlet (Hamford Water) receiving no large stream, W. of the Naze promontory, and then the Stour, bounding the county on the north, joins its estuary to that of the Orwell near the sea. There are several seaside watering-places in favour owing to their proximity to London, of which Southend-on-Sea above the mouth of the Thames, Clacton-on-Sea, Walton-on-the-Naze, and Dovercourt adjoining Harwich are the chief. These and other stations on the estuaries are also in favour with yachtsmen. The sea has at some points seriously encroached upon the land within historic times. The low soft cliffs at various points are liable to give way against the waves; in other parts dykes and embankments are necessary to prevent inundation. Inland, that is apart from the flat coast-district, the country is pleasantly undulating and for the most part well wooded. It was formerly, indeed, almost wholly forested, the great Waltham Forest stretching from Colchester to the confines of London. Of this a fragment is preserved in Epping Forest (see EPPING) between the Lea and the Roding. On the other side of the Roding Hainault Forest is traceable, but was disafforested in 1851. The oak is the principal tree; a noteworthy example was that of Fairlop in Hainault, which measured 45 ft. in girth, but was blown down in 1820.

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[1] *i.e.* in the Devereux line.

[2] *i.e.* in the Devereux line.

Geology.—The geological structure of the county is very simple: the greater part is occupied by the London clay with underlying Reading beds and Thanet sands, with here and there small patches of Bagshot gravels on elevated tracts, as at High Beech, Langdon Hill, Brentwood and Rayleigh; and occasionally the same beds are represented by the large boulder-like Sarsen stones on the lower ground. In the north, the chalk, which underlies the Tertiary strata over the whole county, appears at the surface and forms the downs about Saffron Walden, Birdbrook and Great Yeldham; it is brought up again by a small disturbance at Grays Thurrock where it is quarried on a large scale for lime, cement and whiting. Small patches of Pleistocene Red Crag rest upon the Eocene strata at Beaumont and Oakley, and are very well exposed at Walton-on-the-Naze where they are very fossiliferous. Most of the county is covered by a superficial deposit of glacial drifts, sands, gravel and in places boulder clay, as at Epping, Dunmow and Hornchurch where the drift lies beneath the Thames gravel. An interesting feature in relation to the glacial drift is a deep trough in the Cam valley revealed by borings to be no less than 340 ft. deep at Newport; this ancient valley is filled with drift. In the southern part of the county are broad spreads of gravel and brick earth, formed by the Thames; these have been excavated for brick-making and building purposes about Ilford, Romford and Grays, and have yielded the remains of hippopotamus, rhinoceros and mammoth. More recent alluvial deposits are found in the valley at Walthamstow and Tilbury, in which the remains of the beaver have been discovered.

The roads of this county with a clay soil foundation were for generations repaired with flints picked by women and children from the surface of the fields. Gravel is difficult of access. With the exception of chalk for lime (mainly obtained at Ballingdon in the north and Grays in the south), septaria for making cement, and clay for bricks, the underground riches of the county are meagre.

Agriculture.—As an agricultural county Essex ranks high. Some four-fifths of the total area is under cultivation, and about one-third of that area is in permanent pasture. Wheat, barley and oats, in that relative order, are the principal grain crops, Essex being one of the chief grain-producing counties. The wheat and barley are in particularly high favour, the wheat of various standard species being exported for seed purposes, while the barley is especially useful in malting. Beans and peas are largely grown, as are vegetables for the London market. Hop-growing was once important. From the comparative dryness of the climate Essex does not excel in pasturage, and winter grazing receives the more attention. The numbers of cattle increase steadily, and store bullocks are introduced in large numbers from Norfolk, Lincolnshire, Ireland and Wales. Of sheep there are but few distinct flocks, and the numbers decrease. Pigs are generally of a high-class Berkshire type.

Other Industries.—The south-west of the county, being contiguous to London, is very densely populated, and is the seat of large and varied industries. For example, there are numbers of chemical works, the extensive engine shops and works of the Great Eastern railway at Stratford, government powder works in the vicinity of Waltham Abbey, and powder stores at Purfleet on the Thames. The extensive water-works for east London, by the Lea near Walthamstow, may also be mentioned. The docks at Plaistow and Tilbury on the Thames employ many hands. Apart from this industrial district, there are considerable engineering works, especially for agricultural implements, at Chelmsford, Colchester and elsewhere; several silk works, as at Braintree and Halstead; large breweries, as at Brentwood, Chelmsford and Romford; and lime and cement works at Grays Thurrock. The oyster-beds of the Colne produce the famous Colchester natives, and there are similar beds in the Crouch and Roach, for which Burnham-on-Crouch is the centre; and in the Blackwater (Maldon).

Communications.—Railway communications are supplied principally by the Great Eastern railway, of which the main line runs by Stratford, Ilford, Romford, Brentwood, Chelmsford, Witham, Colchester, and Manningtree. The Cambridge and northern line of this company, following the Lea valley, does not touch the county until it diverges along the valley of the Stort. The chief branches are those to Southend and Burnham, Witham to Maldon, Colchester to Brightlingsea, to Clacton and to Walton, and Manningtree to Harwich, on the coast; and Witham to Braintree and Bishop's Stortford, and Mark's Tey to Sudbury and beyond, inland; while there are several branch lines among the manufacturing and residential suburbs in the south-west, to Walthamstow and Buckhurst Hill, Chigwell, Loughton, Epping, Ongar, &c. The London, Tilbury & Southend railway, following the Thames, serves the places named, and the Colne Valley railway runs from Chappel junction near Mark's Tey by Halstead to Haverhill.

On the Thames, besides the great docks at Plaistow (Victoria and Albert) and the deep-water docks at Tilbury, the principal calling places for vessels are Grays, Purfleet and Southend, while Barking on the Roding has also shipping trade, and the Lea affords important water-connexions. Elsewhere, the principal port is Harwich, at the mouth of the Stour, one of the chief ports of England for European passenger traffic. Other towns ranking as lesser estuarine ports are: Brightlingsea and Wivenhoe on the Colne, forming a member of the Cinque Port of Sandwich; Colchester, Maldon on the Blackwater, and Burnham-on-Crouch. The Stour, Chelmer, and Lea and Stort are the principal navigable inland waterways.

Population and Administration.—The area of the ancient county is 986,975 acres, with a population in 1891 of 785,445 and in 1901 of 1,085,771. The area of the administrative county is 979,532 acres. The county contains nineteen hundreds. It is divided into eight parliamentary divisions, and it also includes the parliamentary boroughs of Colchester and West Ham, the latter consisting of two divisions. Each of these returns one member. The county divisions are—Northern or Saffron Walden, North-eastern or Harwich, Eastern or Maldon, Western or Epping, Mid or Chelmsford, South-eastern, Southern or Romford, South-western or Walthamstow, returning one member each. The municipal boroughs are—Chelmsford (12,580), Colchester (38,373), East Ham (96,018), Harwich (10,070), Maldon (5565), Saffron Walden (5896), Southend-on-Sea (28,857), and one county borough, West Ham (267,358). The following are the other urban districts—Barking Town (21,547), Braintree (5330), Brentwood (4932), Brightlingsea (4501), Buckhurst Hill (4786), Burnham-on-Crouch (2919), Chingford (4373), Clacton (7456), Epping (3789), Frinton-on-Sea (644), Grays Thurrock (13,834), Halstead (6073), Ilford (41,234), Leigh-on-Sea (3667), Leyton (98,912), Loughton (4730), Romford (13,656), Shoeburyness (4081), Waltham Holy Cross (6549), Walthamstow (95,131), Walton-on-the-Naze (2014), Wanstead (9179), Witham (3454), Wivenhoe (2560), Woodford (13,798). Essex is in the South-eastern circuit, and assizes are held at Chelmsford. The boroughs of Harwich and Southend-on-Sea have separate commissions of the peace, and the boroughs of Colchester, Maldon, Saffron Walden and West Ham have, in addition, separate courts of quarter sessions. The county is ecclesiastically within the diocese of St Albans (with a small portion within that of Ely) and is divided into two archdeaconries; containing 452 parishes or districts wholly or in part. There are 399 civil parishes.

There is a military station and depot for recruits at Warley, and a garrison at Tilbury. At Shoeburyness there are a school of gunnery and an extensive ground for testing government artillery of the largest calibre.

History (see also below under ESSEX, KINGDOM OF).—Essex probably originated as a shire in the time of Æthelstan. According to the Domesday Survey it comprised nineteen hundreds, corresponding very closely in extent and in name with those of the present day. The additional half-hundred of Thunreslan on the Suffolk border has disappeared; Witbrictesherna is now Dengie; and the liberty of Havering-atte-Bower appears to have been taken out of Becontree. Essex and Hertfordshire were under one sheriff until the time of Elizabeth. At the time of the Survey Count Eustace held a vast fief in Essex, and the court of the Honour of Boulogne was held at Witham. Bentry Heath in Dagenham, Hundred Heath in Tendring and Castle Hedingham in Hinckford were the meeting-places of their respective hundreds. The stewardship of the forest of Essex was held by the earls of Oxford until deprived of it for adherence to the Lancastrian cause. In 1421 certain parts of Essex inherited by Henry V. from his mother were brought under the jurisdiction of the duchy of Lancaster.

Essex was part of the see of London from the time of the foundation of the bishopric in the 7th century. The archdeaconries are first mentioned in 1108; that of Essex extended over the south of the county and in 1291 included eight deaneries; the north of the county was divided between the archdeaconries of Middlesex and Colchester, comprising three and six deaneries respectively. Colchester was constituted a suffragan bishopric by Henry VIII. In 1836 Essex was transferred to the diocese of Rochester, with the exception of nine parishes which remained in London. In 1845 the archdeacon of Middlesex ceased to exercise control in Essex, and the deaneries were readjusted. In 1875 Essex was transferred to the newly created diocese of St Albans, and in 1877 the archdeaconry of Essex was subdivided into eighteen deaneries and that of Colchester into sixteen.

Owing to its proximity to the capital Essex was intimately associated with all the great historical struggles. The nobility of Essex took a leading part in the struggle for the charter, and of the twenty-four guardians of the charter, four were Essex barons. The castles of Pleshey, Colchester, and Hedingham were held against the king in the Barons' War of the reign of Henry III., and 5000 Essex men joined the peasant rising of 1381. During the Wars of the Roses the Lancastrian cause was supported by the de Veres, while the Bourchiers and Lord Fitz Walter were among the Yorkist leaders. Several Essex men were concerned in the Gunpowder Plot, and in the Civil War of the 17th century the county rendered valuable aid to the parliament.

After the Conquest no Englishman retained estates in Essex of any importance, and the chief lay barons at the time of the Survey were Geoffrey de Mandeville and Aubrey de Vere. The de Veres, earls of Oxford, were continuously connected with the county until the extinction of the title two centuries ago. Pleshey was the stronghold of the Mandevilles, and, although the house became extinct in 1189, its descendants in the female line retained the title of earls of Essex. The Honour of Hatfield Peverel held by Ranulf Peverel after the Conquest escheated to the crown in the reign of Henry I., and in the same reign the fief of Robert Gernon passed to the house of Mountfichet.

Essex has always been mainly an agricultural county, and the ordinary agricultural pursuits were carried on at the time of the Domesday Survey, which also mentions salt-making, wine-making, bee-culture and cheese-making, while the oyster fisheries have been famous from the earliest historic times. The woollen industry dates back to Saxon times, and for many centuries ranked as the most important industry. Cloth-weaving was introduced in the 14th century, and in the 16th century Colchester was noted for its "bays and says." Colchester also possessed a valuable leather industry in the 16th century, at which period Essex was considered an exceptionally wealthy and prosperous county; Norden, writing in 1594, describes it as "moste fatt, frutefull, and full of all profitable things." The decline of the cloth industry in the 17th century caused great distress, but a number of smaller industries began to take its place. Saffron-culture and silk-weaving were extensively carried on in the 17th century, and the 18th century saw the introduction of the straw-plait industry, potash-making, calico-printing, malting and brewing, and the manufacture of Roman cement.

The county returned four members to parliament in 1290. From 1295 it returned two members for the county and two for Colchester. Maldon acquired representation in 1331 and Harwich in 1604. Under the Reform Act of 1832 the county returned four members in four divisions. Under the Representation of the People Act of 1868 Maldon and Harwich each lost one member, and the county returned six members in three divisions.

Antiquities.—It is supposed by many antiquaries that Saxon masonry can be detected in the foundations of several of the Essex churches, but, with the exception of Ashingdon church tower, believed to have been erected by Canute after his victory over Edmund Ironside, there is no obviously recognizable building belonging to that period. This is probably to be in part ascribed to the fact that the comparative scarcity of stone and the unusual abundance of timber led to the extensive employment of the latter material. Several of the Essex churches, as Blackmore, Mountnessing, Margaretting, and South Benfleet, have massive porches and towers of timber; and St Andrew's church, Greenstead, with its walls of solid oak, continues an almost unique example of its kind. Of the four round churches in England one is in Essex at Little Maplestead; it is both the smallest and the latest. The churches of South Weald, Hadleigh, Blackmore, Heybridge and Hadstock may be mentioned as containing Norman work; with the church of Castle Hedingham for its fine Transitional work; Southchurch, Danbury and Boreham as being partly Early English; Ingatestone, Stebbing and Tilty for specimens of Decorated architecture; and Messing, Thaxted, Saffron Walden, and the church of St Peter ad Vincula at the small town of Coggeshall, near Colchester, as specimens of Perpendicular. Stained glass windows have left their traces in several of the churches, the finest remains being those of Margaretting, which represent a tree of Jesse and the daisy or herb Margaret. Paintings have evidently been largely used for internal decoration: a remarkable series, probably of the 12th century, but much restored in the 14th, exists in the chancel of Copford church; and in the church at Ingatestone there was discovered in 1868 an almost unique fresco representation of the seven deadly sins. The oldest brasses preserved in the county are those of Sir William Fitz-Ralph at Pebmarsh, about 1323; Richard of Beltown, at Corringham, 1340; Sir John Gifford, at Bowers

Gifford, 1348; Ralph de Kneyton, at Aveley, 1370; Robert de Swynbourne, at Little Horkesley, 1391; and Sir Ingelram de Bruyn, at South Ockendon, 1400. The brass of Thomas Heron, aged 14, at Little Ilford, though dating only from 1517, is of interest as a picture of a schoolboy of the period. Ancient wooden effigies are preserved at Danbury, Little Leighs and Little Horkesley.

Essex was rich in monastic foundations, though the greater number have left but meagre ruins behind. The Benedictines had an abbey at Saffron Walden, nunneries at Barking and Wickes, and priories at Earl's or Monk's Colne and Castle Hedingham; the Augustinian canons had an abbey at Waltham (see WALTHAM ABBEY; the portion remaining shows Norman work of the finest character), priories at Thoby, Blackmore, Bicknacre, Little Leighs, Little Dunmow and St Osyth (see BRIGHTLINGSEA); there were Cistercian abbeys at Coggeshall, Stratford and Tilty; the Cluniac monks were settled at Prittlewell, the Premonstratensians at Beleigh Abbey, and the Knights Hospitallers at Little Maplestead. Barking Abbey is said to date its first origin from the 7th century; most of the others arose in the 12th and 13th centuries. Besides the keep at Colchester there is a fine Norman castle at Castle Hedingham, and two dilapidated round towers still stand at Hadleigh near Southend. Ongar, the house of the de Lacys, and Pleshey, the seat of the earls of Essex, have left only mounds. Havering-atte-Bower, the palace that was occupied by many queens, is replaced by a modern house; Wickham, the mansion of the bishops of London, no longer stands. New Hall, which was successively occupied by Henry VIII., Elizabeth, the earl of Essex, George Villiers, duke of Buckingham, and Cromwell, is now a nunnery of the order of the Holy Sepulchre. Audley End, the mansion of Lord Braybrooke, is a noble example of the domestic architecture of the Jacobean period; Layer Marney is an interesting proof of the Italian influences that were at work in the time of Wolsey. Horeham Hall was built by Sir John Cutt in the reign of Henry VII., and Gosfield Hall is of about the same date.

See Norden, *Speculi Britanniae Pars: an Hist. and Geogr. Descrip. of the County of Essex* (1594) (edited for the Camden Society by Sir Henry Ellis, 1840, from the original MS. in the Marquis of Salisbury's library at Hatfield); Nicholas Tindal, *Hist. of Essex* (1720); N. Salmon, *The Hist. and Antiq. of Essex* (London, 1740)—based on the collections of James Strangman of Hadleigh (v. *Trans. of Essex Arch. Soc.* vol. ii.); P. Morant, *Hist. and Antiq. of the County of Essex* (London, 1768); P. Muilman, *New and Complete Hist. of Essex from a late Survey, by a Gentleman* (Chelmsford, 6 vols., 1770–1772, London, 1779); Elizabeth Ogbourne, *Hist. of Essex* (London, part i., 1814); *Excursions through Essex, illustrated with one hundred engravings* (2 vols., London, 1818); T. Wright, *Hist. and Topography of Essex* (1831); W. Berry, *Pedigrees of Families in Essex* (1841); A. Suckling, *Memorials of the Antiquities, &c., of the County of Essex* (London, 1845); W. Andrews (ed.), *Bygone Essex* (London, 1892); J. T. Page (ed.), *Essex in the Days of Old* (London, 1898); *Victoria County History, Essex*; *Transactions of the Essex Arch. Soc.* from 1858. An account of various MS. collections connected with the county is given by H. W. King in vol. ii. of the *Transactions* (1863).

ESSEX, KINGDOM OF, one of the kingdoms into which Anglo-Saxon Britain was divided, properly the land of the East Saxons. Of its origin and early history we have no record except the bare statement of Bede that its settlers were of the Old Saxon race. In connexion with this it is interesting to notice that the East Saxon dynasty claimed descent from Seaxneat, not Woden. The form Seaxneat is identical with Saxnot, one of three gods mentioned in a short continental document probably of Old Saxon origin. Bede does not mention this kingdom in his narrative until 604, the year of the consecration of Mellitus to the see of London. The boundaries of Essex were in later times the rivers Stour and Thames, but the original limits of the kingdom are quite uncertain; towards the west it probably included most if not the whole of Hertfordshire, and in the 7th century the whole of Middlesex. In 604 we find Essex in close dependence upon Kent, being ruled by Saberht, sister's son of Æthelberht, under whom the East Saxons received Christianity. The three sons of Saberht, however, expelled Mellitus from his see, and even after their death in battle against the West Saxons, Eadbald of Kent was unable to restore him. In the year 653 we find Northumbrian influence paramount in Essex, for King Sigeberht at the instance of Oswio became a Christian and received Cedd, the brother of St Chad, in his kingdom as bishop, Tilbury and *Ythanceastere* (on the Blackwater) being the chief scenes of his work. Swithhelm, the successor of Sigeberht, was on terms of friendship with the East Anglian royal house, King Æthelwald being his sponsor at his baptism by Cedd. It was probably about this time that Erconwald, afterwards bishop of London, founded the monastery of Barking. Swithhelm's successors Sighere and Sebbe were dependent on Wulfhere, the powerful king of Mercia, who on the apostasy of Sighere sent Bishop Jaruman to restore the faith. There are grounds for believing that an East Saxon conquest of Kent took place in this reign. A forged grant of Ceadwalla speaks of the fall of Kent before Sighere as a well-known event; and in a Kentish charter dated 676 a king of Kent called Swebhard grants land with the consent of his father King Sebbe. In 692 or 694 Sebbe abdicated and received the monastic vows from Waldhere, the successor of Erconwald at London. His sons Sigeheard and Swefred succeeded him as kings of Essex, Sighere being apparently dead. As the laws of Ine of Wessex speak of Erconwald as "my bishop," it is possible that the influence of Wessex for a short time prevailed in Essex; but a subsequent charter of Swefred is approved by Coenred of Mercia, and Offa, the son of Sighere, accompanied the same king to Rome in 709. From this time onwards the history of Essex is almost a blank. In 743 or 745 Æthelbald of Mercia is found granting privileges at the port of London, and perhaps the western portion of the kingdom had already been annexed, for henceforward London is frequently the meeting-place of the Mercian council. The violent death of Selred, king of Essex, is mentioned in the *Saxon Chronicle* under the year 746; but we have no more information of historical importance until the defeat of the Mercian king Beornwulf in 825, when Essex, together with Kent, Sussex and Surrey, passed into the hands of Egbert, king of Wessex. After 825 we hear of no more kings of Essex, but occasionally of earls. About the year 870 Essex passed into the hands of the Danes and was left to them by the treaty between Alfred and Guthrum. It was reconquered by Edward the Elder. The earldom in the 10th century apparently included several other counties, and its most famous holder was the ealdorman Brihtnoth, who fell at the battle of Maldon in 991.

The following is a list of kings of Essex of whom there is record: Saberht (d. *c.* 617); three sons of Saberht, including probably Saweard and Seaxred; Sigeberht (Parvus); Sigeberht II.; Swithhelm (d. *c.* 664); Sighere (reigned perhaps 664–689); Sebbe, son of Seaxred (664–694); Sigeheard (reigning in 693–694); Swefred (reigning in 693–694 and in 704); the two last being sons of Sebbe; Swebriht (d. 738); Selred (d. 746); Swithred, grandson of Sigeheard (succ. 746); Sigeric, son of Selered (abd. 798); Sigered, son of Sigeric (reigning in 823).

See Bede, *Hist. Eccl.*, edited by C. Plummer (Oxford, 1896), ii. 3, 5; *Saxon Chronicle* (Earle and Plummer, Oxford, 1899), *s.a.* 823, 894, 904, 913, 921, 994; William of Malmesbury, *Gesta Regum*, Rolls Series (ed. Stubbs, 1887–1889); *Simeon of Durham*, *s.a.* 746 (ed. T. Arnold, 1882) and appendix, *s.a.* 738; Florence of Worcester (ed. B. Thorpe, London, 1848–1849); H. Sweet, *Oldest English Texts*, p. 179 (London, 1885). (F. G. M. B.)

ESSLINGEN, a town of Germany, in the kingdom of Württemberg, in a fertile district on the Neckar, 9 m. S.E. from Stuttgart, on the railway to Ulm. Pop. (1905) 29,750. It is surrounded by medieval walls with towers and bastions, and has thirteen suburbs, one lying on an island in the river. On a commanding height above the town lies the old citadel. The inner town has an old (1430) and a new Rathaus, the latter, formerly a palace, an exceedingly handsome edifice. The church of Our Lady (Frauenkirche) is a fine Gothic building of the 15th century, and has a beautifully sculptured doorway and a lattice spire 240 ft. high. The church of St Dionysius dated from the 13th century, and possesses a fine screen and a ciborium of 1486. Esslingen possesses several schools, a theatre and a richly endowed hospital, while its municipal archives contain much valuable literature bearing especially on the period of the Reformation. The town has railway, machine and electrical works; cloth, gloves and buttons are also manufactured here, and there are spinning-mills. There is a large lithographic establishment, and a considerable trade is done in wine and fruit, the wines of Esslingen being very famous.

Esslingen, which dates from the 8th century, became a town in 886. It was soon a place of importance; it became a free imperial city in 1209 and was surrounded with walls by order of the emperor Frederick II. Its liberty was frequently threatened by the rulers of Württemberg, but it did not become part of that country until 1802.

See K. H. S. Pfaff, *Geschichte der Reichsstadt Esslingen* (Esslingen, 1852); and Ströhmfeld, *Esslingen in Wort und Bild* (Esslingen, 1902).

ESTABLISHMENT (O. Fr. *establissement*, Fr. *établissement*, late Norm. Fr. *establishement*, from O. Fr. *establir*, Fr. *établir*, Lat. *stabilire*, to make stable), generally the act of establishing or fact of being established, and so by transference a thing established. Thus we may speak of the establishment (*i.e.* setting up) of a business, the "long establishment" of a business, and of the manager of "the establishment." In a special sense the word is applied, with something of all the three above-mentioned connotations, to certain religious bodies in their relation to the state. It is with this latter that the present article is concerned.

Perhaps the best definition which can be given, and which will cover all cases, is that establishment implies the existence of some definite and distinctive relation between the state and a religious society (or conceivably more than one) other than that which is shared in by other societies of the same general character. Of course, a certain relationship must needs exist between the state and every society, religious or secular, by virtue of the sovereignty of the state over each and all of its members. Every society must possess certain principles or perform certain acts, and the state may make the profession of such principles unlawful, or impose a penalty upon the performance of such acts; and, moreover, every society is liable before the law as to the fulfilment of its obligations towards its members and the due administration of its property should it possess any. With all this establishment has nothing to do. It is not concerned with what pertains to the religious society *qua* society, or with what is common to all religious societies, but with what is exceptional. It denotes any special connexion with the state, or privileges and responsibilities before the law, possessed by one religious society to the exclusion of others; in a word, establishment is of the nature of a monopoly. But it does not imply merely privilege. The state and the Church have mutual obligations towards one another: each is, to some extent, tied by the existence of this relationship, and each accepts the limitations for the sake of the advantages which accrue to itself. The state does so in view of what it believes to be the good of all its members; for "the true end for which religion is established is not to provide for the true faith, but for civil utility" (Warburton), even if the latter be held to be implied in the former. On the other hand, the Church accepts these relations for the facilities which they involve, *i.e.* for its own benefit. It will be seen that this definition excludes, and rightly, many current presuppositions. Establishment affirms the *fact*, but does not determine the precise *nature*, of the connexion between the state and the religious society. It does not tell us, for example, when or how it began, whether it is the result of an unconscious growth (as with the Gallican Church previous to the French Revolution), or of a determinate legislative act (as with the same Church re-established by the Concordat of 1801). It does not tell us whether an endowment of the religious society by the state is included; what particular privileges are enjoyed by the religious society; and what limitations are placed upon the free exercise of its life. These things can only be ascertained by actual inquiry; for the conditions are precisely similar in no two cases.

To proceed to details. At the present day there is no established religion in the United States, the German empire as a whole, Holland, Belgium, France and Austria-Hungary (saving, indeed, "the rights of the sovereign arising from ecclesiastical dignity"[1]); whereas there are religious establishments in Russia, Greece, Sweden, Norway, Denmark, Prussia,[2] Spain, Portugal and even in Italy, as well as in England and Scotland. These, however, differ greatly amongst themselves. In Russia the "Orthodox Catholic Eastern" is the state religion. The emperor is, by the fundamental laws of the empire, "the sovereign defender and protector of the dogmas of the dominant faith, who maintains orthodoxy and holy discipline within the Church," although, of course, he cannot modify either its dogmas or its outward order. Further, "the autocratic (*i.e.* imperial) power acts in the ecclesiastical administration by means of the Most Holy Ruling Synod, created by it"; and all the officers of the Church are appointed by it. The enactments of the Synod do not become law till they have received the emperor's sanction, and are then published, not in its name but in his; and a large part of the revenues of the Church is derived from state subsidies. In Greece "the dominant religion ('H *ἐπικρατοῦσα θρησκεία*) is that of the Eastern Orthodox Church of Christ"; and although toleration is otherwise complete, no proselytism from the Church of Greece is allowed. The king swears to protect it, but no powers pertain to him with regard to it such as those which the tsar enjoys; the present king is not a member of it, but his successors must be. In Sweden, Lutheranism was adopted as the state religion by the synod of Upsala (*Upsala möte*) in 1593, and the king must profess it. The "Lutheran Protestant Church" retains an episcopal order, and is supported out of its own revenues. Archbishops and bishops are chosen by the king out of those names submitted to him, and he also nominates to royal peculiars. The ecclesiastical law (*Kyrkolag*), first constituted in 1686, is part of the law of the state, but may not be modified or abrogated without consent of a General Synod; and although *ad interim* interpretations of that law may be given by the king on the advice of the Supreme Court, since 1866 these have been subject to review and rejection by the next General Synod. In Norway the "Evangelical-Lutheran" is the "official religion," but the Church is supported by the state, its property having been secularized. It is also more subject to the king, who by the constitution is to "regulate all that concerns divine service and the clergy," and to see that the prescribed order is carried out. It is much the same in Denmark, where, however, the "Evangelical-Lutheran Church" has since the fundamental constitutional law of the 5th of June 1849 been officially described as the National Church (*Folkekirche*) instead of the State Church (*Statskirche*) as formerly, and the constitution provides for its regulation by further legislation, which has not yet been passed. For Prussia, see under that heading; it need only be added that self-government still tends to increase, but that the emperor William II. has exercised his office as *summus episcopus* more freely than most of his predecessors. In Spain the "Catholic, Apostolic and Roman" religion is that of the state, "the nation binds itself to maintain its worship and its ministers," and the rites of any other religion are only permitted in private. The patriarch of the Indies and the archbishops are senators by right, and the king may nominate others from amongst the bishops; only laymen may sit in the chamber of deputies. Convents were suppressed, and their property confiscated, in 1835 and 1836; in 1859 the remaining ecclesiastical property was exchanged for untransferable government securities and the support of the clergy of the State Church is assured by an unrepealed law previous to the present constitution. In Portugal it is much the same, but all the home bishops sit in the upper chamber as peers (*Pares do Reino*) by right, and there is no restriction on membership of the chamber of deputies. A more important point is that the king confers all ecclesiastical benefices and nominates the bishops, instead of their being chosen, as in Spain, by agreement between the civil power and the papacy. In Italy, in spite of the feud between the papacy and the civil power, the fact remains that, by the *Statuto fondamentale*, "the Catholic, Apostolic and Roman religion is the sole religion of the state," and the king may nominate "archbishops and bishops of the state" to be senators. The *Legge sulle prerogative del Summo Pontifice*, &c., or "Law of Guarantees," by which the papal prerogatives are secured, has been declared by the Council of State to be a fundamental law; and while many civil restrictions upon the activities of the Church are removed by it, outside Rome and the suburbicarian dioceses the royal *exequatur* is still required before a bishop is installed. Moreover, the bulk of Church property having been secularized, the Italian clergy receive a stipend from the state.

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[1] In effect this involves the establishment of all religious denominations, for none can exist without the express authorization of the state, and all are subject to more or less interference on its part. Thus the emperor-king is, in his capacity of head of the state, technically "bishop" of the Evangelical Church, the constitution of which was fixed by an imperial patent in 1866 and modified by another in 1891 (see Herzog-Hauck, *Realencykl.* ed. 1904, *s.* "Österreich").—[Ed.]

[2] Also in the other German Protestant states. The relations of the Roman Catholic Church with the various governments are settled by separate concordats with the papacy (see Concordat).

Church and State in Britain.

Establishment is, of course, a distinctively English term, but it implies precisely the same thing as "Staatsreligion" or "église dominante" does elsewhere, neither more nor less. It denotes the existence of a special relationship between Church and state without defining its precise nature. The statement that the Church of England or the Scottish Kirk is "established by law" denotes that it has a peculiar status before the law; but that is all. (*a*) There is no basis whatever for the once popular assumption that the word "established" as applied to the Church means "created," or the like; on the contrary, the modern use of the word in this sense is a misleading perversion. To *establish* is to make firm or stable; and a thing cannot be established unless it is already in existence. A few examples will make it clear that this is the true sense of the word, and that in which it is used here. "Stablish the thing, O God, that thou hast wrought in us" (Ps. lxviii. 28, P.B.; A.V. and R.V. "strengthen") implies that the thing is already wrought; it could not be "stablished" else. "Stablish your hearts" (Jas. v. 8) implies that the hearts are already in existence. "Until he had her settled in her raine With safe assuraunce and establishment" (*Faerie Queene*, v. xi. 35) would have been impossible unless the reign had already begun. This is the meaning of the words in many Tudor acts of parliament, "be it enacted, ordained and established," or the like (21 Hen. VIII. c. 1; 27 Hen. VIII. c. 28, s. 9; 28 Hen. VIII. c. 13 [Ireland]; 28 Hen. VIII. c. 18 [Ireland]; 33 Hen. VIII. c. 27; 1 Eliz. c. 1, ss. 15, 17; 1 Eliz. c. 4, s. 4); that which is then and there enacted is to be valid for the future. (*b*) Nor is it necessarily implied that establishment is a process completed once for all. Every law touching the Church slightly alters its conditions; everything that affects the relations of Church and state may be regarded as a measure of establishment, or the reverse. When the two Houses of Parliament, in an address to William III. after his coronation, spoke of their proposed measures of toleration, the king said in his reply, "I do hope that the ease which you design to Dissenters will contribute very much to the establishment of the Church" (Cobbett, *Parl. Hist.* v. 218). And Defoe (in 1702) published an ironical tract with the title, *The Shortest Way with the Dissenters; or Proposals for the Establishment of the Church*. (*c*) Nor is it necessarily implied that there was any specific time at which establishment took place. Such may indeed be the case, as with the Kirk in Scotland; but it certainly cannot be said that the English Church was established at any particular time, or by any particular legislative act. There were, no doubt, periods when the existing relations between Church and state were modified or re-defined, notably in the 16th and 17th centuries; but the relations themselves are far older. In fact, they existed from the very first: the English Church and state grew up side by side, and from the beginning they were in close relations with one another. But although the state of things which it represented was there from the first, the term "established" or "established by law" only came into use at a later date. Until there was some other religious society to be compared with it such a distinctive epithet would have had no point. As, however, there arose religious societies which had no status before the law, it became more natural; and yet more so when the formularies of the Church came to be "established" by civil sanctions (the Books of Common Prayer by 5 and 6 Edw. VI. c. 1, s. 4, &c.; the Articles by 13 Eliz. c. 12; the new Ordinal by 13 and 14 Car. II. c. 4, title). Accordingly the Church itself came to be spoken of as established by law; first, it would seem, in the Canons of 1604, and subsequently in many statutes (Act of Settlement, 6 Anne, c. 8 and c. 11, &c.). In all such cases the Church is described as already established, not as being established by the particular canon or statute. In other words, the constitutional status of the Church is affirmed, but nothing is said as to how it arose.

The legislative changes of the 16th and 17th centuries brought "establishment" into greater prominence and greatly modified its conditions, but a moment's thought will show that it did not begin then. If, *e.g.*, all post-Reformation ecclesiastical statutes were non-existent, the relations between Church and state would be very different, but there would still be an "establishment." The bishops would sit in the House of Lords, the clergy would tax themselves in convocation, the Church courts would possess coercive jurisdiction, and so on. The present relations of Church and state in England may be briefly summed up as follows:—(1) *The personal relation of the crown to the Church*, including (*a*) restraints upon the action of convocation (formulated by 25 Hen. VIII. c. 19); (*b*) nomination of bishops, &c. (25 Hen. VIII. c. 20); (*c*) power of supervision as visitor, long disused (26 Hen. VIII. c. 1; 1 Eliz. c. 1, s. 17); (*d*) power of receiving appeals as the fount of civil justice (25 Hen. VIII. c. 19, &c.). In connexion with these, it must be borne in mind that (*a*) the holder of the crown receives coronation from the church and takes an oath having reference to it (1 Will. III. c. 6), and (*b*) the crown is held on the condition of communion with the Church of England (Act of Settlement; the conditions of communion are laid down in the Prayer Book, which itself is sanctioned by law). (2) *The relation of the Church to the crown in parliament.* No change has been permitted in its doctrine or formularies without the sanction of an act of parliament. (3) *Privileges of the Church and clergy.* Of these may be mentioned (*a*) the coercive jurisdiction of the Church courts; (*b*) the right of bishops to sit in the House of Lords. It need hardly be said that establishment in England does not include an endowment of the Church by the state. Nothing of the kind ever took place on any large scale, and the grants for Church purposes in the 18th century are comparable with the *regium donum* to Nonconformists.

The position of the Church of Ireland until its disestablishment (see below) was not dissimilar. With Scotland the case is different. The establishment of the Kirk was an entirely new process, carried out by a more or less definite series of legislative and administrative acts. The Convention of Estates which met at Edinburgh in 1560 ordered the drawing up of a new Confession of Faith, which was done in four days by a committee of preachers, and on the 24th of August it passed three acts, one abolishing the pope's authority and all jurisdiction of Catholic prelates, another repealing the old statutes in favour of the Old Church, the third forbidding the celebrating and hearing of mass under penalty of imprisonment, exile and death. The intention was to make a clean sweep of the Old Church, which was denounced as "the Kirk Malignant."[1] The new model thus set up was confirmed by the Scottish act of 1567, c. 6, which declared it to be "the onely true and halie kirk of Jesus Christ within this realme." Again, after the revolution of 1688 had put an end to the attempts of the Stuart kings to impose the episcopal model on Scotland, by the act of 1690, c. 5, the crown and estates "ratifie and establish the Confession of Faith, . . . as also they do establish, ratifie and confirm the Presbyterian government and discipline." The "Act of Security" of 1705, as incorporated in the Act of Union 1706, speaking of it "as now by law established," says that "Her Majesty . . . doth hereby establish and confirm" it, and finally declares this act, "with the Establishment therein contained," to be "a fundamental and essential condition of the Union." Nevertheless, the conditions of establishment in the Scottish Kirk are much easier than those of the Church of England. It is bound by the statutes sanctioning its doctrine and order, but within these limits its legislative and judicial freedom is unimpaired. A royal commissioner is present at the meetings of the general assembly, but he need not be a member of the Kirk; and there is no constitutional tie between the crown and the Kirk such as there is in England. There is what may accurately be described as a state endowment, the bulk of the property of the Old Church having been conferred upon the Scottish Kirk.

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[1] Andrew Lang, *Hist. of Scotland*, ii. p. 75 ff. Compare with this the position of the reformers generally in England, where even so stout a Puritan as William Harrison (*Description of England*, 1570) does not dream of separating the organic life of the Church of England from that of the pre-Reformation Church. (Ed.).

Not unnaturally the organization of Anglican Churches in the colonies was followed in some cases by their establishment, which included endowment. It was so, for example, in the East and West Indies; and the disestablishment of the West Indian Church in 1868 was followed, in 1873, by a re-establishment of the Church in Barbados by the colonial legislature. India is the only other part of the empire (outside Great Britain) in which there is to-day a religious establishment.

The Colonies.

Disestablishment is in theory the annulling of establishment; but since an established Church is usually rich, disestablishment generally includes disendowment, even where there is no state endowment of religion. It is, in short, the abrogation of establishment, coupled with such a confiscation of Church property as the state thinks good in the interests of the community. The disestablishment of the West Indian Church in 1868 has already been referred to; in 1869 the Irish Church Disestablishment Bill was passed. Private bills relating to Scotland have more than once been brought forward. In 1895 the Liberal government introduced a suspensory bill, intended as the preliminary step towards disestablishing and disendowing the Church in Wales; it was withdrawn, however, in the same session, and the question of Welsh disestablishment slumbered until in 1906 a royal commission was appointed by the Liberal government to inquire into the subject, and in 1909 a bill was introduced on much the same lines as in 1895.

Disestablishment.

The case of the Irish Church will illustrate the process of disestablishment, although, of course, the precise details would vary in other cases. The Irish Church Act was passed in 1869 by Gladstone's first government, after considerable opposition, and provided that from January 1, 1871, the union created by statute between the Churches of England and Ireland should be dissolved, and the Church of Ireland should "cease to be established by law." Existing ecclesiastical corporations were dissolved, and their rights ceased, compensation being given to all individuals and their personal precedence being secured for life. All rights of patronage, including those of the crown, were abolished, with compensation in the case of private patrons; and the archbishops and bishops ceased to have the right of summons to the House of Lords. All laws restraining the freedom of action of the Church were repealed; the ecclesiastical law, however, to subsist by way of contract amongst the members of the Church (until altered by a representative body). Provision was made for the incorporation by charter of the representative body of the Church, should such a body be found, with power to hold landed property. All existing ecclesiastical property was vested in a commission, which was to give compensation for life interests, to transfer to the new representative body the churches, glebe houses, and £500,000 in compensation for endowments by private persons since 1660, and to hold the rest for such purposes as parliament might thereafter determine.

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ESTABLISHMENT OF A PORT, the technical expression for the time that elapses between the moon's transit across the meridian at new or full moon at a given place and the time of high water at that place. The interval (constant at any one place) may vary from 6 mins. (Harwich) to 11 hrs. 45 mins. (North Foreland). At London Bridge it is 1 hr. 58 mins. (See also TIDE.)

ESTAING, CHARLES HECTOR, COMTE D' (1729-1794), French admiral, was born at the château of Ruvel, Auvergne, in 1729. He entered the army as a colonel of infantry, and in 1757 he accompanied count de Lally to the East Indies, with the rank of brigadier-general. In 1759 he was made prisoner at the siege of Madras, but was released on parole. Before the ratification of his exchange he obtained command of some vessels, and conducted various naval attacks against the English; and having, on his return to France in 1760, fallen accidentally into their hands, he was, on the ground of having broken his parole, thrown into prison at Portsmouth, but as the charge could not be properly substantiated he was soon afterwards released. In 1763 he was named lieutenant-general in the navy, and in 1777 vice-admiral, and in 1778 he obtained the command of a fleet intended to assist the United States against Great Britain. He sailed on the 13th of April, and between the 11th and the 22nd of July, blockaded Howe at Sandy Hook, but did not venture to attack him, though greatly superior in force. In concert with the American generals, he planned an attack on Newport, preparatory to which he compelled the British to destroy some war vessels that were in the harbour; but before the concerted attack could take place, he put to sea against the English fleet, under Lord Howe, when owing to a violent storm, which arose suddenly and compelled the two fleets to separate before engaging in battle, many of his vessels were so shattered that he found it necessary to put into Boston for repairs. He then sailed for the West Indies on the 4th of November. After a feeble attempt to retake Santa Lucia from Admiral Barrington, he captured St Vincent and Grenada. On the 6th of July 1779 he fought a drawn battle with Admiral John Byron, who retired to St Christopher. Though superior in force, D'Estaing would not attack the English in the roadstead, but set sail to attack Savannah. All his attempts, as well as those of the Americans, against the town were repulsed with heavy loss, and he was finally compelled to retire. He returned to France in 1780. He was in command of the combined fleet before Cadiz when the peace was signed in 1783; but from that time his chief attention was devoted to politics. In 1787 he was elected to the assembly of the notables; in 1789 he was appointed commandant of the national guard; and in 1792 he was chosen admiral by the National Assembly. Though in favour of national reform he continued to cherish a strong feeling of loyalty to the royal family, and on the trial of Marie Antoinette in 1793 bore testimony in her favour. On this account, and because of certain friendly letters which had passed between him and the queen, he was himself brought to trial, and was executed on the 28th of April 1794.

See *Marins et soldats français en Amérique*, by the Viscomte de Noailles (1903); Beatson, *Naval and Military Memoirs of Great Britain*, vol. v.

ESTATE (through O. Fr. *estat*, mod. *état*, from Lat. *status*, state, condition, position, *stare*, to stand), the state or condition in which a man lives, now chiefly used poetically and in such phrases as "man's estate," or "of high estate"; "state" has superseded most of the uses of the word except (1) in property and (2) in constitutional law.

1. In the law of property the word is employed in several senses. In the widest sense a man's estate comprises his entire belongings, so much of it as consists of land and certain other interests associated therewith is his "real estate"; the rest is his "personal estate." The word is more particularly applied to interests in land, and in popular and general use "an estate" means the land itself. The strict technical meaning of "an estate" is an interest in lands, and this conception lies at the root of the English theory of property in land. "The first thing that the student has to do," says Joshua Williams (*Law of Real Property*), "is to get rid of the idea of absolute ownership. Such an idea is quite unknown to the English law. No man is in law the absolute owner of lands. He can only hold an estate in them." That is, the notion of tenure, of holding by a tenant from a lord, prevails. The last lord of all from whom all land was ultimately held was the king. Persons holding directly from the king and granting to others were the king's tenants *in capite*, and were the mesne lords of their tenants.

Estates in land may be classified according to (1) the quantity of their interest or duration, (2) the time of enjoyment, and (3) the number and connexion of the tenants. According to (1), an estate may be either a freehold of inheritance or a freehold not of inheritance. A freehold of inheritance may be (*a*) an estate in fee simple, which is the largest estate a man can hold in English law, and comes close to the idea of absolute ownership, repudiated by Williams; an estate in fee simple is inheritable by a man's heirs generally, he has full powers of disposition over it, and may alienate the whole or part. (*b*) It may also be in limited fees, which are again subdivided into (i.) qualified or base fee, (ii.) fee conditional, so called at the common law, afterwards, on the passing of the statute *De Donis Conditionalibus*, fee tail, which may be general as to the heirs of a man's body, or special, as to the heirs *male* (or *female*) of his body. A freehold not of inheritance may be either (1) conventional, as an estate for life, which may be either an estate for one's own life or for the life of another (*pur autre vie*), (2) legal, or created by operation of law, as tenancy in tail after possibility of issue extinct (*i.e.* where an estate is given to a man and the heirs of his body by his present wife, and the wife dies without issue, the husband becomes tenant in tail after possibility of issue extinct), tenancy by curtesy (see CURTESY), tenancy in dower (see DOWER).

Estates not of freehold or less than freehold are subdivided into (i.) estates for years (often called estates for a term of years, the instrument creating it being termed a *lease* or demise, and the estate itself a *leasehold interest*); (ii.) estates at will, that is, where lands or tenements are let by one man to another to have and to hold at the will of the lessor; (iii.) estates at sufferance, where one comes into possession of land under a lawful title, and continues in possession after his title has determined.

According to (2), estates are either in possession or in expectancy. Estates in expectancy are either (*a*) in remainder, which may be vested or contingent, or (*b*) in reversion (see REMAINDER, REVERSION).

According to (3), estates may be either (i.) in severalty, that is, the holding of an estate by a person in his own right only, without any other person being joined or connected with him in point of interest therein; (ii.) estates in joint tenancy (see JOINT); (iii.) coparcenary (*q.v.*); and (iv.) tenancy in common, where two or more hold the same land, by several and distinct titles, but with unity of possession. (See also REAL PROPERTY.)

2. In constitutional law an estate is an order or class having a definite share as such in the body politic, and participating either directly or by its representatives in the government. The system of representation by estates took its rise in western Europe during the 13th century, at a time when the feudal system was being broken up through various causes, notably the growing wealth and power of the towns. In the feudal council the clergy and the territorial nobles had alone had a voice; but the 13th century, to quote Stubbs (*Const. Hist.* ii. 168, ed. 1875), "turns the feudal council into an assembly of estates, and draws the constitution of the third estate from the ancient local machinery which it concentrates." This is, allowing for differences of detail, true of other countries as well as England. To the two estates already existing, clergy and nobles, is added a third, that of the commons (burgesses and knights of the shire) in England, that of the *roturiers* in France (known as the *tiers état*). This division into three estates became the norm, but it was not universal, nor inevitable.[1] Even in England there was a tendency to create other estates, the king for instance treating with the merchants separately for grants of money to be raised by taxing the general body of merchants in the country; and there was a similar tendency on the part of the lawyers. But for the accident of their sitting and voting together, the burgesses and knights of the shire would also have formed separate estates. In Aragon the cortes contained four estates (*brazos* or arms), the clergy, the great barons (*ricos hombres*), the minor barons (knights or *infanzones*), and the towns. The Swedish diet had also four—clergy, barons, burghers and peasants.

The system of estates, based on the medieval conception of society as divided into definite orders, formed the basis of whatever constitutional forms survived in Europe till the French Revolution. In England, of course, it had early become obscured, the House of Commons representing the whole nation outside the narrow order of the peers. The creation of an estate of lesser nobles or landowners had been prevented by the fusion of the knights of the shire with the burgesses; the spiritual estate was ruled out by the determination of the clergy to deliberate and tax themselves in their own convocation, leaving the bishops, as spiritual peers, to represent their interests in parliament.

The phrase "the three estates of the realm" still survives, but to most men it conveys no clear meaning. The erroneous conception early arose—Hallam says it was current among the popular lawyers of the 17th century—that the "three estates" were king, lords and commons, as representing the three great divisions of legislative authority. Such a conception might be possible in Hungary, where the crown of St Stephen symbolizes not so much the royal power as the co-ordination of the powers of all the organs of the state, including the king; but in England the king represents the whole nation and in no sense a separate interest within it, which is the essence of an estate. The phrase "three estates" as applied to the English constitution at present is, in fact, misleading. It is now usually understood of the lords spiritual, the lords temporal, and the commons.

The conception of the "three estates of the realm" as the great divisions of legislative authority led in England to the coining of the phrase "fourth estate," to indicate some power of corresponding magnitude in the state distinct from them. Fielding thus spoke of "the mob," and Hazlitt of Cobbett; but the phrase is now usually applied to the press, a usage originating in a speech by Burke (Carlyle, *Hero-worship*, Lect. v.).

In the constitutional struggles of the European continent, from the Revolution onward, the rival theories of representation by estates and of popular representation have played a great part. The crucial moment of the French Revolution was when the vote according to "order" was rejected and the estates of the clergy and nobles were merged with the *tiers état*, the states-general thus becoming the National Assembly. This was the precedent followed, generally speaking, during the 19th century in the other countries in which constitutional government was established. In most of them the medieval estates lingered on in provincial diets (*Landtage*),[1] and the famous Article XIII. of the Federal Act (*Bundesakte*) of Vienna decreed that "assemblies of estates" should be set up, wherever not already existing, in the German states. The efforts of Metternich and the statesmen of his school were directed, not so much to abolishing the constitutional model, as to establishing it, if need were, on traditional and conservative lines. This is what was meant by the famous reply of the emperor Francis I. to the Magyar deputation: "All the world is playing the fool and demanding fanciful constitutions." When the need for making constitutional concessions became urgent, the attempt was accordingly made to base them on the system of estates. But the central diet convoked in 1847 by Frederick William IV. to Berlin, technically a concentration of provincial estates, quickly converted itself as Metternich had prophesied—into a national assembly; and precisely the same thing happened in the case of the first Austrian parliament in 1848. In Hungary the revolution was in some respects more conservative in character. The March Laws of 1848 preserved the general character of the House of Magnates, comparable to the British House of Lords, but converted the Lower House from what was practically representative of the estate of the lesser nobles into a national representative assembly. Of all the sovereign states of Europe only the grand-duchies of Mecklenburg still (1909) retain the ancient system of estates untouched. The diet, which is common to the two duchies, consists of the *Ritterschaft*, in which all tenants in chivalry (*Rittergutsbesitzer*), whether noble or non-noble, have a voice, and the *Landschaft*, which consists of the chief magistrates of the towns. The former is taken as representative of the peasant proprietors and copy-holders (*Hintersassen*), the latter of the burghers.

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[1] In Scotland the three estates were the prelates, the tenants-in-chief and the burgesses, the third estate joining the others for the first time about the beginning of the 14th century. In 1428 commissioners of shires, men elected by the minor tenants-in-chief, were ordered to appear in parliament; the greater tenants-in-chief then coalesced with the prelates and the three estates were the lords, clerical and lay, the commissioners of shires and the burgesses From 1640 to 1660 parliament was reorganized, the prelates being excluded, but at the Restoration the old order was re-established. The Scottish parliament was accustomed to depute much of its work to a committee, composed of members from each of the three orders, and the committee of the estates was very prominent during the struggle between Charles I and his people.

The plural form ESTATES or STATES (Fr. *états*, Ger. *Stände*) is the name commonly given to an assembly of estates (*assemblée des états*, *Ständeversammlung*). When such an assembly is not merely local or provincial it is called the estates-general or states-general (*états généraux*), *e.g.* in France the assembly of the deputies of the three estates of the realm as distinct from the provincial estates which met periodically in the so-called *pays d'états*.

For further details about the estates in England and elsewhere see W. Stubbs, *Constitutional History*, vol. ii. (1896); H. Hallam, *The Middle Ages* (1855); F. W. Maitland, *Constitutional History of England* (1908); A. Luchaire, *Histoire des institutions monarchiques de la France* (1883–1885); G. Waitz, *Deutsche Verfassungsgeschichte* (Kiel, 1865–1878); and A. S. Rait, *The Scottish Parliament* (1901). See also REPRESENTATION.

ESTATE AND HOUSE AGENTS. A person exercising the calling of a house agent in England is required, under a penalty of £20, to take out yearly a licence upon which £2 is charged as a duty of excise, unless he is licensed as an auctioneer or appraiser, or is an agent employed in the management of landed estates, or a solicitor or conveyancer who has taken out his annual certificate as such. In this connexion a person is deemed to be a house agent if he advertises for sale or for letting, or in any way negotiates for the selling or letting of any furnished house or part of any furnished house (any storey or flat rated and let as a separate tenement being for this purpose a house); subject, however, to the qualification that no one is to be deemed to be a house agent by reason of his letting, or offering to let, or in any way negotiating for the letting of, any house the annual rent or value of which does not exceed £25.

A house agent who is merely instructed to act in the usual way of his calling has no authority to bind his employer by a contract. His business is to endeavour to find a person willing to become a purchaser or tenant and then to communicate his offer to the owner. Unless express authority is given to the agent to sell or let, and for that purpose to enter into a binding contract, the principal reserves his right to accept or refuse the offer. As a rule, a house or estate agent has no authority to receive payment on behalf of the principal. Where he is employed to procure a tenant, he must use reasonable diligence to ascertain that the person to whom the property is let through his agency is fit to be a tenant. He does not, however, in any way guarantee the payment of the rent. A house agent may not, for or in expectation of payment, prepare any deed relating to the sale or letting of real or personal estate. There is, however, no similar prohibition as to agreements not under seal, and it is a common practice for house agents to charge for the preparation of them.

House agents are usually remunerated by way of commission. The scale adopted by the Institute of Estate and House Agents embodies the rates usually charged. In the absence of express provision upon the subject between the principal and the agent, commission is payable only when the latter has found a purchaser or tenant. If, however, he had found a person willing to buy or take property upon the terms upon which the principal intimated to him his willingness to sell or let it, the principal will be liable to pay the amount of the commission, even though in fact he refuses or is unable to sell or let it. Where the agent can show that he has brought about a sale or tenancy he will be entitled to the commission notwithstanding the fact that another agent has been paid, or has recovered in an action, commission in respect of the same sale or tenancy. The agent's authority may be revoked at any time; but, where he has already performed the service for which he was employed, the principal cannot defeat his right to be paid the amount of the commission by subsequently revoking his authority. If the agent is unsuccessful in finding a purchaser or tenant, as the case may be, he will not, as a rule, have any right to remuneration for his efforts in the matter.

Most auctioneers, in addition to holding auctions, carry on the business of house and estate agency. The number of licences issued to house agents and appraisers in England for the year ended 31st March 1899 was 4429, and for the year ended 31st March 1909, 4618. The number of licences issued to auctioneers in England for the corresponding periods was 6389 and 6543 respectively. (H. HA.)

ESTATE DUTY. For purposes of the national revenue in the United Kingdom, the Finance Act 1894 imposed on all property passing by death after the 1st of August 1894 a duty called estate duty, in lieu of certain other duties previously payable. The objects of the act were—(1) simplification of the death duties and equalization as between real and personal property, and (2) aggregation of all the property passing on a death, and taxation at rates graduated according to the value of the whole. Before the act a duty (probate duty) was taken on the free personal property of deceased persons in the hands of the executor or administrator, without regard to the subsequent distribution. The legacy and succession duties were levied on distribution of the property passing on the death, from the persons taking any property under the will or intestacy of the deceased, or under settlement, or by devolution of title on his death. These two latter duties were mutually exclusive, and together covered practically all property passing by death. They were levied at rates graduated according to consanguinity. In 1888 an attempt was made to equalize the rates of the death duties as between property which paid the probate and legacy duties, and property which paid succession duty only. But the Finance Act 1894 replaced the probate duty by a duty extending to all property real or personal passing on or by reference to death, whether by disposition of the deceased or not, without regard to its tenure or destination. The Finance Acts of 1907 and 1909–1910 increased the scale of duties laid down in 1894.

For this purpose all property passing on a death is aggregated to form one estate, on the capital value of which the duty is charged, at rates graduated from 1 to 15% according to the aggregate value. Besides the property of which the deceased was competent to dispose at his death, the aggregated estate includes property in which he had an interest ceasing on his death, from the cesser of which a benefit accrues, or which was disposed of by him within twelve months of death, or at any time, with reservation of an interest to himself. The extent to which property is deemed to pass on the cesser of a limited interest is measured by the proportion of the income to which the interest extended, without regard to the tenure of the deceased or his successor. Property may therefore be included in the aggregate estate at its capital value owing to the passing of a life interest only, the property being settled so that the absolute ownership does not pass at all. But when the duty has once been paid on property passing under a settlement, the property does not again become chargeable until it passes on the death of a person who is or has been competent to dispose of it. To compensate for this advantage, when property passing under a settlement made after the act pays the estate duty, a further duty of 2 % (settlement estate duty) is taken, except where the only subsequent life-interest is that of the wife or husband of the deceased.

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[1] These diets are, wherever they still exist, survivals of the "parliaments" of separate territorial units.

The rate of duty being fixed according to the aggregate capital value of the whole estate, the charge is distributed according to the different modes of disposition of the property comprised in the estate. The duty on the personalty which passes to the executor as such is paid by him, as the probate duty was, and comes out of the general estate. For the other property passing, trustees, or any person to whom it passes for a beneficial interest in possession, are made accountable, and are required to bring in an account of the property and pay the duty. The duty is a first charge on such property, and, when it is paid by a person having a life-interest only, he may charge the *corpus* of the property with it. The duty on real property included in an account is payable by eight yearly or sixteen half-yearly instalments, becoming due twelve months after the death, and bearing interest at 3 % from that date. On other property, except in a few special cases, the duty bears interest at 3 % from the date of the death. When the estate duty has been paid no further duty is chargeable on property comprised in the estate which passes to lineal relations of the deceased. But on property passing to collaterals or strangers legacy or succession duty, as the case may be, is payable by the devisees or successors, at a rate (which is the same whichever duty be payable) fixed according to consanguinity.

For a detailed account of the provisions of the act of 1894 and subsequent amending acts, and of the practical working of the duty, reference is made to Austen-Cartmell, *Finance Acts* (1894-1907); Hanson, *Death Duties* (London, 1904); Soward, *Handbook to the Estate Duty* (4th ed., London, 1900); and to the reports of the commissioners of Inland Revenue for 1894-1895 and subsequent years.

ESTCOURT, RICHARD (1668-1712), English actor, began by playing comedy parts in Dublin. His first London appearance was in 1704 as Dominick, in Dryden's *Spanish Friar*, and he continued to take important parts at Drury Lane, being the original Pounce in Steele's *Tender Husband* (1705), Sergeant Kite in Farquhar's *Recruiting Officer*, and Sir Francis Gripe in Mrs Centlivre's *Busybody*. He was an excellent mimic and a great favourite socially. Estcourt wrote a comedy, *The Fair Example, or the Modish Citizen* (1703), and *Prunella* (1704), an interlude.

ESTE, one of the oldest of the former reigning houses of Italy. It is in all probability of Lombard origin, and descended, according to Muratori, from the princes who governed in Tuscany in Carolingian times. The lordship of the town of Este was first acquired by Alberto Azzo II., who also bore the title of marquis of Italy[1] (d. *c.* 1097); he married Kunitza or Kunegonda, sister of Welf or Guelph III., duke of Carinthia. Welf died without issue, and was succeeded by Welf IV., son of Kunitza, who married a daughter of Otto II., duke of Bavaria, and who obtained the duchy of Bavaria in 1070. Through him the house of Este became connected with the princely houses of Brunswick and Hanover, from which the sovereigns of England are descended. The Italian titles and estates were inherited by Folco I. (1060-1135), son of Alberto Azzo by his second wife Gersende, daughter of Herbert I., count of Maine.[2] The house of Este played a great part in the history of medieval and Renaissance Italy, and it first comes to the front in the wars between the Guelphs and Ghibellines; as leaders of the former party its princes received at different times Ferrara, Modena, Reggio and other fiefs and territories.

Obizzo I., son of Folco, was the first to bear the title of marquis of Este. He entered into the Guelphic league against the emperor Frederick I., and was comprehended in the treaty of Venice of 1177 by which municipal *podestàs* (foreigners chosen as heads of cities to administer justice impartially) were instituted. He was elected podestà of Padua in 1178, and in 1184 he was reconciled with Frederick, who created him marquis of Genoa and Milan, a dignity somewhat similar to that of imperial vicar. By the marriage of his son Azzo to the heiress of the Marchesella family (the story that she was carried off to prevent her marrying an enemy of the Este is a pure legend), he came to acquire great influence in Ferrara, although he was opposed by the hardly less powerful house of Torelli.

Obizzo died in 1194 and Azzo V. having predeceased him, the marquisate devolved on his grandson Azzo VI. (1170-1212), who became head of the Guelph party, and to him the people of Ferrara sacrificed their liberty by making him their first lord (1208). But during his lifetime civil war raged in the city, between the Este and the Torelli, each party being driven out again and again. Azzo (also called Azzolino) died in 1212 and was succeeded by Aldobrandino I., who in 1213 concluded a treaty with Salinguerra Torelli, the head of that house, to divide the government of the city between them. On his death in 1215 he was succeeded by his brother Azzo VII. (1205-1264), surnamed Novello, but Salinguerra Torelli usurped all power in Ferrara and expelled Azzo (1222). In 1240 Pope Gregory IX. determined on another war against the emperor Frederick II., but deemed it wise to begin by crushing the chief Ghibelline houses. Thus Azzo found himself in league with the pope and various Guelph cities in his attempt to regain Ferrara. That town underwent a four months' siege, and was at last compelled to surrender; Salinguerra was sent to Venice as a prisoner, and Azzo ruled in Ferrara once more. The Ghibelline party was annihilated, but the city enjoyed peace and happiness within, although her citizens took part in the wars raging outside. The Guelph cause triumphed, Frederick being defeated several times, and after his death Azzo helped in crushing the terrible Eccelino da Romano (*q.v.*) who upheld the imperial cause, at the battle of Cassano (1259). He died in 1264 and was succeeded by Obizzo II. (1240-1293) his grandson, who in 1288 received the lordship of Modena, and that of Reggio in 1289. He was a capable but cruel ruler, and while professing devotion to the Guelph cause, did homage to the German king Rudolph I. when he descended into Italy.

Obizzo II. died in 1293 and was succeeded by his son Azzo VIII., but the latter's brothers, Aldobrandino and Francesco, who were to have shared in the government, were expelled and became his bitter enemies. The misgovernment of Azzo led to the revolt of Reggio and Modena, which shook off his yoke. Enemies arose on all sides, and he spent his last years in perpetual fighting. He died in 1308, and having no legitimate children, his brothers, his natural son Fresco, and others disputed the succession. A papal legate was appointed, and though the Este returned they were placed under pontifical tutelage.

The history of the house now becomes involved and of little interest until we come to Nicholas III. (1384-1441), who exercised sway over Ferrara, Modena, Parma and Reggio, waged many wars, was made general of the army of the Church, and in his later years governor of Milan, where he died, not without suspicion of poison. To him succeeded Lionello (1407-1450), a wise and virtuous ruler and a patron of literature and art; then Borso (1413-1471), his brother, who was created duke of Modena and Reggio by the emperor Frederick III., and duke of Ferrara by the pope. In spite of the wars by which all Italy was torn, Ferrara enjoyed a period of peace and prosperity under Borso; he patronized literature, established a printing-press at Ferrara, surrounded himself with learned men, and his court was of unparalleled splendour. He also protected industry and commerce, and ruled with great wisdom. His brother Ercole I. (1431–1505), who succeeded him in 1471, was less fortunate, and had to engage in a war with Venice, owing to a dispute about the salt monopoly, with the result that by the peace of 1484 he was forced to cede the district of Polesine to the republic. But the last years of his life were peaceful and prosperous, so that afterwards men looked back to the days of Ercole I. as to a golden age; his capital was noted both for its luxury and as the resort of men eminent in literature and art. Boiardo the poet was his minister, and Ariosto obtained his patronage.

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[1] *i.e.* Margrave of the Empire (*marchio Sancti Imperii*) in Italy. (See MARQUESS.)

[2] Another son of Azzo and Gersende became count of Maine as Hugh III. (d. 1131).

Ercole's daughter Beatrice d'Este (1475–1497), duchess of Milan, one of the most beautiful and accomplished princesses of the Italian Renaissance, was bethrothed at the age of five to Lodovico Sforza (known as *il Moro*), duke of Bari, regent and afterwards duke of Milan, and was married to him in January 1491. She had been carefully educated, and availed herself of her position as mistress of one of the most splendid courts of Italy to surround herself with learned men, poets and artists, such as Niccolò da Correggio, Bernardo Castiglione, Bramante, Leonardo da Vinci and many others. In 1492 she visited Venice as ambassador for her husband in his political schemes, which consisted chiefly in a desire to be recognized as duke of Milan. On the death of Gian Galeazzo Sforza, Lodovico's usurpation was legalized, and after the battle of Fornovo (1495) both he and his wife took part in the peace congress of Vercelli between Charles VIII. of France and the Italian princes, at which Beatrice showed great political ability. But her brilliant career was cut short by death through childbirth, on the 3rd of January 1497. She belongs to the best class of Renaissance women, and was one of the culture influences of the age; to her patronage and good taste are due to a great extent the splendour of the Castello of Milan, of the Certosa of Pavia and of many other famous buildings in Lombardy.

Her sister Isabella d'Este (1474–1539), marchioness of Mantua, was carefully educated both in letters and in the arts like Beatrice, and was married when barely sixteen to Francesco Gonzaga, marquis of Mantua (1490). She showed great diplomatic and political skill, especially in her negotiations with Cesare Borgia (*q.v.*), who had dispossessed Guidobaldo da Montefeltro, duke of Urbino, the husband of her sister-in-law and intimate friend Elisabetta Gonzaga (1502). She received the deposed duke and duchess, as well as other princes in the same condition, at her court of Mantua, which was one of the most brilliant in Italy, and like her sister she gathered together many eminent men of letters and artists, Raphael, Andrea Mantegna and Giulio Romano being among those whom she employed. Both she and her husband were greatly influenced by Baldassare Castiglione (1478–1529), author of *Il Cortigiano*, and it was at his suggestion that Giulio Romano was summoned to Mantua to enlarge the Castello and other buildings. Isabella was "undoubtedly, among all the princesses of the 15th and 16th centuries, the one who most strikingly and perfectly personified the aspirations of the Renaissance" (Eugène Müntz); but her character was less attractive than that of her sister, and in her love of collecting works of art she showed a somewhat grasping nature, being ever anxious to cut down the prices of the artists who worked for her.

To Ercole I. succeeded his son Alphonso I. (1486–1534), the husband of Lucrezia Borgia (*q.v.*), daughter of Pope Alexander VI. During nearly the whole of his reign he was engaged in the Italian wars, but by his diplomatic skill and his military ability he was for many years almost always successful. He was gifted with great mechanical skill, and his artillery was of world-wide reputation. On the formation of the league of Cambrai against Venice in 1508, he was appointed to the supreme command of the papal troops by Julius II.; but after the Venetians had sustained a number of reverses they made peace with the pope and joined him against the French. Alphonso was invited to co-operate in the new combination, and on his refusal war was declared against him; but although he began by losing Modena and Reggio, he subsequently inflicted several defeats on the papal troops. He fought on the side of the French at the battle of Ravenna (1512), from which, although victorious, they derived no advantage. Soon afterwards they retired from Italy, and Alphonso, finding himself abandoned, tried to make his peace with the pope, through the mediation of Fabrizio Colonna. He went to Rome for the purpose and received absolution, but on discovering that Julius meant to detain him a prisoner, he escaped in disguise, and the pope's death in 1513 gave him a brief respite. But Leo X. proved equally bent on the destruction of the house of Este, when he too was cut off by death. Alphonso availed himself of the troubles of the papacy during the reign of the equally hostile Clement VII. to recapture Reggio (1523) and Modena (1527), and was confirmed in his possession of them by the emperor Charles V., in spite of Clement's opposition.

He died in 1534, and was succeeded by his son Ercole II. (1508–1559), who married Renée, daughter of Louis XII. of France, a princess of Protestant proclivities and a friend of Calvin. On joining the league of France and the papacy against Spain, Ercole was appointed lieutenant-general of the French army in Italy. The war was prosecuted, however, with little vigour, and peace was made with Spain in 1558. The duke and his brother, Cardinal Ippolito the Younger, were patrons of literature and art, and the latter built the magnificent Villa d' Este at Tivoli. He was succeeded by Alphonso II. (1533–1597), remembered for his patronage of Tasso, whom he afterwards imprisoned. He reorganized the army, enriched the public library, encouraged agriculture, but was extravagant and dissipated. With him the main branch of the family came to an end, and although at his death he bequeathed the duchy to his cousin Cesare (1533–1628), Pope Clement VIII., renewing the Church's hostility to the house of Este, declared that prince to be of illegitimate birth (a doubtful contention), and by a treaty with Lucrezia, Alphonso's sister, Ferrara was made over to the Holy See. Cesare held Modena and Reggio, but with him the Estensi cease to play an important part in Italian politics. For two centuries this dynasty had been one of the greatest powers in Italy, and its court was perhaps the most splendid in Europe, both as regards pomp and luxury and on account of the eminent artists, poets and scholars which it attracted.

The subsequent heads of the family were: Alphonso III., who retired to a monastery in 1629 and died in 1644; Francis I. (1610–1658), who commanded the French army in Italy in 1647; Alphonso IV. (1634–1662), the father of Mary Beatrice, the queen of James II. of England, who fought in the French army during the Spanish War, and founded the picture gallery of Modena; Francis II. (1660–1694), who originated the Este library, also at Modena, and founded the university; Rinaldo (1655–1737), through whose marriage with Charlotte Felicitas of Brunswick-Lüneburg the long-separated branches of the house of Este were reunited; Francis III. (1698–1780), who married the daughter of the regent Philip of Orleans. Francis III. wished to remain neutral during the war between Spain and Austria (1740), but the imperialists having occupied and devastated his duchy, he took the Spanish side and was appointed *generalissimo* of the Spanish army in Italy. He was re-established in his possessions by the treaty of Aix-la-Chapelle (1748), and on being reconciled with the empress Maria Theresa, he received from her the title of governor of Lombardy in 1754. With his son Ercole III. Rinaldo (1727–1803), who at the peace of Campoformio lost his duchy, the male line of the Estensi came to an end. His only daughter, Marie Beatrice (d. 1829), was married to the archduke Ferdinand, third son of the emperor Francis I. Ferdinand was created duke of Breisgau in 1803, and at his death in 1806 he was succeeded by his son Francis IV. (*q.v.*), to whom the duchy of Modena was given at the treaty of Vienna in 1814. He died in 1846 and was succeeded by Francis V. (*q.v.*), who lost his possessions by the events of 1859. With his death in 1875 the title and estates passed to the archduke Francis Ferdinand, heir to the Austro-Hungarian throne. The children of Lady Augusta Murray, daughter of the earl of Dunmore, by her marriage with Augustus Frederick, duke of Sussex, sixth son of George III. of Great Britain, assumed the old name of d'Este, and claimed recognition as members of the royal family; but as the marriage was in violation of the royal marriages act of 1773, it was declared invalid, and their claims were set aside.

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ESTE (anc. *Ateste*, *q.v.*), a town and episcopal see of Venetia, Italy, in the province of Padua, 20 m. S.S.W. of it by rail. Pop. (1901) 8671 (town); 10,779 (commune). It lies 49 ft. above sea-level below the southern slopes of the Euganean Hills. The external walls of the castle still rise above the town on the N., but the interior is now occupied by the cattle-market. A fragment of the once enormous Palazzo Mocenigo, of the 16th century, is now occupied by the important archaeological museum (see ATESTE). The cathedral was erected in 1690–1720, on the site of an older building destroyed by an earthquake in 1688. S. Martino is a church in the Lombard Romanesque style. The archives in the Palazzo Comunale are important.

After the Roman period the history of Este is a blank until the Lombard period, in which it was dependent on Monselice. In the 10th century the family of Este (see above) established itself in the castle above the town. At the end of the 13th century Padua, which had already captured Este more than once, became definitely mistress of it. When the Carrara family succumbed in 1405, Este voluntarily surrendered to Venice and was allowed its independence, under a podestà; and thenceforth it followed the fortunes of Venetia.

ESTÉBANEZ CALDERÓN, SERAFÍN (1799–1867), a Spanish author, best known by the pseudonym of "El Solitario," was born at Málaga on the 27th of December 1799. His first literary effort was *El Listón verde*, a poem signed "Safinio" and written to celebrate the revolution of 1820. He was called to the bar, and settled for some time at Madrid, where he published a volume of verses in 1831 under the assumed name of "El Solitario." He obtained an exaggerated reputation as an Arabic scholar, and played a minor part in the political movements of his time. He died at Madrid on the 5th of February 1867. His most interesting work, *Escenas andaluzas* (1847), is in a curiously affected style, the vocabulary being partly archaic and partly provincial; but, despite its eccentric mannerisms, it is a vivid record of picturesque scenes and local customs. Estébanez Calderón is also the author of an unfinished history, *De la conquista y pérdida de Portugal* (1883), issued posthumously under the editorship of his nephew, Antonio Cánovas del Castillo.

ESTELLA, a town of northern Spain, in the province of Navarre, on the left bank of the river Ega, 15 m. W.S.W. of Pamplona. Pop. (1900) 5736. Estella, which occupies the site of a Roman town of uncertain name, contains several monasteries and churches, a medieval citadel, and a college which was formerly a university. Its principal industries are the manufacture of woollen and linen fabrics and brandy-making; and it has a considerable trade in fruit, wine and cattle. Estella commands several defiles on the roads from Castile and Aragon, and on that account occupies a position of considerable strategic importance. It was long the headquarters of Don Carlos, who was proclaimed king here in 1833. In 1873 it was the chief stronghold of the Carlists, and in 1874, when driven from other places, they succeeded in retiring to Estella. On the 16th of February 1876 the Carlists in the town surrendered unconditionally. For an account of the Carlist rising see SPAIN: *History*.

ESTERHÁZY OF GALÁNTHA, a noble Magyar family. Its origin has been traced, not without some uncertainty, to Salamon of Estoras, whose sons Péter and Illyés divided their patrimony in 1238. Péter founded the family of Zerházy, and Illyés that of Illyesházy, which became extinct in the male line in 1838. The first member of the family to emerge definitely into history was Ferencz Zerházy (1563–1594), vice lord-lieutenant of the county of Pressburg, who took the name of Esterházy when he was created *Freiherr* of Galántha, an estate acquired by the family in 1421. His eldest son, Dániel (d. 1654), founded the house of Czesznek, the third, Pál (d. 1641), the line of Zólyom (Altsohl), and the fourth, Miklós, that branch of the family which occupies the most considerable place in Hungarian history, that of Fraknó or Forchtenstein.

This MIKLÓS [Nicholas] ESTERHÁZY of Galántha (1582–1645) was born at Galántha on the 8th of April 1582. His parents were Protestants, and he himself, at first, followed the Protestant persuasion; but he subsequently went over to Catholicism and, along with Cardinal Pázmány, his most serious rival at court, became a pillar of Catholicism, both religiously and politically, and a worthy opponent of the two great Protestant champions of the period, Gabriel Bethlen and George I. Rákóczy. In 1611 he married Orsolyá, the widow of the wealthy Ferencz Mágocsy, thus coming into possession of her gigantic estates, and in 1622 he acquired Fraknó. Matthias II. made him a baron (1613), count of Beregh (1617), and lord-lieutenant of the county of Zólyom and *magister curiae regiae* (1618). At the coronation of Ferdinand II., when he officiated as grand-standard-bearer, he received the order of the Golden Fleece and fresh donations. At the diet of Sopron, 1625, he was elected palatine of Hungary. As a diplomatist he powerfully contributed to bring about the peace of Nikolsburg (1622) and the peace of Linz (1645) (see HUNGARY: *History*). His political ideal was the consolidation of the Habsburg dynasty as a means towards freeing Hungary from the Turkish yoke. He himself, on one occasion (1623), defeated the Turks on the banks of the Nyitra; but anything like sustained operations against them was then impossible. He was also one of the most eminent writers of his day. He died at Nagy-Heflán on the 11th of September 1645, leaving five sons.

See *Works of Nicholas Esterházy*, with a biography by Ferencz Toldi (Hung.) (Pest, 1852); *Nicholas Count Esterházy, Palatine of Hungary* (a biography, Hung.) (Pest, 1863–1870).

His third son PÁL [Paul] (1635–1713), prince palatine, founded the princely branch of the family of Esterházy. He was born at Kis Marton (Eisenstadt) on the 7th of September 1635. In 1663 he fought, along with Miklós Zrinyi, against the Turks, and distinguished himself under Montecuculi. In 1667 he was appointed commander-in-chief in south Hungary, where he defeated the malcontents at Leutschau and Györk. In 1681 he was elected palatine. In 1683 he participated in the deliverance of Vienna from the Turks, and entered Buda in 1686 at the head of 20,000 men. Thoroughly reactionary, and absolutely devoted to the Habsburgs, he contributed more than any one else to the curtailing of the privileges of the Magyar gentry in 1687, when he was created a prince of the Empire, with (in 1712) succession to the first-born of his house. His "aulic tendencies" made him so unpopular that his offer of mediation between the Rákóczy insurgents and the government was rejected by the Hungarian diet, and the negotiations, which led to the peace of Szatmár (see HUNGARY: *History*), were entrusted to János Pállfy. He died on the 26th of March 1713. He loved the arts and sciences, wrote several religious works, and was one of the chief compilers of the *Trophaeum Domus Inclytae Estoratianae*.

See Lajos Merényi, *Prince Paul Esterházy* (Hung.) (Budapest, 1895).

Prince PÁL ANTAL, grandson of the prince palatine Pál, was a distinguished soldier, who rose to the rank of field-marshal in 1758. On his death in 1762 he was succeeded by his brother.

Prince Miklós József [Nicholas Joseph] (1714–1790), also a brilliant soldier, is perhaps best remembered as a patron of the fine arts. For his services in command of an infantry brigade at Kolin (1757) he was specially mentioned by Count Daun, and became one of the original members of the order of Maria Theresa. In 1762 he was appointed captain of Maria Theresa's Hungarian bodyguard, in 1764 *Feldzeugmeister*, and in 1768 field marshal. His other honours included the Golden Fleece and the grade of commander in the order of Maria Theresa. Joseph II. conferred the princely title, which had previously been limited to the eldest-born of the house, on all his descendants, male and female. Esterházy died in Vienna on the 28th of September 1790. He rebuilt in the Renaissance style Schloss Esterházy, the splendour of which won for it the name of the Hungarian Versailles. Haydn was for thirty years conductor of his private orchestra and general musical director, and many of his compositions were written for the private theatre and the concerts of this prince.

His grandson, Prince Miklós [Nicholas] (1765–1833) was born on the 12th of December 1765. He began life as an officer in the guards, subsequently making the grand tour, which first awakened his deep interest in art. He quitted the army for diplomacy after reaching the rank of *Feldzeugmeister*, and was employed as extraordinary ambassador, on special occasions, when he displayed a magnificence extraordinary even for the Esterházys. He made at Vienna an important collection of paintings and engravings, which came into the possession of the Hungarian Academy at Budapest in 1865. At his summer palace of Kis Marton (Eisenstadt) he erected a monument to Haydn. His immense expenditure on building and the arts involved the family in financial difficulties for two generations. When the French invaded Austria in 1797, he raised a regiment of 1000 men at his own expense. In 1809, when Napoleon invited the Magyars to elect a new king to replace the Habsburgs, overtures were made to Prince Nicholas, who refused the honour and, further, raised a regiment of volunteers in defence of Austrian interests. He died at Como on the 24th of November 1833.

His son, Prince Pál Antal [Paul Anthony] (1786–1866), entered the diplomatic service. In 1806 he was secretary of the embassy in London, and in 1807 worked with Prince Metternich in the same capacity in Paris. In 1810 he was accredited to the court of Dresden, where he tried in vain to detach Saxony from Napoleon, and in 1814 he accompanied his father on a secret mission to Rome. He took a leading part in all the diplomatic negotiations consequent upon the wars of 1813–1815, especially at the congress of Châtillon, and on the conclusion of peace was, at the express desire of the prince regent, sent as ambassador to London. In 1824 he represented Austria as ambassador extraordinary at the coronation of Charles X., and was the premier Austrian commissioner at the London conferences of 1830–1836. In 1842 he quitted diplomacy for politics and attached himself to "the free-principles party." He was minister for foreign affairs in the first responsible Hungarian ministry (1848), but resigned his post in September bcause he could see no way of reconciling the court with the nation. The last years of his life were spent in comparative poverty and isolation, as even the Esterházy-Forchtenstein estates were unequal to the burden of supporting his fabulous extravagance and had to be placed in the hands of curators.

The cadet branch of the house of Fraknó, the members of which bear the title of count, was divided into three lines by the sons of Ferencz Esterházy (1641–1683).

The eldest of these, Count Antal (1676–1722), distinguished himself in the war against Rákóczy in 1703, but changed sides in 1704 and commanded the left wing of the Kuruczis at the engagements of Nagyszombat (1704) and Vereskő (1705). In 1706 he defeated the imperialist general Guido Stahremberg and penetrated to the walls of Vienna. Still more successful were his operations in the campaign of 1708, when he ravaged Styria, twice invaded Austria, and again threatened Vienna, on which occasion the emperor Joseph narrowly escaped falling into his hands. In 1709 he was routed by the superior forces of General Sigbert Heister at Palota, but brought off the remainder of his arms very skilfully. In 1710 he joined Rákóczy in Poland and accompanied him to France and Turkey. He died in exile at Rodosto on the shores of the Black Sea. His son Bálint József [Valentine Joseph], by Anna Maria Nigrelli, entered the French army, and was the founder of the Hallewyll, or French, branch of the family, which became extinct in the male line in 1876 with Count Ladislas.

See *Count Esterházy's Campaign Diary* (Hung.), ed. by K. Thaly (Pest, 1901).

Count Bálint Miklós (1740–1805), son of Bálint József, was an enthusiastic partisan of the duc de Choiseul, on whose dismissal, in 1764, he resigned the command of the French regiment of which he was the colonel. It was Esterházy who conveyed to Marie Antoinette the portrait of Louis XVI. on the occasion of their betrothal, and the close relations he maintained with her after her marriage were more than once the occasion of remonstrance on the part of Maria Theresa, who never seems to have forgotten that he was the grandson of a rebel. At the French court he stood in high favour with the comte d'Artois. He was raised to the rank of maréchal de camp, and made inspector of troops in the French service in 1780. At the outbreak of the French Revolution, he was stationed at Valenciennes, where he contrived for a time to keep order, and facilitated the escape of the French *emigrés* by way of Namur; but, in 1790, he hastened back to Paris to assist the king. At the urgent entreaty of the comte d'Artois in 1791 he quitted Paris for Coblenz, accompanied Artois to Vienna, and was sent to the court of St Petersburg the same year to enlist the sympathies of Catherine II. for the Bourbons. He received an estate from Catherine II., and although the gift was rescinded by Paul I., another was eventually granted him. He died at Grodek in Volhynia on the 23rd of July 1805.

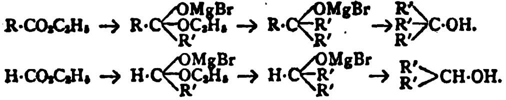
See *Mémoires*, ed. by E. Daudet (Fr.) (Paris, 1905), and *Lettres* (Paris, 1906).

Two other sons of Count Ferencz (d. 1685), Ferencz and József, founded the houses of Dotis and Cseklész (Landschütz) respectively. Of their descendants, Count Móricz (1807–1890) of Dotis, Austrian ambassador in Rome until 1856, became in 1861 a member of the ministry formed by Anton Schmerling, and in 1865 joined the clerical cabinet of Richard Belcredi. His bitter hostility to Prussia helped to force the government of Vienna into the war of 1866. His official career closed in 1866, but he remained one of the leaders of the clerical party.

See also Count János Esterházy, *Description of the Esterházy Family* (Hung., Budapest, 1901). (R. N. B.)

ESTERS, in organic chemistry, compounds formed by the condensation of an alcohol and an acid, with elimination of water; they may also be considered as derivatives of alcohols, in which the hydroxylic hydrogen has been replaced by an acid radical, or as acids in which the hydrogen of the carboxyl group has been replaced by an alkyl or aryl group. In the case of the polybasic acids, all the hydrogen atoms can be replaced in this way, and the compounds formed are known as "neutral esters." If, however, some of the hydrogen of the acid remain undisplaced, then "acid esters" result. These acid esters retain some of the characteristic properties of the acids, forming, for example, salts, with basic oxides. Esters may be prepared by heating the silver salt of an acid with an alkyl iodide; by heating the alcohols or alcoholates with an acid chloride; by distilling the anhydrous sodium salt of an acid with a mixture of the alcohol and concentrated sulphuric acid; or by heating for some hours on the water bath, a mixture of an acid and an alcohol, with a small quantity of hydrochloric or sulphuric acids (E. Fischer and A. Speier, *Ber.*, 1896, 28, p. 3252).

The esters of the aliphatic and aromatic acids are colourless neutral liquids, which are generally insoluble in water, but readily dissolve in alcohol and ether. Many possess a fragrant odour and are prepared in large quantities for use as artificial fruit essences. They hydrolyse readily when boiled with solutions of caustic alkalies or mineral acids, yielding the constituent acid and alcohol. When heated with ammonia, they yield acid amides (*q.v.*). They form unstable addition products with sodium ethylate or methylate. With the Grignard reagent, they form addition compounds which on the addition of water yield tertiary alcohols, except in the case of ethyl formate, where a secondary alcohol is obtained.



$$R\cdot CO_2C_2H_5 \rightarrow R\cdot C\begin{cases}OMgBr\\OC_2H_5\\R'\end{cases} \rightarrow R\cdot C\begin{cases}OMgBr\\R'\\R'\end{cases} \rightarrow \begin{matrix}R'\\R'\\R'\end{matrix}\Big\rangle C\cdot OH.$$

$$H\cdot CO_2C_2H_5 \rightarrow H\cdot C\begin{cases}OMgBr\\OC_2H_5\\R'\end{cases} \rightarrow H\cdot C\begin{cases}OMgBr\\R'\\R'\end{cases} \rightarrow \begin{matrix}R'\\R'\end{matrix}\Big\rangle CH\cdot OH.$$

N. Menschutkin (*Ber.*, 1882, 15, p. 1445; *Ann.*, 1879, 195, p. 334) examined the rate of esterification of many acids with alcohols. It was found that the normal primary alcohols were all esterified at about the same rate, the secondary alcohols more slowly than the primary, and the tertiary alcohols still more slowly. The investigation also showed that the nature of the acid used affected the result, for in an homologous series of acids it was found that as the molecule of the acid became more complex, the rate of esterification became less. The formation of an ester by the interaction of an acid with an alcohol is a "reversible" or "balanced" action, for as M. Berthelot and L. Péan de St Gilles (*Ann. Chim. Phys.*, 1862 (3), 65, p. 385 et seq.) have shown in the case of the formation of ethyl acetate from ethyl alcohol and acetic acid, a point of equilibrium is reached, beyond which the reacting system cannot pass, unless the system be disturbed in some way by the removal of one of the products of the reaction. V. Meyer (*Ber.*, 1894, 27, p. 510 et seq.) showed that in benzenoid compounds ortho-substituents exert a great hindering effect on the esterification of alcohols by acids in the presence of hydrochloric acid, this hindering being particularly marked when two substituents are present in the ortho positions to the carboxyl group. In such a case the ester is best prepared by the action of an alkyl halide on the silver salt of the acid, and when once prepared, can only be hydrolysed with great difficulty.

Ethyl formate, $H\cdot CO_2C_2H_5$, boils at 55° C and has been used in the artificial preparation of rum. Ethyl acetate (acetic ether), $CH_3\cdot CO_2C_2H_5$, boils at 75° C. Isoamylisovalerate, $C_4H_9\cdot CO_2C_5H_{11}$, boils at 196° C. and has an odour of apples. Ethyl butyrate, $C_3H_7\cdot CO_2C_2H_5$, boils at 121° C. and has an odour of pineapple. The fats (*q.v.*) and waxes (*q.v.*) are the esters of the higher fatty acids and alcohols. The esters of the higher fatty acids, when distilled under atmospheric pressure, are decomposed, and yield an olefine and a fatty acid.

Esters of the mineral acids are also known and may be prepared by the ordinary methods as given above. The neutral esters are as a rule insoluble in water and distil unchanged; on the other hand, the acid esters are generally soluble in water, are non-volatile, and form salts with bases. *Ethyl hydrogen sulphate* (sulphovinic acid), $C_2H_5\cdot HSO_4$, is obtained by the action of concentrated sulphuric acid on alcohol. The ester is separated from the solution by means of its barium salt, and the salt decomposed by the addition of the calculated amount of sulphuric acid. It is a colourless oily liquid of strongly acid reaction; its aqueous solution decomposes on standing and on heating it forms diethyl sulphate and sulphuric acid. *Dimethyl sulphate*, $(CH_3)_2SO_4$, is a colourless liquid which boils at 187°-188° C., with partial decomposition. It is used as a methylating agent (F. Ullmann). Great care should be taken in using dimethyl and diethyl sulphates, as the respiratory organs are affected by the vapours, leading to severe attacks of pneumonia. *Ethyl nitrate*, $C_2H_5\cdot ONO_2$, is a colourless liquid which boils at 86·3° C. It is prepared by the action of nitric acid on ethyl alcohol (some urea being added to the nitric acid, in order to destroy any nitrous acid that might be produced in secondary reactions and which, if not removed, would cause explosive decomposition of the ethyl nitrate). It burns with a white flame and is soluble in water. When heated with ammonia it yields ethylamine nitrate, and when reduced with tin and hydrochloric acid it forms hydroxylamine (*q.v.*) (W. C. Lossen). *Ethyl nitrite*, $C_2H_5\cdot ONO$, is a liquid which boils at 18° C.; the crude product obtained by distilling a mixture of alcohol, sulphuric and nitric acids and copper turnings is used in medicine under the name of "sweet spirits of nitre." *Amyl nitrite*, $C_5H_{11}\cdot ONO$, boils at 96° C. and is used in the preparation of the anhydrous diazonium salts (E. Knoevenagel, *Ber.*, 1890, 23, p. 2094). It is also used in medicine.

ESTHER. The *Book of Esther*, in the Bible, relates how a Jewish maiden, Esther, cousin and foster-daughter of Mordecai, was made his queen by the Persian king Ahasuerus (Xerxes) after he had divorced Vashti; next, how Esther and Mordecai frustrated Haman's endeavour to extirpate the Jews; how Haman, the grand-vizier, fell, and Mordecai succeeded him; how Esther obtained the king's permission for the Jews to destroy all who might attack them on the day which Haman had appointed by lot for their destruction; and lastly, how the feast of Purim (Lots ?) was instituted to commemorate their deliverance. Frequent incidental references are made to Persian court-usages (explanations are given in i. 13, viii. 8), while on the other hand the religious rites of the Jews (except fasting), and even Jerusalem and the temple, and the name of Israel, are studiously ignored. Even the name of God is not once mentioned, perhaps from a dread of its profanation during the Saturnalia of Purim. The early popularity of the book is shown by the interpolated passages in the Septuagint and the Old Latin versions.

The criticism of *Esther* began in the 18th century. As soon as the questioning spirit arose, the strangeness of many statements in the book leaped into view. A moderate scholar of our day can find no historical nucleus, and calls it a sort of historical romance.[1] The very first verses in the book startle the reader by their exaggerations, *e.g.* a banquet lasting 180 days, "127 provinces." Farther on, the improbabilities of the plot are noticeable. Esther, on her elevation, keeps her Jewish origin secret (ii. 10; cf. vii. 3 ff.), although she has been taken from the house of her uncle, who is known to be a Jew (iii. 4; cf. vi. 13), and has remained in constant intercourse with him (ii. 11, 19, 20, 22; cf. iv. 4-17). We are further told that the grand-vizier was an Agagite or Amalekite (iii. 1, &c.); would the nobility of Persia have tolerated this ? Or did Haman too keep his non-Persian origin secret? Also that Mordecai offered a gross affront to Haman, for which no slighter punishment would satisfy Haman than the destruction of the whole Jewish race (iii. 2-6). Of this savage design eleven months' notice is given (iii. 12-14); and when the danger has been averted by the cleverness of Esther, the provincial Jews are allowed to butcher 75,000, and those in the capital 800 of their Persian fellow-subjects (ix. 6-16).

It is urged, on the other hand, that the assembly mentioned in i. 3 may be that referred to by Herodotus (vii. 8) as having preceded the expedition against Greece. This hypothesis, however, requires us to suppose that Xerxes had returned from Sardis to Susa by the tenth month of the seventh year of his reign, which is barely credible. In the reckoning of 127 provinces (cf. Dan. vi. 1; 1 Esd. iii. 2) satrapies and sub-satrapies may be confounded. It is at any rate correct to include India among the provinces; this is justified, not only by Herodotus (iii. 94), but by the inscriptions of Darius at Persepolis and Naksh-i-Rustam. Herodotus again (vii. 8) confirms the custom referred to in Esth. ii. 12. But what authority can make the conduct of Mordecai credible ? To-day the harem is impenetrable, while "any one declining to stand as the grand-vizier passes is almost beaten to death."[2] This, surely, is what a real Mordecai would have suffered from a real Haman. Even the capricious Xerxes would never have permitted the entire destruction of one of the races of the empire, nor would a vizier have proposed it.

Serious difficulties of another kind remain. Mordecai is represented as a fellow-captive of Jeconiah (597 B.C.), and grand-vizier in Xerxes's twelfth year (474 B.C.)! This is parallel to the strange statement in Tobit xiv. 15. And how can we find room for Esther as queen by the side of Amestris (Herod. vii. 14, ix. 112)? How, too, can a Jewess have been a legal queen (see Herod. iii. 84) ? Then take the supposed Persian proper names. "Ahasuerus" may no doubt stand, but very few of the rest (see Nöldeke, *Ency. Bib.* col. 1402). As to the style, the general verdict is that it points to a late date (see Driver, *Introd.*^{6}, p. 484). Altogether, critics decline to date the book earlier than the 3rd or even 2nd century B.C.

So far we have only been carrying on 18th-century criticism. In more recent years, however, new lines of inquiry have been opened up. First of all by the great Semitic scholar Lagarde. His thesis (seldom defended now) was that Purim corresponds to Fûrdigan, the name of the old Persian New Year's and All Souls' festival held in spring, on which the Persians were wont to exchange presents (cf. Esth. ix. 19). In 1891 came a new explanation of Esther from Zimmern. It is true that in its earlier form his theory was very incomplete. But in justice to this scholar we may notice that from the first he looked for light to Babylonia, and that many other critics now take up the same position. There is also another new point which has to be mentioned, viz. that, judging from our experience elsewhere, the Book of Esther has probably passed through various stages of development. Here, then, are two points which call for investigation, viz. (1) a possible mythological element in Esther, and (2) possible stages of development prior to that represented by the Hebrew text.

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[1] Kautzsch, *Old Testament Literature* (1898), p. 130.

[2] So Morier, the English minister to the Persian court, quoted by Dean Stanley.

As to the first point. The Second Targum (on Esth. ii. 7) long ago declared that Esther was so called "because she was like the planet Venus." Recent scholars have expressed the same idea more critically. Esther is a modification of Ishtar, the name of the Babylonian goddess of fertility and of the planet Venus, whose myth must have been partially known to the Israelites even in pre-exilic times,[1] and after the fall of the state must have acquired a still stronger hold on Jewish exiles. A general knowledge of the myth of Marduk among the Israelites cannot indeed be proved. Singularly enough, the Babylonian colonists in the cities of Samaria are said to have made idols, not of Marduk, but of a deity called Succoth-benoth[2] (2 Kings xvii. 30). Nor does the Second Targum help us here; it gives a wild explanation of Mordecai as "pure myrrh." Still it is plain that the name of the god Marduk (Merodach) was known to the Jews, and the Cosmogony in Gen. i. is considered by critics to have ultimately arisen out of the myth of Marduk's conflict with the dragon (see COSMOGONY). At any rate the name Mordecai (the vocalization is uncertain) looks very much like Marduk, which, with terminations added, often occurs in cuneiform documents as a personal name.[3] Add to this, that, according to Jensen, Ishtar in mythology was the cousin of Marduk, just as the legend represents Esther as the cousin of Mordecai.[4] The same scholar also accounts for Esther's other name Hadassah (Esth. ii. 7); *hadasshatu* in Babylonian means "bride," which may have been a title of Ishtar.

But we cannot stop short here. Unless the mythological key can also explain Haman and Vashti, it is of no use. Jensen, now followed by Zimmern, is equal to the occasion. Haman, he says, is a corruption of Hamman or Humman or Uman, the name of the chief deity of the Elamites, in whose capital (Susa) the scene of the narrative is laid, while Vashti is Mashti (or Vashti), probably the name of an Elamite goddess.

Following the real or fancied light of these names, Prof. Jensen holds that the Esther-legend is based on a mythological account of the victory of the Babylonian deities over those of Elam, which in plain prose means the deliverance of ancient Babylonia from its Elamite oppressors, and that such an account was closely connected with the Babylonian New Year's festival, called Zagmuk, just as the Esther-legend is connected with the festival of Purim.

We are bound, however, to mention some critical objections. (1) The Babylonian festival corresponding to Purim was not the spring festival of Zagmuk, but the summer festival of Ishtar, which is probably the Sacaea of Berossus, an orgiastic festival analogous to Purim. (2) According to Jensen's theory, Mordecai, and not Esther, ought to be the direct cause of Haman's ruin. (3) No such Babylonian account as Jensen postulates can be indicated. (4) The identifications of names are hazardous. Fancy a descendant of Kish called Marduk, and an "Agagite" called Hamman! Elsewhere Mordecai (Ezra ii. 2; Neh. vii. 7) occurs among names which are certainly not Persian (Bigvai is no exception), and Haman (Tobit xiv. 10) appears as a nephew of Achiachar, which is not a Persian name. Esther, moreover, ought to be parallel to Judith; fancy likening the representative of Israel to the goddess Ishtar!

Next, as to the preliminary literary phases of Esther. Such phases are probable, considering the later phases represented in the Septuagint. There may have once existed in Hebrew a story of the deadly feud between Mordecai (if that be the original name) and Haman, with elements suggested by the story of the battle between the Supreme God and the dragon (see COSMOGONY). As the legend stands, Mordecai and Esther seem to be in each other's way. In a passage (i. 5 in LXX.) only found in the Septuagint, but which may have belonged to the original Esther, reference is made to a dream of Mordecai respecting two great dragons, *i.e.* Mordecai and Haman (x. 7). This seems to confirm the view here mentioned. If so, however, there must also have been an Esther-legend, which was afterwards worked up with that of Mordecai. This is, in fact, the view of Erbt. Winckler takes a different line. Linguistic facts and certain points in the contents seem to him to show that our Esther is a work of the age of the Seleucidae; more precisely he thinks of the time of the revolt of Molon under Antiochus III. Of course there was a Book of Esther before this, and even in its redacted form our Esther reflects the period of three Persian kings, via. Cyrus, Cambyses and Darius. Lastly, Cheyne (*Ency. Bib.* "Purim," § 7), while agreeing with Winckler that the book is based on an earlier narrative, holds that that earlier text differed more widely from the present in its geographical and historical setting than Winckler seems to suppose. The problem of the origin of the name Purim, however, can hardly be said to have received a final solution.

BIBLIOGRAPHY.—Kuenen, *History of Israel*, iii. (1875), 148-153; Lagarde, *Purim* (1887); Zimmern in Stade's *Zeitschrift*, xi. (1891), pp. 157-169, and *Keilinschriften und das Alte Testament*$^{(3)}$, 485, 515-520, Jensen in Wildeboer's *Esther* (in Marti's series, 1898), pp. 173-175; Winckler, *Keilinschriften und das Alte Testament*$^{(3)}$, p. 288, *Altorientalische Forschungen*, 3rd ser. i. 1-64; Erbt, *Die Purimsage* (1900); *Ency. Biblica*, articles "Esther" and "Purim" (a composite article). (T. K. C.)

ADDITIONS TO BOOK OF ESTHER. These "additions" were written originally in Greek and subsequently interpolated in the Greek translation of the Book of Esther. Here the principle of interpolation has reached its maximum. Of 270 verses, 107 are not to be found in the Hebrew text. These additions are distributed throughout the book in the Greek, but in the Latin Bible they were relegated to the end of the canonical book by Jerome—an action that has rendered them meaningless. In the Greek the additions form with the canonical text a consecutive history. They were made probably in the time of the Maccabees, and their aim was to supply the religious element which is so completely lacking in the canonical work. The first, which gives the dream of Mordecai and the events which led to his advancement at the court of Artaxerxes, precedes chap. i. of the canonical text: the second and fifth, which follow iii. 13 and viii. 12, furnish copies of the letters of Artaxerxes referred to in these verses; the third and fourth, which are inserted after chap. iv., consist of the prayers of Mordecai and Esther, with an account of Esther's approach to the king. The last, which closes the book, tells of the institution of the feast of Purim. The Greek text appears in two widely-differing recensions. The one is supported by ABא, and the other—a revision of the first—by codices 19, 93a, 108b. The latter is believed to have been the work of Lucian. Swete, *Old Test. in Greek*, ii. 755, has given the former, while Lagarde has published both texts with critical annotations in his *Librorum Veteris Testamenti Canonicorum*, i. 504-541 (1883), and Scholz in his *Kommentar über das Buch Esther* (1892).

For an account of the Latin and Syriac versions, the Targums, and the later Rabbinic literature connected with this subject, and other questions relating to these additions, see Fritzsche, *Exeget. Handbuch zu den Apok.* (1851), i. 67-108; Schürer$^{(3)}$, iii. 330-332; Fuller in *Speaker's Apocr.* i. 360-402; Ryssel in Kautzsch's *Apok. u. Pseud.* i. 193-212; Siegfried in *Jewish Encyc.* v. 237 sqq.; Swete, *Introd. to the Old Test. in Greek*, 257 seq.; L. B. Paton, "A Text-Critical Apparatus to the Book of Esther" in *O.T. and Semitic Studies in Memory of W. R. Harper* (Chicago, 1908). (R. H. C.)

ESTHONIA (Ger. *Ehstland* and *Esthland*, Esthonian *Eesti-maa* and *Meie-maa*, also *Viroma* and *Rahvama*; Lettish *Iggaun Senna*), a Baltic province of Russia, stretching along the south coast of the Gulf of Finland, and having Lake Peipus and Livonia on the S. and the government of St Petersburg on the E. An archipelago of islands, of which Dagö is the largest, belongs to this government (Oesel belongs to Livonia). The area is 7818 sq. m., 503 sq. m. of this being insular. The surface is low, not exceeding 100 ft. in altitude along the coast and alongside Lake Peipus, while in the interior the average elevation ranges from 200 to 300 ft., and nowhere exceeds 450 ft. It was entirely covered with the bottom moraine of the great ice-sheet of the Glacial Epoch, resting upon Silurian sandstones and limestones. In places sands and clays overlie the glacial deposits. The principal stream is the Narova, which issues from Lake Peipus, flows along the eastern border, and empties into the Gulf of Finland. The other drainage arteries are all small, but many in number; while lakes and marshes aggregate fully 22½% of the total surface. The climate is severe, great cold being experienced in winter, though moist west winds exercise a moderating influence. Nevertheless the annual mean temperature ranges between 39° and 43° Fahr. In 1878 the nobility, mostly of German descent, owned and farmed 52% of the land; 42% was farmed, but not owned, by the peasants, mostly Esths or Ehsts, and only 3% was owned by persons outside the ranks of the nobility. Since then one-fourth of the peasantry have been enabled to purchase their holdings, more than half a million acres having passed into their possession. Agriculture is the chief occupation; and it is, on all the larger holdings, carried on with greater scientific knowledge than in any other part of Russia. Of the total area about 16·6% is under cultivation; meadows and grass-lands amount to 41·7%; and forests cover 19%. The principal crops are rye, oats, barley and potatoes, with large quantities of vegetables. Cattle-breeding flourishes, and meat and butter are constantly increasing items of export. The manufactories consist chiefly of distilleries (over 13,500,000 gallons annually), cotton (at Kränholm falls on the Narova), woollen, flour, paper and saw mills, iron and machinery works, and match factories. Fishing is active along the coast, especially for anchovies. The province is intersected by a railway running from St Petersburg to Reval, with branches from the latter city westwards to Baltic Port and southwards into Livonia, and from Taps south to Yuryev (Dorpat). The chief seaports are Reval, Baltic Port, Hapsal, Kunda and Dagö. Esthonia is divided into four districts, the chief towns of which are Reval (pop. in 1897, 66,292), the capital of the province; Hapsal, a lively watering-place (3238); Weissenstein (2509); and Wesenberg (5560). The population, which consists chiefly of Ehstes (365,959 in 1897), Russians (18,000), Germans (16,000), Swedes (5800), and some Jews, is growing fairly fast: in 1870 it numbered 323,960, and in 1897 413,747, of whom 210,199 were women and 76,315 lived in towns; in 1906 it was estimated at 451,700. Ninety-six per cent. of the whole belong to the Lutheran Church. Education is, for Russia, relatively high.

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[1] See Zimmern, *Die Keilinschriften und das Alte Test.*$^{(3)}$, p. 438.

[2] *Ibid.* p. 396.

[3] Johns, *Assyrian Deeds*, iii. 198-199; *Amer. Journ. of Sem. Languages* (April 1902), p. 158.

[4] So too Zimmern, in Gunkel's *Schöpfung und Chaos*, p. 313, note 2.

The Esths, Ehsts or Esthonians, who call themselves Tallopoeg and Maamees, are known to the Russians as Chukhni or Chukhontsi, to the Letts as Iggauni, and to the Finns as Virolaiset. They belong to the Finnish family, and consequently to the Ural-Altaic division of the human race. Altogether they number close upon one million, and are thus distributed: 365,959 in Esthonia (in 1897), 518,594 in Livonia, 64,116 in the government of St Petersburg, 25,458 in that of Pskov, and 12,855 in other parts of Russia. As a race they exhibit manifest evidences of their Ural-Altaic or Mongolic descent in their short stature, absence of beard, oblique eyes, broad face, low forehead and small mouth. In addition to that they are an under-sized, ill-thriven people, with long arms and thin, short legs. They cling tenaciously to their native language, which is closely allied to the Finnish, and divisible into two, or according to some authorities into three, principal dialects—Dorpat Esthonian and Reval Esthonian, with Pernau Esthonian. Reval Esthonian, which preserves more carefully the full inflectional forms and pays greater attention to the laws of euphony, is recognized as the literary language. Since 1873 the cultivation of their mother-tongue has been sedulously promoted by an Esthonian Literary Society (*Eesti Korjameeste Selts*), which publishes *Toimetused*, or "Instructions" in all sorts of subjects. They have a decided love of poetry, and exhibit great facility in improvising verses and poems on all occasions, and they sing everywhere, from morning to night. Like the Finns they possess rich stores of national songs. These, which bear an unmistakable family likeness to those of the great Finnish epic of the *Kalevala*, were collected as the Kalevi Poëg, and edited by Kreutzwald (1857), and translated into German by Reinthal (1857–1859) and Bertram (1861) and by Löwe (1900). Other collections of *Esthnische Volkslieder* have been published by Neuss (1850–1852) and Kreutzwald and Neuss (1854); while Kreutzwald (1866) and Jannsen (1888) have published collections of legends and national tales. The earliest publication in Esthonian was a Lutheran catechism in the 16th century. An Esthonian translation of the New Testament was printed at Reval in 1715. Between 1813 and 1832 there appeared at Pernau twenty volumes of *Beiträge zur genauern Kenntniss der esthnischen Sprache*, by Rosenplänter, and from 1840 onwards many valuable papers on Esthonian subjects were contributed to the *Verhandlungen der gelehrten esthnischen Gesellschaft zu Dorpat*. F. J. Wiedemann, who laboured indefatigably in the registration and preservation of matters connected with Esthonian language and lore, published an *Esthnisch-deutsches Wörterbuch* (1865; 2nd ed. by Hurt, 1891, &c.), and in 1903 there appeared at Reval a *Deutsch-esthnisches Wörterbuch*, by Ploompun and Kann.

The Esthonians first appear in history as a warlike and predatory race, the terror of the Baltic seamen in consequence of their piracies. More than one of the Danish kings made serious attempts to subdue them. Canute VI. invaded their country (1194–1196) and forced baptism upon many of them, but no sooner did his war-ships disappear than they reverted to their former heathenism. In 1219 Waldemar II. undertook a more formidable crusade against them, in the course of which he founded the town and episcopal see of Reval. By his efforts the northern portion of the race were made submissive to the Danish crown; but, though conquered, they were by no means subdued, and were incessantly in revolt, until, after a great rebellion in 1343, Waldemar IV. Atterdag sold for 19,000 marks his portion of Esthonia in 1346, to the order of the Knights of the Sword. These German crusaders had already, after a quarter of a century's fighting, in 1224 gained possession of the regions inhabited by the southern portion of the race, that is those now included in Livonia. From that time for nearly six hundred years or more the Esthonians were practically reduced to a state of serfdom to the German landowners. In 1521 the nobles and cities of Esthonia voluntarily placed themselves under the protection of the crown of Sweden; but after the wars of Charles XII., Esthonia was formally ceded to his victorious rival, Peter the Great, by the peace of Nystad (1721). Serfdom was abolished in 1817 by Tsar Alexander I.; but the condition of the peasants was so little improved that they rose in open revolt in 1859. Since 1878, however, a vast change for the better has been effected in their economic position (see above). The determining feature of their recent history has been the attempt made by the Russian government (since 1881) and the Orthodox Greek Church (since 1883) to russify and convert the inhabitants of the province, Germans and Esths alike, by enforcing the use of Russian in the schools and by harsh and repressive measures aimed at their native language.

See Merkel, *Die freien Letten und Esthen* (1820); Parrot, *Versuch einer Entwickelung der Sprache, Abstammung, &c., der Liwen, Letten, Eesten* (1839); F. Kruse, *Urgeschichte des esthnischen Volksstammes* (1846); Wiedemann, *Grammatik der esthnischen Sprache* (1875), and *Aus dem innern und äussern Leben der Esthen* (1876); Köppen, *Die Bewohner Esthlands* (1847); F. Müller, *Beiträge zur Orographie und Hydrographie von Esthland* (1869–1871); Bunge, *Das Herzogthum Esthland unter den Königen von Dänemark* (1877); and Seraphim, *Geschichte Liv-, Est-, und Kurlands* (2nd ed., 1897) and various papers in the *Finnisch-Ugrische Forschungen*.

(P. A. K.; J. T. Be.; C. El.)

ESTIENNE (or Étienne; the French form of the name; anglicized to Stephens, and latinized to Stephanus), a French family of scholars and printers.

The founder of the race was Henri Estienne (d. 1520), the scion of a noble family of Provence, who came to Paris in 1502, and soon afterwards set up a printing establishment at the top of the rue Saint-Jean de Beauvais, on the hill of Saint-Geneviève opposite the law school. He died in 1520, and, his three sons being minors, the business was carried on by his foreman Simon de Colines, who in 1521 married his widow.

Robert Estienne (1503–1559) was Henri's second son. After his father's death he acted as assistant to his stepfather, and in this capacity superintended the printing of a Latin edition of the New Testament in 16mo (1523). Some slight alterations which he had introduced into the text brought upon him the censures of the faculty of theology. It was the first of a long series of disputes between him and that body. It appears that he had intimate relations with the new Evangelical preachers almost from the beginning of the movement, and that soon after this time he definitely joined the Reformed Church. In 1526 he entered into possession of his father's printing establishment, and adopted as his device the celebrated olive-tree (a reminiscence doubtless of his grandmother's family of Montolivet), with the motto from the epistle to the Romans (xi. 20), *Noli altum sapere*, sometimes with the addition *sed time*. In 1528 he married Perrette, a daughter of the scholar and printer Josse Bade (Jodocus Badius), and in the same year he published his first Latin Bible, an edition in folio, upon which he had been at work for the last four years. In 1532 appeared his *Thesaurus linguae Latinae*, a dictionary of Latin words and phrases, upon which for two years he had toiled incessantly, with no other assistance than that of Thierry of Beauvais. A second edition, greatly enlarged and improved, appeared in 1536, and a third, still further improved, in 3 vols. folio, in 1543. Though the *Thesaurus* is now superseded, its merits must not be forgotten. It was vastly superior to anything of the kind that had appeared before; it formed the basis of future labours, and even as late as 1734 was considered worthy of being re-edited. In 1539 Robert was appointed king's printer for Hebrew and Latin, an office to which, after the death of Conrad Neobar in 1540, he united that of king's printer for Greek. In 1541 he was entrusted by Francis I. with the task of procuring from Claude Garamond, the engraver and type-founder, three sets of Greek type for the royal press. The middle size were the first ready, and with these Robert printed the *editio princeps* of the *Ecclesiasticae Historiae* of Eusebius and others (1544). The smallest size were first used for the 16mo edition of the New Testament known as the *O mirificam* (1546), while with the largest size was printed the magnificent folio of 1550. This edition involved the printer in fresh disputes with the faculty of theology, and towards the end of the following year he left his native town for ever, and took refuge at Geneva, where he published in 1552 a caustic and effective answer to his persecutors under the title *Ad censuras theologorum Parisiensium, quibus Biblia a R. Stephano, Typographo Regio, ex usa calumniose notarunt, eiusdem R. S. responsio*. A French translation, which is remarkable for the excellence of its style, was published by him in the same year (printed in Rénouard's *Annales de l'imprimerie des Estienne*). At Geneva Robert proved himself an ardent partisan of Calvin, several of whose works he published. He died there on the 7th of September 1559.

It is by his work in connexion with the Bible, and especially as an editor of the New Testament, that he is on the whole best known. The text of his New Testament of 1550, either in its original form or in such slightly modified form as it assumed in the Elzevir text of 1634, remains to this day the traditional text. But this is due rather to its typographical beauty than to any critical merit. The readings of the fifteen MSS. which Robert's son Henri had collated for the purpose were merely introduced into the margin. The text was still almost exactly that of Erasmus. It was, however, the first edition ever published with a critical apparatus of any sort. Of the whole Bible Robert printed eleven editions—eight in Latin, two in Hebrew and one in French; while of the New Testament alone he printed twelve—five in Greek, five in Latin and two in French. In the Greek New Testament of 1551 (printed at Geneva) the present division into verses was introduced for the first time. The *editiones principes* which issued from Robert's press were eight in number, viz. *Eusebius*, including the *Praeparatio evangelica* and the *Demonstratio evangelica* as well as the *Historia ecclesiastica* already mentioned (1544–1546), *Moschopulus* (1545), *Dionysius of Halicarnassus* (February 1547), *Alexander Trallianus* (January 1548), *Dio Cassius* (January 1548), *Justin Martyr* (1551), *Xiphilinus* (1551), *Appian* (1551), the last being completed, after Robert's departure from Paris, by his brother Charles, and appearing under his name. These editions, all in folio, except the *Moschopulus*, which is in 4to, are unrivalled for beauty. Robert also printed numerous editions of Latin classics, of which perhaps the folio *Virgil* of 1532 is the most noteworthy, and a large quantity of Latin grammars and other educational works, many of which were written by Maturin Cordier, his friend and co-worker in the cause of humanism.

Charles Estienne (1504 or 1505–1564), the third son of Henri, was, like his brother Robert, a man of considerable learning. After the usual humanistic training he studied medicine, and took his doctor's degree at Paris. He was for a time tutor to Jean Antoine de Baïf, the future poet. In 1551, when Robert Estienne left Paris for Geneva, Charles, who had remained a Catholic, took charge of his printing establishment, and in the same year was appointed king's printer. In 1561 he became bankrupt, and he is said to have died in a debtors' prison.

His principal works are *Praedium Rusticum* (1554), a collection of tracts which he had compiled from ancient writers on various branches of agriculture, and which continued to be a favourite book down to the end of the 17th century; *Dictionarium historicum ac poëticum* (1553), the first French encyclopaedia; *Thesaurus Ciceronianus* (1557), and *De dissectione partium corporis humani libri tres*, with well-drawn woodcuts (1548). He also published a translation of an Italian comedy, *Gli Ingannati*, under the title of *Le Sacrifice* (1543; republished as *Les Abusez*, 1549), which had some influence on the development of French comedy; and *Paradoxes* (1553), an imitation of the *Paradossi* of Ortensio Landi.

Henri Estienne (1531–1598), sometimes called Henri II., was the eldest son of Robert. In the preface to his edition of Aulus Gellius (1585), addressed to his son Paul, he gives an interesting account of his father's household, in which, owing to the various nationalities of those who were employed on the press, Latin was used as a common language. Henri thus picked up Latin as a child, but by his own request he was allowed to learn Greek as a serious study before Latin. At the age of fifteen he become a pupil of Pierre Danès, at that time the first Greek scholar in France. Two years later he began to attend the lectures of Jacques Toussain, one of the royal professors of Greek, and in the same year (1545) was employed by his father to collate a MS. of Dionysius of Halicarnassus. In 1547 he went to Italy, where he spent three years in hunting for and collating MSS. and in intercourse with learned men. In 1550 he visited England, where he was favourably received by Edward VI., and then Flanders, where he learnt Spanish. In 1551 he joined his father at Geneva, which henceforth became his home. In 1554 he gave to the world, as the firstfruits of his researches, two first editions, viz. a tract of Dionysius of Halicarnassus and the so-called "Anacreon." In 1556 he discovered at Rome ten new books (xi.-xx.) of Diodorus Siculus. In 1557 he issued from the press which in the previous year he had set up at Geneva three first editions, viz. *Athenagoras*, *Maximus Tyrius*, and some fragments of Greek historians, including Appian's 'Αννιβαϊκή, and 'Ιβηρική and an edition of Aeschylus, in which for the first time the *Agamemnon* was printed in entirety and as a separate play. In 1559 he printed a Latin translation from his own pen of Sextus Empiricus, and an edition of Diodorus Siculus with the new books. His father dying in the same year, he became under his will owner of his press, subject, however, to the condition of keeping it at Geneva. In 1566 he published his best-known French work, the *Apologie pour Hérodote*, or, as he himself called it, *L'Introduction au traité de la conformité des merveilles anciennes avec les modernes ou Traité préparatif à l'Apologie pour Hérodote*. Some passages being considered objectionable by the Geneva consistory, he was compelled to cancel the pages containing them. The book became highly popular, and within sixteen years twelve editions were printed. In 1572 he published the great work upon which he had been labouring for many years, the *Thesaurus Graecae linguae*, in 5 vols. fol. The publication in 1578 of his *Deux Dialogues du nouveau françois italianizé* brought him into a fresh dispute with the consistory. To avoid their censure he went to Paris, and resided at the French court for a year. On his return to Geneva he was summoned before the consistory, and, proving contumacious, was imprisoned for a week. From this time his life became more and more of a nomad one. He is to be found at Basel, Heidelberg, Vienna, Pest, everywhere but at Geneva, these journeys being undertaken partly in the hope of procuring patrons and purchasers, for the large sums which he had spent on such publications as the *Thesaurus* and the *Plato* of 1578 had almost ruined him. His press stood nearly at a standstill. A few editions of classical authors were brought out, but each successive one showed a falling off. Such value as the later ones had was chiefly due to the notes furnished by Casaubon, who in 1586 had married his daughter Florence. His last years were marked by ever-increasing infirmity of mind and temper. In 1597 he left Geneva for the last time. After visiting Montpellier, where Casaubon was now professor, he started for Paris, but was seized with sudden illness at Lyons, and died there at the end of January 1598.

Few men have ever served the cause of learning more devotedly. For over thirty years the amount which he produced, whether as printer, editor or original writer, was enormous. The productions of his press, though printed with the same beautiful type as his father's books, are, owing to the poorness of the paper and ink, inferior to them in general beauty. The best, perhaps, from a typographical point of view, are the *Poëtae Graeci principes* (folio, 1566), the *Plutarch* (13 vols. 8vo, 1572), and the *Plato* (3 vols. folio, 1578). It was rather his scholarship which gave value to his editions. He was not only his own press-corrector but his own editor. Though by the latter half of the 16th century nearly all the important Greek and Latin authors that we now possess had been published, his untiring activity still found some gleanings. Eighteen first editions of Greek authors and one of a Latin author are due to his press. The most important have been already mentioned. Henri's reputation as a scholar and editor has increased of late years. His familiarity with the Greek language has always been admitted to have been quite exceptional; but he has been accused of want of taste and judgment, of carelessness and rashness. Special censure has been passed on his *Plutarch*, in which he is said to have introduced conjectures of his own into the text, while pretending to have derived them from MS. authority. But a late editor, Sintenis, has shown that, though like all the other editors of his day he did not give references to his authorities, every one of his supposed conjectures can be traced to some MS. Whatever [may be said as to his taste or his judgment, it seems that he was both careful and scrupulous, and that he only resorted to conjecture when authority failed him. And, whatever the merit of his conjectures, he was at any rate the first to show what conjecture could do towards restoring a hopelessly corrupt passage. The work, however, on which his fame as a scholar is most surely based is the *Thesaurus Graecae linguae*. After making due allowance for the fact that considerable materials for the work had been already collected by his father, and that he received considerable assistance from the German scholar Sylburg, he is still entitled to the very highest praise as the producer of a work which was of the greatest service to scholarship and which in those early days of Greek learning could have been produced by no one but a giant. Two editions of the *Thesaurus* were published in the 19th century—at London by Valpy (1815–1825) and at Paris by Didot (1831–1863).

It was one of Henri Estienne's great merits that, unlike nearly all the French scholars who preceded him, he did not neglect his own language. In the *Traité de la conformité du langage françois avec le Grec* (published in 1565, but without date; ed. L. Feugère, 1850), French is asserted to have, among modern languages, the most affinity with Greek, the first of all languages. *Deux Dialogues du nouveau françois italianisé* (Geneva, 1578; ed. P. Ristelhuber, 2 vols., 1885) was directed against the fashion prevailing in the court of Catherine de' Medici of using Italian words and forms. The *Project du livre intitulé de la Précellence du langage françois* (Paris, 1579; ed. E. Huguet, 1896) treats of the superiority of French to Italian. An interesting feature of the *Précellence* is the account of French proverbs, and, Henry III. having expressed some doubts as to the genuineness of some of them, Henri Estienne published, in 1594, *Les Premices ou le I. livre des Proverbes epigrammatisez* (never reprinted and very rare).

Finally, there remains the *Apologie pour Hérodote*, his most famous work. The ostensible object of the book is to show that the strange stories in Herodotus may be paralleled by equally strange ones of modern times. Virtually it is a bitter satire on the writer's age, especially on the Roman Church. Put together without any method, its extreme desultoriness makes it difficult to read continuously, but the numerous stories, collected partly from various literary sources, notably from the preachers Menot and Maillard, partly from the writer's own multifarious experience, with which it is packed, make it an interesting commentary on the manners and fashions of the time. But satire, to be effective, should be either humorous or righteously indignant, and, while such humour as there is in the *Apologie* is decidedly heavy, the writer's indignation is generally forgotten in his evident relish for scandal. The style is, after all, its chief merit. Though it bears evident traces of hurry, it is, like that of all Henri Estienne's French writings, clear, easy and vigorous, uniting the directness and sensuousness of the older writers with a suppleness and logical precision which at this time were almost new elements in French prose. An edition of the *Apologie* has recently been published by Liseux (ed. Ristelhuber, 2 vols., 1879), after one of the only two copies of the original uncancelled edition that are known to exist. The very remarkable political pamphlet entitled *Discours merveilleux de la vie et actions et déportemens de Catherine de Medicis*, which appeared in 1574, has been ascribed to Henri Estienne, but the evidence both internal and external is conclusive against his being the author of it. Of his Latin writings the most worthy of notice are the *De Latinitate falso suspecta* (1576), the *Pseudo-Cicero* (1577) and the *Nizoliodidascalus* (1578), all three written against the Ciceronians, and the *Francofordiense Emporium* (1574), a panegyric on the Frankfort fair (reprinted with a French translation by Liseux, 1875). He also wrote a large quantity of indifferent Latin verses, including a long poem entitled *Musa monitrix Principum* (Basel, 1590).

The primary authorities for an account of the Estiennes are their own works. In the garrulous and egotistical prefaces which Henri was in the habit of prefixing to his editions will be found many scattered biographical details. Twenty-seven letters from Henri to John Crato of Crafftheim (ed. F. Passow, 1830) have been printed, and there is one of Robert's in Herminjard's *Correspondence des Réformateurs dans de pays de langue française* (9 vols. published 1866–1897), while a few other contemporary references to him will be found in the same work. The secondary authorities are Janssen van Almeloveen, *De vitis Stephanorum* (Amsterdam, 1683); Maittaire, *Stephanorum historia* (London, 1709); A. A. Rénouard, *Annales de l'imprimerie des Estienne* (2nd ed., Paris, 1843); the article on Estienne by A. F. Didot in the *Nouv. Biog. gén.*; Mark Pattison, *Essays*, i. 67 ff. (1889), L. Clément, *Henri Estienne et son œuvre française* (Paris, 1899). There is a good account of Henri's *Thesaurus* in the *Quart. Rev.* for January 1820, written by Bishop Blomfield. (A. A. T.)

ESTON, an urban district in the Cleveland parliamentary division of the North Riding of Yorkshire, England, 4 m. S.E. of Middlesbrough, on a branch of the North Eastern railway. Pop. (1901) 11,199. This is one of the principal centres from which the great ironstone deposits of the Cleveland Hills are worked, and there are extensive blast-furnaces, iron-foundries and steam sawing-mills in the district. Immediately W. of Eston lies the urban district of Ormesby (pop. 9482), and the whole district is densely populated (see MIDDLESBROUGH). Marton, west of Ormesby, was the birthplace of Captain Cook (1728). Numerous early earthworks fringe the hills to the south.

ESTOPPEL (from O. Fr. *estopper*, to stop, bar; *estoupe*, mod. *étoupe*, a plug of tow; Lat. *stuppa*), a rule in the law of evidence by which a party in litigation is prohibited from asserting or denying something, when such assertion or denial would be inconsistent with his own previous statements or conduct. Estoppel is said to arise in three ways—(1) by record or judgment, (2) by deed, and (3) by matter *in pais* or conduct. (1) Where a cause of action has been tried and final judgment has been pronounced, the judgment is conclusive—either party attempting to renew the litigation by a new action would be estopped by the judgment. "Every judgment is conclusive proof as against parties and privies, of facts directly in issue in the case, actually decided by the court, and appearing from the judgment itself to be the ground on which it was based"—Stephen's *Digest of the Law of Evidence*, Art. 41. (2) It is one of the privileges of *deeds* as distinguished from simple contracts that they operate by way of estoppel. "A man shall always be estopped by his own deed, or not permitted to aver or prove anything in contradiction to what he has once so solemnly and deliberately avowed" (Blackstone, 2 *Com.* 295); *e.g.* where a bond recited that the defendants were authorized by acts of parliament to borrow money, and that under such authority they had borrowed money from a certain person, they were estopped from setting up as a defence that they did not in fact so borrow money, as stated by their deed. (3) Estoppel by conduct, or, as it is still sometimes called, estoppel by matter *in pais*, is the most important head. The rule practically comes to this that, when a person in his dealings with others has acted so as to induce them to believe a thing to be true and to act on such belief, he may not in any proceeding between himself and them deny the thing to be true: *e.g.* a partner retiring from a firm without giving notice to the customers, cannot, as against a customer having no knowledge of his retirement, deny that he is a partner.

As between landlord and tenant the principle operates to prevent the denial by the tenant of the landlord's title. So if a person comes upon land by the licence of the person in possession, he cannot deny that the licenser had a title to the possession at the time the licence was given. Again, if a man accepts a bill of exchange he may not deny the signature or the capacity of the drawer. So a person receiving goods as baillee from another cannot deny the title of that other to the goods at the time they were entrusted to him.

Estoppel of whatever kind is subject to one general rule, that it cannot override the law of the land; for example, a corporation would not be estopped as to acts which are *ultra vires*.

See L. F. Everest and E. Strode, *The Law of Estoppel*; M. Cababé, *Principles of Estoppel*.

ESTOUTEVILLE, GUILLAUME D' (1403–1483), French ecclesiastic, was bishop of Angers, of Digne, of Porto and Santa Rufina, of Ostia and Velletri, archbishop of Rouen, prior of Saint Martin des Champs, abbot of Mont St Michel, of St Ouen at Rouen, and of Montebourg. He was sent to France as legate by Pope Nicholas V. to make peace between Charles VII. and England (1451), and undertook, *ex officio*, the revision of the trial of Joan of Arc; he afterwards reformed the statutes of the university of Paris. He then went to preside over the assembly of clergy which met at Bourges to discuss the observation of the Pragmatic Sanction (see Basel, Council of), finally returning to Rome, where he passed almost all the rest of his life. He was a great builder, Rouen, Mont St Michel, Pontoise and Gaillon owing many noble buildings to his initiative.

ESTOVERS (from the O. Fr. *estover*, *estovoir*, a verb used as a substantive in the sense of that which is necessary; the word is of disputed origin; it has been referred to the Lat. *stare*, to stand, or *studere*, to desire), a term, in English law, for the wood which a tenant for life or years may take from the land he holds for repair of his house, the implements of husbandry, and the hedges and fences, and for firewood. The O. Eng. word for estover was *bote* or *boot* (literally meaning "good," "profit," the same word as seen in "better"). The various kinds of estovers were thus known as house-bote, cart or plough-bote, hedge or hay-bote, and fire-bote respectively. These rights may, of course, be restricted by express covenants. Copyholders have similar rights over the land they occupy and over the waste of the manor, in which case the rights are known as "Commons of estovers." (See Commons.)

ESTRADA, LA, a town of north-western Spain, in the province of Pontevedra, 15 m. S. by E. of Santiago de Compostela. Pop. (1900) 23,916. La Estrada is the chief town of a densely-populated mountainous district; its industries are agriculture, stock-breeding, and the manufacture of linen and woollen cloth. Timber from the mountain forests is conveyed from La Estrada to the river Ulla, 4 m. N., and thence floated down to the seaports on Arosa Bay. The nearest railway-station is Requeijo, 7 m. W., on the Pontevedra-Santiago railway. There are mineral springs at La Estrada and at Caldas de Reyes, 11 m. W.S.W.

ESTRADE, a French architectural term for a raised platform (see Dais). In the Levant the estrade of a divan is called Sopha (Blondel), from which comes our "sofa."

ESTRADES, GODEFROI, Comte d' (1607–1686), French diplomatist and marshal, was born at Agen. He was the son of François d'Estrades (d. 1653), a partisan of Henry IV., and brother of Jean d'Estrades, bishop of Condom. He became a page to Louis XIII., and at the age of nineteen was sent on a mission to Maurice of Holland. In 1646 he was named ambassador extraordinary to Holland, and took part in the conferences at Münster. Sent in 1661 to England, he obtained in 1662 the restitution of Dunkirk. In 1667 he negotiated the treaty of Breda with the king of Denmark, and in 1678 the treaty of Nijmwegen, which ended the war with Holland. Independently of these diplomatic missions, he took part in the principal campaigns of Louis XIV., in Italy (1648), in Catalonia (1655), in Holland (1672); and was created marshal of France in 1675. He left *Lettres, mémoires et négociations en qualité d'ambassadeur en Hollande depuis 1663 jusqu' en 1668*, of which the first edition in 1709 was followed by a nine-volume edition (London (the Hague), 1743).

Of the sons of Godefroi d'Estrades, Jean François d'Estrades was ambassador to Venice and Piedmont; Louis, marquis d'Estrades (d. 1711), succeeded his father as governor of Dunkirk, and was the father of Godefroi Louis, comte d'Estrades, lieutenant-general, who was killed at the siege of Belgrade, 1717.

See Felix Salomon, *Frankreichs Beziehungen zu dem Scottischen Aufstand* (1637–1640), containing an excursus on the falsification of the letters of the comte d'Estrades; Philippe Lauzun, *Le Maréchal d'Estrades* (Agen, 1896).

ESTREAT (O. Fr. *estrait*, Lat. *extracta*), originally, a true copy or duplicate of some original writing or record; now used only with reference to the enforcement of a forfeited recognizance. At one time it was the practice to extract and certify into the exchequer copies of entries in court rolls which contained provisions or orders in favour of the treasury, hence the estreating of a recognizance was the taking out from among the other records of the court in which it was filed and sending it to the exchequer to be enforced, or sending it to the sheriff to be levied by him, and then returned by the clerk of the peace to the lords of the treasury. (See Recognizance.)

ESTRÉES, GABRIELLE D' (1573–1599), mistress of Henry IV. of France, was the daughter of Antoine d'Estrées, marquis of Cœuvres, and Françoise Babou de la Bourdaisière. Henry IV., who in November 1590 stayed at the castle of Cœuvres, became violently enamoured of her. Her father, anxious to save his daughter from so perilous an entanglement, married her to Nicholas d'Amerval, seigneur de Liancourt, but the union proved unhappy, and in December 1592, Gabrielle, whose affection for the king was sincere, became his mistress. She lived with him from December 1592 onwards, and bore him several children, who were recognized and legitimized by him. She possessed the king's entire confidence; he willingly listened to her advice, and created her marchioness of Monceaux, duchess of Beaufort (1597) and Étampes (1598), a peeress of France. The king even proposed to marry her in the event of the success of his suit for the nullification by the Holy See of his marriage with Margaret of Valois; but before the question was settled Gabrielle died, on the 10th of April 1599. Poison was of course suspected; but her death was really caused by puerperal convulsions (*eclampsia*).

See Adrien Desclozeaux, *Gabrielle d'Estrées, Marquise de Monceaux, &c.* (Paris, 1889).

ESTREMADURA, or Extremadura, an ancient territorial division of central and western Portugal, and of western Spain; comprising the modern districts of Leiria, Santarem and Lisbon, in Portugal, and the modern provinces of Badajoz and Cáceres in Spain. Pop. (1900) 2,095,818; area, 23,055 sq. m. The name of Estremadura appears to be of early Romance or Late Latin origin, and probably was applied to all the far western lands (*extrema ora*) bordering upon the lower Tagus, as far as the Atlantic Ocean. It is thus equivalent to *Land's End*, or *Finistère*. In popular speech it is more commonly used than the names of the modern divisions mentioned above, which were created in the 19th century. As, however, there are many racial, economic and historic differences between Portuguese and Spanish Estremadura, the two provinces are separately described below.

1. Portuguese Estremadura is bounded on the N. by Beira, E. and S. by Alemtejo, and W. by the Atlantic Ocean. Pop. (1900) 1,221,418; area, 6937 sq. m. The greatest length of the province, from N. to S., is 165 m.; its greatest breadth, from E. to W., is 72 m. The general uniformity of the coast-line is broken by the broad and deep estuaries of the Tagus and the Sado, and by the four conspicuous promontories of Cape Carvoeiro, Cape da Roca, Cape Espichel and Cape de Sines. The Tagus is the great navigable waterway of Portuguese Estremadura, flowing from north-east to south-west, and fed by many minor tributaries, notably the Zezere on the right and the Zatas on the left. It divides the country into two nearly equal portions, wholly dissimilar in surface and character. South of the Tagus the land is almost everywhere low, flat and monotonous, while in several places it is rendered unhealthy by undrained marshes. The

Sado, which issues into Setubal Bay, is the only important river of this region. North of the Tagus, and parallel with its right bank, extends the mountain chain which is known at its northern extremity as the Serra do Aire and, where it terminates above Cape da Roca, as the Serra da Cintra. This ridge, which is buttressed on all sides by lesser groups of hills, and includes part of the famous lines of Torres Vedras (*q.v.*), exceeds 2200 ft. in height, and constitutes the watershed between the right-hand tributaries of the Tagus and the Liz, Sizandro and other small rivers which flow into the Atlantic. On its seaward side, except for the line of sheer and lofty cliffs between Cape Carvoeiro and Cape da Roca, the country is mostly flat and sandy, with extensive heaths and pine forests; but along the fertile and well-cultivated right bank of the Tagus the river scenery, with its terraced hills of vines, olives and fruit trees, often resembles that of the Rhine in Germany. The natural resources of Portuguese Estremadura, with its inhabitants, industries, commerce, communications, &c., are described under Portugal; for on such matters there is little to be said of this central and most characteristic province which does not apply to the whole kingdom. Separate articles are also devoted to Lisbon, the capital, and Abrantes, Cintra, Leiria, Mafra, Santarem, Setubal, Thomar, Torres Novas and Torres Vedras, the other chief towns. The women of Peniche, a small fishing village on the promontory of Cape Carvoeiro, have long been celebrated throughout Portugal for their skill in the manufacture of fine laces.

2. Spanish Estremadura is bounded on the N. by Leon and Old Castile, E. by New Castile, S. by Andalusia, and W. by the Portuguese province of Beira and Alemtejo, which separate it from Portuguese Estremadura. Pop. (1900) 882,410; area, 16,118 sq. m. Spanish Estremadura consists of a tableland separated from Leon and Old Castile by the lofty Sierra de Gredos, the plateau of Béjar and the Sierra de Gata, which form an almost continuous barrier along the northern frontier, with its summits ranging from 6000 to more than 8500 ft. in altitude. On the south the comparatively low range of the Sierra Morena constitutes the frontier of Andalusia; on the east and west there is a still more gradual transition to the plateau of New Castile and the central plains of Portugal. The tableland of Spanish Estremadura is itself bisected from east to west by a line of mountains, the Sierras of San Pedro, Montanchez and Guadalupe (4000-6000 ft.), which separate its northern half, drained by the river Tagus, from its southern half, drained by the Guadiana. These two halves are respectively known as Alta or Upper Estremadura (the modern Cáceres), and Baja or Lower Estremadura (the modern Badajoz). The Tagus and Guadiana flow from east to west through a monotonous country, level or slightly undulating, often almost uninhabited, and covered with a thin growth of shrubs and grass. Perhaps the most characteristic feature of this tableland is the vast heaths of gum-cistus, which in spring colour the whole landscape with leagues of yellow blossom, and in summer change to a brown and arid wilderness.

The climate in summer is hot but not unhealthy, except in the swamps which occur along the Guadiana. The rainfall is scanty; dew, however, is abundant and the nights are cool. Although the high mountains are covered with snow in November, the winters are not usually severe. The soil is naturally fertile, but drought, floods and locusts render agriculture difficult, and sheep-farming is the most important of Estremaduran industries. (See Spain: *Agriculture.*) In the 19th century, however, this industry lost much of its former importance owing to foreign competition.

Immense herds of swine are bred and constitute a great source of support to the inhabitants, not only supplying them with food, but also forming a great article of export to other provinces —the pork, bacon and hams being in high esteem. The beech, oak and chestnut woods afford an abundance of food for swine, and there are numerous plantations of olive, cork and fruit trees, but a far greater area of forest has been destroyed. For an account of commerce, mining, communications, &c., in Spanish Estremadura, with a list of the chief towns, see Cáceres and Badajoz. In character and physical type, the people of this region are less easily classified than those of other Spanish provinces. They lack the endurance and energy of the Galicians, the independent and enterprising spirit of the Asturians, Basques and Catalans, the culture of the Castilians and Andalusians. Their failure to develop a distinctive local type of character and civilization is perhaps due to the adverse economic history of their country. The two great waterways which form the natural outlet for Estremaduran commerce flow to the Atlantic through a foreign and, for centuries, a hostile territory. Like other parts of Spain, Estremadura suffered severely from the expulsion of the Jews and Moors (1492–1610), while the compensating treasure, derived during the same period from Spanish America, never reached a province so remote at once from the sea and from the chief centres of national life. Although Cortes (1485–1547), the conqueror of Mexico and Pizarro (*c.* 1471–1541), the conqueror of Peru, were both born in Estremadura, their exploits, far from bringing prosperity to their native province, only encouraged the emigration of its best inhabitants. Heavy taxation and harsh land-laws prevented any recovery, while the felling of the forests reduced many fertile areas to waste land, and rendered worse a climate already unfavourable to agriculture. Few countries leave upon the mind of the traveller a deeper impression of hopeless poverty.

ESTREMOZ, a town of Portugal, in the district of Evora, formerly included in the province of Alemtejo; 104 m. by rail E. of Lisbon, on the Casa Branca-Evora-Elvas railway. Pop. (1900) 7920. Estremoz is built at the base of a hill crowned by a large dismantled citadel; its fortifications, which in the 17th century accommodated 20,000 troops and rendered the town one of the principal defences of the frontier, are now obsolete. There are marble quarries in the neighbourhood, and the Estremoz *bilhas*, red earthenware jars, are used throughout Portugal as water-holders and exported to Spain. At Ameixial (1188) and Montes Claros, near Estremoz, the Spanish were severely defeated by the Portuguese in 1663 and 1665. Villa Viçosa (3841), 10 m. S.E., is a town of pre-Roman origin, containing a royal palace. The altars with Latin inscriptions to the Iberian god Endovellicus, found at Villa Viçosa, are preserved in the museum of the Royal Academy of Sciences, Lisbon.

ESTUARY (from the Lat. *aestuarium*, a place reached by *aestus*, the tide), an arm of the sea narrowing inwards at the mouth of a river where sea and fresh water meet and are mixed, *i.e.* the tidal portion of a river's mouth. Structurally the estuary may represent the long-continued action of river erosion and tidal erosion confined to a narrow channel, most effective where most concentrated, or an estuary may be the drowned portion of the lower part of a river-valley. In a map of Britain showing sea-depths it will be observed that under the Severn estuary the sea deepens in a number of steps descending by concentric V's that become blunter towards deep water until the last is a mere indentation pointing towards the long narrow termination of the present estuary. In this and in similar cases the progress of the estuary is indicated upon what is now the continental shelf. The chief interest in estuarine conditions is the mingling of sea and fresh water. Where, as in the Severn and the Thames, the fresh water meets the sea gradually the water is mixed, and there is very little change in salinity at high tide. The fresh water flows over the salt water and there is a continuous rapid change in salinity towards the sea, for the currents sweeping in and out mix the water constantly. Where the river brings down a great quantity of fresh water in a narrow channel, the change of salinity at high and low water is very marked. "When, however, the inlet is very large compared with the river, and there is no bar at the opening, the estuarine character is only shown at the upper end. In the Firth of Forth, for example, the landward half is an estuary, but in the seaward half the water has become more thoroughly mixed, the salinity is almost uniform from surface to bottom, and increases very gradually towards the sea. The river-water meets the sea diffused uniformly through a deep mass of water scarcely fresher than the sea itself, so that the two mix uniformly, and the sea becomes slightly freshened throughout its whole depth for many miles from land" (H. R. Mill, *Realm of Nature*, 1897).

ESZTERGOM (Ger. *Gran*; Lat. *Strigonium*), a town of Hungary, capital of the county of the same name, 36 m. N.W. of Budapest by rail. Pop. (1900) 16,948, mostly Magyars and Roman Catholics. It is situated on the right bank of the Danube, nearly opposite the confluence of the Gran, and is divided into the town proper and three suburbs. The town is the residence of the primate of Hungary, and its cathedral, built in 1821–1870, after the model of St Peter's at Rome, is one of the finest and largest in the country. It is picturesquely built on an elevated and commanding position, 215 ft. above the Danube, and its dome, visible from a long distance, is 260 ft. high, and has a diameter of 52 ft. The interior is very richly decorated, notably with fine frescoes, and its treasury and fine library of over 60,000 volumes are famous. Besides several other churches and two monastic houses, the principal buildings include the handsome palace of the primate, erected in 1883; the archiepiscopal library, with valuable incunabula and old MSS.; the seminary for the education of Roman Catholic priests; the residences of the chapter; and the town-hall. The population is chiefly employed in cloth-weaving, wine-making and agricultural pursuits. An iron bridge, 1664 ft. long, connects Esztergom with the market town of Párkány (pop. 2836) on the opposite bank of the Danube.

Esztergom is one of the oldest towns of Hungary, and is famous as the birthplace of St Stephen, the first prince crowned "apostolic king" of Hungary. During the early times of the Hungarian monarchy it was the most important mercantile centre in the country, and it was the meeting-place of the diets of 1016, 1111, 1114 and 1256. It was almost completely destroyed by Tatar hordes in 1241, but was rebuilt and fortified by King Béla IV. In 1543 it fell into the hands of the Turks, from whom it was recovered, in 1595, by Carl von Mansfeld. In 1604 it reverted to the Turks, who held it till 1683, when it was regained by the united forces of John Sobieski, king of Poland, and Prince Charles of Lorraine. It was created an archbishopric in 1001. During the Turkish occupation of the town the archbishopric was removed to Tyrnau, while the archbishop himself had his residence in Pressburg. Both returned to Esztergom in 1820. In 1708 it was declared a free city by Joseph I. On the 13th of April 1818 it was partly destroyed by fire.

For numerous authorities on the see and cathedral of Esztergom see V. Chevalier, *Répertoire des sources. Topo-bibliogr.* s.v. "Gran." Of these may be mentioned especially F. Knauz, *Monumenta Ecclesiae Strigoniensis* (3 vols., Eszterg. 1874); Joseph Dankó, *Geschichtliches aus dem Graner Domschatz* (Gran, 1880).

ÉTAGÈRE, a piece of light furniture very similar to the English what-not, which was extensively made in France during the latter part of the 18th century. As the name implies, it consists of a series of stages or shelves for the reception of ornaments or other small articles. Like the what-not it was very often cornerwise in shape, and the best Louis XVI. examples in exotic woods are exceedingly graceful and elegant.

ETAH, a town and district of British India, in the Agra division of the United Provinces. The town is situated on the Grand Trunk road. Pop. (1901) 8796. The district has an area of 1737 sq. m. The district consists for the most part of an elevated alluvial plateau, dipping down on its eastern slope into the valley of the Ganges. The uplands are irrigated by the Ganges canal. Between the modern bed of the Ganges and its ancient channel lies a belt of fertile land, covered with a rich deposit of silt, and abundantly supplied with natural moisture. A long line of swamps and hollows still marks the former course of the river; and above it rises abruptly the original cliff which now forms the terrace of the upland plain. The Kali Nadi, a small stream flowing in a deep and narrow gorge, passes through the centre of the district, and affords an outlet for the surface drainage. Etah was at an early date the seat of a primitive Aryan civilization, and the surrounding country is mentioned by Hsüan Tsang, the Chinese Buddhist pilgrim of the 7th century A.D., as rich in temples and monasteries. But after the bloody repression of Buddhism before the 8th century, the district seems to have fallen once more into the hands of aboriginal tribes, from whom it was wrested a second time by Rajputs during the course of their great migration eastward. With the rest of upper India it passed under the sway of Mahmud of Ghazni in 1017, and thenceforth followed the fortunes of the Mahommedan empire. At the end of the 18th century it formed part of the territory over which the wazir of Oudh had made himself ruler, and it came into the possession of the British government in 1801, under the treaty of Lucknow. During the mutiny of 1857 it was the scene of serious disturbances, coupled with the usual anarchic quarrels among the native princes. In 1901 the population was 863,948, showing an increase of 23% in the decade due to the extension of canal irrigation. It is traversed by a branch of the Rajputana railway from Agra to Cawnpore, with stations at Kasganj and Soron, which are the two largest towns. It has several printing presses, indigo factories, and factories for pressing cotton, and there is a considerable agricultural export trade.

ÉTAMPES, ANNE DE PISSELEU D'HEILLY, DUCHESSE D' (1508–*c.* 1580), mistress of Francis I. of France, daughter of Guillaume de Pisseleu, sieur d'Heilly, a nobleman of Picardy. She came to court before 1522, and was one of the maids of honour of Louise of Savoy. Francis I. made her his mistress, probably on his return from his captivity at Madrid (1526), and soon gave up Madame de Châteaubriant for her. Anne was sprightly, pretty, witty and cultured, and succeeded in keeping the favour of the king till the end of the reign (1547). The liaison received some official recognition; when Queen Eleanor entered Paris (1530), the king and Anne occupied the same window. In 1533 Francis gave her in marriage to Jean de Brosse, whom he created duc d'Étampes. The influence of the duchesse d'Étampes, especially in the last years of the reign, was considerable. She upheld Admiral Chabot against the constable de Montmorency, who was supported by her rival, Diane de Poitiers, the dauphin's mistress. She was a friend to new ideas, and co-operated with the king's sister, Marguerite d'Angoulême. She used her influence to elevate and enrich her family, her uncle, Antoine Sanguin (d. 1559), being made bishop of Orleans in 1535 and a cardinal in 1539.[1] The accusations made against her of having allowed herself to be won over by the emperor Charles V. and of playing the traitor in 1544 rest on no serious proof. After the death of Francis I. (1547) she was dismissed from the court by Diane de Poitiers, humiliated in every way, and died in obscurity much later, probably in the reign of Henry III.

See Paulin Paris, *Études sur François Ier* (Paris, 1885).

ÉTAMPES, a town of northern France, capital of an arrondissement in the department of Seine-et-Oise, on the Orléans railway, 35 m. S. by W. of Paris. Pop. (1906) 8720. Étampes is a long straggling town hemmed in between the railway on the north and the Chalouette on the south; the latter is a tributary of the Juine which waters the eastern outskirts of the town. A fine view of Étampes is obtained from the Tour Guinette, a ruined keep built by Louis VI. in the 12th century on an eminence on the other side of the railway. Notre-Dame du Fort, the chief church, dates from the 11th and 12th centuries; irregular in plan, it is remarkable for a fine Romanesque tower and spire, and for the crenellated wall which partly surrounds it. The interior contains ancient paintings and other artistic works. St Basile (12th and 16th centuries), which preserves a Romanesque doorway, and St Martin (12th and 13th centuries), with a leaning tower of the 16th century, are of less importance. The civil buildings offer little interest, but two houses named after Anne de Pisseleu (see above), mistress of Francis I., and Diane de Poitiers, mistress of Henry II., are graceful examples of Renaissance architecture. In the square there is a statue of the naturalist, Geoffroy Saint-Hilaire, who was born in Étampes. The subprefecture, a tribunal of first instance, and a communal college are among the public institutions of Étampes. Flour-milling, metal-founding, leather-dressing, printing and the manufacture of boots and shoes and hosiery are carried on; there are quarries of paving-stone, nurseries and market gardens in the vicinity, and the town has important markets for cereals and sheep.

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[1] The château of Meudon, belonging to the Sanguin family, was handed over to the duchesse d'Étampes in 1539. Sanguin was translated to Limoges in 1546, and became archbishop of Toulouse in 1550.

Étampes (Lat. *Stampae*) existed at the beginning of the 7th century and in the early middle ages belonged to the crown domain. During the middle ages it was the scene of several councils, the most notable of which took place in 1130 and resulted in the recognition of Innocent II. as the legitimate pope. In 1652, during the war of the Fronde it suffered severely at the hands of the royal troops under Turenne.

Lords, Counts and Dukes of Étampes.—The lordship of Étampes, in what is now the department of Seine et Oise in France, belonged to the royal domain, but was detached from it on several occasions in favour of princes, or kings' favourites. St Louis gave it to his mother Blanche of Castile, and then to his wife Marguerite of Provence. Louis, the brother of Philip the Fair, became lord of Étampes in 1317 and count in 1327; he was succeeded by his son and his grandson. Francis I. raised the countship of Étampes to the rank of a duchy for his mistress Anne de Pisseleu D'Heilly. The new duchy passed to Diane de Poitiers (1553), to Catherine of Lorraine, duchess of Montpensier (1578), to Marguerite of Valois (1582) and to Gabrielle d'Estrées (1598). The latter transmitted it to her son, César of Vendôme, and his descendants held it till 1712. It then passed by inheritance to the families of Bourbon-Conti and of Orleans.

ÉTAPLES, a town of northern France, in the department of Pas-de-Calais, on the right bank of the estuary of the Canche, 3 m. from the Straits of Dover, 17 m. S. of Boulogne by rail. Pop. (1906) 5136. Étaples has a small fishing and commercial port which enjoyed a certain importance during the middle ages. Boat-building is carried on. There is an old church with a statue of the Virgin much revered by the sailors. The Canche is crossed by a bridge over 1600 ft. in length. Le Touquet, in the midst of pine woods, and the neighbouring watering-place of Paris-Plage, 3½ m. W. of Étaples at the mouth of the estuary, are much frequented by English and French visitors for golf, tennis and bathing, and Étaples itself is a centre for artists. Antiquarian discoveries in the vicinity of Étaples have led to the conjecture that it occupies the site of the Gallo-Roman port of *Quentovicus*. In 1492 a treaty was signed here between Henry VII., king of England, and Charles VIII., king of France.

ETAWAH, a town and district of British India, in the Agra division of the United Provinces. The town is situated on the left bank of the Jumna, and has a station on the East Indian railway, 206 m. from Allahabad. Pop. (1901) 42,570. Deep fissures intersect the various quarters of the town, over which broad roads connect the higher portions by bridges and embankments. The Jama Masjid (Great Mosque) is the chief architectural ornament of Etawah. It was originally a Hindu temple, and was adapted to its present use by the Mahommedan conquerors. Several fine Hindu temples also stand about the mound on which are the ruins of the ancient fort. Etawah is now only the civil headquarters of the district, the military cantonment having been abandoned in 1861. Considerable trade is carried on by rail and river. The manufactures include cotton cloth, skin-bottles, combs and horn-ware and sweetmeats.

The District of Etawah has an area of 1691 sq. m. It forms a purely artificial administrative division, stretching across the level plain of the Doab, and beyond the valley of the Jumna, to the gorges of the Chambal, and the last rocky outliers of the Vindhyan range. The district exhibits a striking variety of surface and scenery. The greater portion lies within the Doab or level alluvial plain between the Ganges and the Jumna. This part falls naturally into two sections, divided by the deep and fissured valley of the river Sengar. The tract to the north-east of that stream is rich and fertile, being watered by the Cawnpore and Etawah branches of the Ganges canal, and other important works. The south-western region has the same natural advantages, but possesses no great irrigation system, and is consequently less fruitful than the opposite slopes. Near the banks of the Jumna, the plain descends into the river valley by a series of wild ravines and terraces, inhabited only by a scattered race of hereditary herdsmen. Beyond the Jumna again a strip of British territory extends along the tangled gorges of the Chambal and the Kuari Nadi, far into the borders of the Gwalior state. This outlying tract embraces a series of rocky glens and mountain torrents, crowned by the ruins of native strongholds, and interspersed with narrow ledges of cultivable alluvium. The climate, once hot and sultry, has now become comparatively moist and equable under the influence of irrigation and the planting of trees.

Etawah was marked out by its physical features as a secure retreat for the turbulent tribes of the Upper Doab, and it was not till the 12th century that any of the existing castes settled on the soil. After the Mussulman conquests of Delhi and the surrounding country, the Hindus of Etawah appear to have held their own for many generations against the Mahommedan power; but in the 16th century Baber conquered the district, with the rest of the Doab, and it remained in the hands of the Moguls until the decay of their empire. After passing through the usual vicissitudes of Mahratta and Jat conquests during the long anarchy which preceded the British rule, Etawah was annexed by the wazir of Oudh in 1773. The wazir ceded it to the East India Company in 1801, but it still remained so largely in the hands of lawless native chiefs that some difficulty was experienced in reducing it to orderly government. During the mutiny of 1857 serious disturbances occurred in Etawah, and the district was occupied by the rebels from June to December; order was not completely restored till the end of 1858. In 1901 the population was 806,798, showing an increase of 11% in the decade. The district is partly watered by branches of the Ganges canal, and is traversed throughout by the main line of the East Indian railway from Cawnpore to Agra. Cotton, oilseeds and other agricultural produce are exported, and some indigo is made, but manufacturing industry is slight.

ETCHING (Dutch, *etsen*, to eat), a form of engraving (*q.v.*) in which, in contradistinction to line engraving (*q.v.*), where the furrow is produced by the ploughing of the burin, the copper is eaten away or corroded by acid.

To prepare a plate for etching it is first covered with etching-ground, a composition which resists acid. The qualities of a ground are to be so adhesive that it will not quit the copper when a small quantity is left isolated between lines, yet not so adhesive that the etching point cannot easily and entirely remove it; at the same time a good ground will be hard enough to bear the hand upon it, or a sheet of paper, yet not so hard as to be brittle. The ground used by Abraham Bosse, the French painter and engraver (1602–1676) was composed as follows:—Melt 2 oz. of white wax; then add to it 1 oz. of gum-mastic in powder, a little at a time, stirring till the wax and the mastic are well mingled; then add, in the same manner, 1 oz. of bitumen in powder. There are three different ways of applying an etching-ground to a plate. The old-fashioned way was to wrap a ball of the ground in silk, heat the plate, and then rub the ball upon the surface, enough of the ground to cover the plate melting through the silk. To equalize the ground a dabber was used, which was made of cotton-wool under horsehair, the whole inclosed in silk. This method is still used by many artists, from tradition and habit, but it is far inferior in perfection and convenience to that which we will now describe. When the etching-ground is melted, add to it half its volume of essential oil of lavender, mix well, and allow the mixture to cool. You have now a paste which can be spread upon a cold plate with a roller; these rollers are covered with leather and made (very carefully) for the purpose. You first spread a little paste on a sheet of glass (if too thick, add more oil of lavender and mix with a palette knife), and roll it till the roller is quite equally charged all over, when the paste is easily transferred to the copper, which is afterwards gently heated to expel the oil of lavender. In both these methods of grounding a plate, the work is not completed until the ground has been smoked, which is effected as follows. The plate is held by a hand-vice if a small one, or if large, is fixed at some height, with the covered side downwards. A smoking torch, composed of many thin bees-wax dips twisted together, is then lighted and passed repeatedly under the plate in every direction, till the ground has incorporated enough lampblack to blacken it. The third way of covering a plate for etching is to apply the ground in solution as collodion is applied by photographers. The ground may be dissolved in chloroform, or in oil of lavender. The plate being grounded, its back and edges are protected from the acid by Japan varnish, which soon dries, and then the drawing is traced upon it. The best way of tracing a drawing is to use sheet gelatine, which is employed as follows. The gelatine is laid upon the drawing, which its transparence allows you to see perfectly, and you trace the lines by scratching the smooth surface with a sharp point. You then fill these scratches with fine black-lead, in powder, rubbing it in with the finger, turn the tracing with its face to the plate, and rub the back of it with a burnisher The black-lead from the scratches adheres to the etching ground and shows upon it as pale grey, much more visible than anything else you can use for tracing. Then comes the work of the etching-needle, which is merely a piece of steel sharpened more or less. J M. W. Turner used a prong of an old steel fork which did as well as anything, but neater etching-needles are sold by artists' colourmakers. The needle removes the ground or cover and lays the copper bare. Some artists sharpen their needles so as to present a cutting edge which, when used sideways, scrapes away a broad line; and many etchers use needles of various degrees of sharpness to get thicker or thinner lines. It may be well to observe, in connexion with this part of the subject, that whilst thick lines agree perfectly well with the nature of woodcut, they are very apt to give an unpleasant heaviness to plate engraving of all kinds, whilst thin lines have generally a clear and agreeable appearance in plate engraving. Nevertheless, lines of moderate thickness are used effectively in etching when covered with finer shading, and very thick lines indeed were employed with good results by Turner when he intended to cover them with mezzotint (*q.v.*), and to print in brown ink, because their thickness was essential to prevent them from being overwhelmed by the mezzotint, and the brown ink made them print less heavily than black. Etchers differ in opinion as to whether the needle ought to scratch the copper or simply to glide upon its surface. A gliding needle is much more free, and therefore communicates a greater appearance of freedom to the etching, but it has the inconvenience that the etching-ground may not always be entirely removed, and then the lines may be defective from insufficient biting. A scratching needle, on the other hand, is free from this serious inconvenience, but it must not scratch irregularly so as to *engrave* lines of various depth. The *biting* in former times was generally done with a mixture of nitric acid and water, in equal proportions; but in the present day a Dutch mordant is a good deal used, which is composed as follows: Hydrochloric acid, 100 grammes; chlorate of potash, 20 grammes; water, 880 grammes. To make it, heat the water, add the chlorate of potash, wait till it is entirely dissolved, and then add the acid. The nitrous mordant acts rapidly and causes ebullition; the Dutch mordant acts slowly and causes no ebullition. The nitrous mordant widens the lines; the Dutch mordant bites in depth, and does not widen the lines to any perceptible degree. The time required for both depends upon temperature. A mordant bites slowly when cold, and more and more rapidly when heated. To obviate irregularity caused by difference of temperature, it is a good plan to heat the Dutch mordant artificially to 95° Fahr. by lamps under the bath (for which a photographer's porcelain tray is most convenient), and keep it steadily to that temperature; the results may then be counted upon; but whatever the temperature fixed upon, the results will be regular if it is regular. To get different degrees of biting on the same plate the lines which are to be pale are "stopped out" by being painted over with Japan varnish or with etching ground dissolved in oil of lavender, the darkest lines being reserved to the last, as they have to bite longest. When the acid has done its work properly the lines are bitten in such various degrees of depth that they will print with the degree of blackness required; but if some parts of the subject require to be made paler, they can be lowered by rubbing them with charcoal and olive oil, and if they have to be made deeper they can be rebitten, or covered with added shading. Rebiting is done with the roller above mentioned, which is now charged very lightly with paste and rolled over the copper with no pressure but its own weight, so as to cover the smooth surface but not fill up any of the lines. The oil of lavender is then expelled as before by gently heating the plate, but it is not smoked. The lines which require rebiting may now be rebitten, and the others preserved against the action of the acid by stopping out. These are a few of the most essential technical points in etching, but there are many matters of detail for which the reader is referred to the special works on the subject.

There are many varieties in the processes of etching, and it is only necessary here to indicate the essential facts. A brief analysis of different styles may be given.

(1) *Pure Line.* As there is line engraving, so there is line etching; but as the etching-needle is a freer instrument than the burin, the line has qualities which differ widely from those of the burin line. Each of the two has its own charm and beauty; the liberty of the one is charming, and the restraint of the other is admirable also in its right place. In line etching, as in line engraving, the great masters purposely exhibit the line and do not hide it under too much shading. (2) *Line and Shade.* This answers exactly in etching to Mantegna's work in engraving. The most important lines are drawn first throughout, and the shade thrown over them like a wash with the brush over a pen sketch in indelible ink. (3) *Shade and Texture.* This is used chiefly to imitate oil-painting. Here the line (properly so called) is entirely abandoned, and the attention of the etcher is given to texture and chiaroscuro. He uses lines, of course, to express these, but does not exhibit them for their own beauty; on the contrary, he conceals them.

Of these three styles of etching the first is technically the easiest, and being also the most rapid, is adopted for sketching on the copper from nature; the second is the next in difficulty; and the third the most difficult, on account of the biting, which is never easy to manage when it becomes elaborate. The etcher has, however, many resources; he can make passages paler by burnishing them, or by using charcoal, or he can efface them entirely with the scraper and charcoal; he can darken them by rebiting or by regrounding the plate and adding fresh work; and he need not run the risk of biting the very palest passages of all, because these can be easily done with the *dry point*, which is simply a well-sharpened stylus used directly on the copper without the help of acid. It is often asserted that any one can etch who can draw, but this is a mistaken assertion likely to mislead. Without requiring so long an apprenticeship as the burin, etching is a very difficult art indeed, the two main causes of its difficulty being that the artist does not see his work properly as he proceeds, and that mistakes or misfortunes in the biting, which are of frequent occurrence to the inexperienced, may destroy all the relations of tone.

Etching, like line engraving, owed much to the old masters, but whereas, with the exception of Albert Dürer, the painters were seldom practical line engravers, they advanced etching not only by advice given to others but by the work of their own hands. Rembrandt did as much for etching as either Raphael or Rubens for line engraving; and in landscape the etchings of Claude had an influence which still continues, both Rembrandt and Claude being practical workmen in etching, and very skilful workmen. Ostade, Ruysdael, Berghem, Paul Potter, Karl Dujardin, etched as they painted, and so did a greater than any of them, Vandyck. In the earlier part of the 19th century etching was almost a defunct art, except as it was employed by engravers as a help to get faster through their work, of which "engraving" got all the credit, the public being unable to distinguish between etched lines and lines cut with the burin. But from the middle of the century dates a great revival of etching as an independent art, a revival which has extended all over Europe.

Apart from the copying of pictures by etching—which was found commercially preferable to the use of line engraving—

a number of artists and amateurs gradually practised original etching with increasing success, notably Sir Seymour Haden, J. M. Whistler, Samuel Palmer and others in England, Felix Bracquemond, C. F. Daubigny, Charles Jacque, Adolphe Appian, Maxime Lalanne, Jules Jacquemart and others on the continent, besides that singular and remarkable genius, Charles Méryon. Etching clubs, or associations of artists for the publication of original etchings, were gradually founded in England, France, Germany and Belgium. Méryon and Whistler are two of the greatest modern etchers. Among earlier names mention may be made of Andrew Geddes (1783–1844) and of Sir David Wilkie (1785–1841). Geddes was the finer artist with the needle; he it was whom Rembrandt best inspired; his work was in the grand manner. Of the rich and rare dry-points "At Peckham Rye" and "At Halliford-on-Thames," the deepest and most brilliant master of landscape would have no need to be ashamed. David Wilkie's prints were, naturally, not less dramatic than his pictures, but the etcher's particular gift was possessed by him more intermittently: it is shown best in "The Receipt," a strong and vivid, dexterous sketch, quite full of character. J. S. Cotman's (1782–1842) etchings are also historically interesting though they were "soft ground" for the most part. They show all his qualities of elegance and freedom as a draughtsman, and much of his large dignity in the distribution of light and shade. T. Girtin (1775–1802), in the preparations for his views of Paris, was notably happy. The work of Sir Francis Seymour Haden (b. 1818) had a powerful influence on the art in England. Between 1858 and 1879 Seymour Haden—the first president of the Royal Society of Painter Etchers—produced the vast majority of his plates, which have always good draughtsmanship, unity of effect and a personal impression. They show a strong feeling for nature. If, amongst some two hundred subjects, it were necessary to select one or two for peculiar praise, they might be the "Breaking up of the *Agamemnon*," the almost perfect "Water Meadow," the masterly presentment of "Erith Marshes," and the later dry-point of "Windmill Hill." Another great etcher—Frenchman by birth, but English by long residence—is Alphonse Legros (*q.v.*). Great in expression and suggestive draughtsmanship, austere and economical in line, Legros's work is the grave record of the observation and the fancy of an imaginative mind. In poetic portraiture nothing can well exceed his etched vision of G. F. Watts; "La Mort du Vagabond" is noticeable for terror and homely pathos; "Communion dans l'Église St Médard" is perhaps the best instance of the dignity, vigour and grave sympathy with which he addresses himself to ecclesiastical themes. Something of these latter qualities, in dealing with similar themes, Legros passed on to his pupil, Sir Charles Holroyd (b. 1861)—an etcher in the true vein; whilst an earlier pupil, prolific as himself, as imaginative, and sometimes more deliberately uncouth—William Strang, A.R.A. (b. 1859)—carried on in his own way the tradition of that part of Legros's practice, the preoccupation with the humble, for which Legros himself found certain warrant in a portion of the great *œuvre* of Rembrandt. Frank Short, A.R.A. (b. 1857), as with the very touch of Turner, carried to completion great designs that Turner left unfinished for the *Liber studiorum*. The delicacy of "Sleeping till the Flood," the curiously suggestive realism of "Wrought Nails"—a scene in the Black Country—entitle him to a lasting place in the list of the fine wielders of the etching-needle. D. Y. Cameron (b. 1865) betrays the influence of Rembrandt in a noble etching, "Border Towers," and the influence of Méryon in such a print as that of "The Palace, Stirling." His "London Set" is particularly fine. The individuality of C. J. Watson is less marked, but his skill, chiefly in architectural work, is noticeable. Admirers of the studiously accurate portraiture of a great monument may be able to set Watson's print of "St Étienne du Mont" by the side of Méryon's august and mysterious and ever-memorable vision. Paul Helleu (b. 1859) in his brilliant sketches, particularly of women, has used the art of etching in a peculiarly individual and delightful way. Among the numerous other modern etchers only a bare mention can be made of Oliver Hall, Minna Bolingbroke and Elizabeth Armstrong (Mrs Watson and Mrs Stanhope Forbes), Alfred East, Robert Macbeth, Walter Sickert, Robert Goff, Mortimer Menpes, Percy Thomas, Raven Hill, and Prof. H. von Herkomer, in England; in France, Roussel, J. F. Raffaëlli (b. 1850), Besnard and J. J. J. Tissot (1836–1902).

The oldest treatise on etching is that of Abraham Bosse (1645). See also P. G. Hamerton, *Etching and Etchers* (1868), and *Etchers' Handbook* (1881); F. Wedmore, *Etching in England* (1895); Singer and Strang, *Etching, Engraving, &c.* (1897).

ETEOCLES, in Greek legend, king of Thebes, son of Oedipus and Jocasta (Iocaste). After their father had been driven out of the country, he and his brother Polyneices agreed to reign alternately for a year. Eteocles, however, refused to keep the agreement, and Polyneices fled to Adrastus, king of Argos, whom he persuaded to undertake the famous expedition against Thebes on his behalf. The two brothers met in single combat, and both were slain. The Theban rulers decreed that only Eteocles should receive the honour of burial, but the decree was set at naught by Antigone (*q.v.*), the sister of Polyneices. The fate of Eteocles and Polyneices forms the subject of the *Seven against Thebes* of Aeschylus and the *Phoenissae* of Euripides.

ETESIAN WIND (Lat. *etesius*, annual; Gr. ἔτος, year), a Mediterranean wind blowing from the north and west in summer for about six weeks annually.

ÉTEX, ANTOINE (1808–1888), French sculptor, painter and architect, was born in Paris on the 20th of March 1808. He first exhibited in the salon of 1833, his work including a reproduction in marble of his "Death of Hyacinthus," and the plaster cast of his "Cain and his race cursed by God." Thiers, who was at this time minister of public works, now commissioned him to execute the two groups of "Peace" and "War," placed at each side of the Arc de Triomphe. This last, which established his reputation, he reproduced in marble in the salon of 1839. The French capital contains numerous examples of the sculptural works of Étex, which included mythological and religious subjects besides a great number of portraits. His paintings include the subjects of Eurydice and the martyrdom of Saint Sebastian, and among the best known of his architectural productions are the tomb of Napoleon I. in the Invalides and a monument of the revolution of 1848. Étex wrote a number of essays on subjects connected with the arts. The last year of his life was spent at Nice, and he died at Chaville (Seine-et-Oise) on the 14th of July 1888.

See P. E. Mangeant, *Antoine Étex, peintre, sculpteur et architecte, 1808–1888* (Paris, 1894).

ETHER, $(C_2H_5)_2O$, the *Aether* of pharmacy, a colourless, volatile, highly inflammable liquid, of specific gravity 0·736 at 0°, boiling-point 35° C., and freezing-point 117°·4 C. (K. Olszewski). It has a strong and characteristic odour, and a hot sweetish taste, is soluble in ten parts of water, and in all proportions in alcohol, and dissolves bromine, iodine, and, in small quantities, sulphur and phosphorus, also the volatile oils, most fatty and resinous substances, guncotton, caoutchouc and certain of the vegetable alkaloids. The vapour mixed with oxygen or air is violently explosive. The making of ether by the action of sulphuric acid on alcohol was known in about the 13th century; and later Basil Valentine and Valerius Cordus described its preparation and properties. The name ether appears to have been applied to the drug only since the times of Frobenius, who in 1730 termed it *spiritus aethereus* or *vini vitriolatus*. It was considered to be a sulphur compound, hence its name sulphur ether; this idea was proved to be erroneous by Valentine Rose in about 1800. Ether is manufactured by the distillation of 5 parts of 90% alcohol with 9 parts of concentrated sulphuric acid at a temperature of 140°–145° C., a constant stream of alcohol being caused to flow into the mixture during the operation. The distillate is purified by treatment with lime and calcium chloride, and subsequent distillation. The mechanism of this reaction was explained by A. Williamson in 1850. For other methods of preparation see ETHERS.[1]

[1] See also J. v. Liebig, *Ann. Chem. Pharm.*, 1837, 23, p. 39; 1839, 30, p. 129; E. Mitscherlich, *Pogg. Ann.*, 1836, 31, p. 273; 1841, 53, p. 95; A. W. Williamson, *Phil. Mag.*, 1850 (3), 37, p. 350.

The presence of so small a quantity as 1% of alcohol may be detected in ether by the colour imparted to it by aniline violet; if water or acetic acid be present, the ether must be shaken with anhydrous potassium carbonate before the application of the test. When heated with zinc dust, it yields ethylene and water. Chromic acid oxidizes it to acetic acid and ozone oxidizes it to ethyl peroxide. In contact with hydriodic acid gas at 0° C., it forms ethyl iodide (R. D. Silva, *Ber.*, 1875, 8, p. 903), and with water and a little sulphuric acid at 180° C., it yields alcohol (E. Erlenmeyer, *Zeit. f. chemie*, 1868, p. 343). It forms crystalline compounds with bromine and with many metallic salts.

Medicine.—For the anaesthetic properties of ether see ANAESTHESIA. Applied externally, ether evaporates very rapidly, producing such intense cold as to cause marked local anaesthesia. For this purpose it is best applied as a fine spray, but ethyl chloride is generally found more efficient and produces less subsequent discomfort. It aids the absorption of fats and may be used with cod liver-oil when the latter is administered by the skin. If it be rubbed in or evaporation be prevented, it acts, like alcohol and chloroform, as an irritant. Ten to twenty minims of ether, subcutaneously injected, constitute perhaps the most rapid and powerful cardiac stimulant known, and are often employed for this purpose in cases of syncope under anaesthesia. Taken internally, ether acts in many respects similarly to alcohol and chloroform, but its stimulant action on the heart is much more marked, being exerted both reflexly from the stomach and directly after its rapid absorption. Ether is thus the type of a rapidly diffusible stimulant. It is also useful in relieving the paroxysms of asthma. The dose for repeated administration is from 10 to 30 minims and for a single administration up to a drachm.

Chronic Poisoning.—A dose of a little more than a drachm (a teaspoonful) will produce a condition of inebriation lasting for one-half to one hour, but the dose must soon be greatly increased. The after-effects are, if anything, rather pleasant, and the habit of ether drinking is certainly not so injurious as alcoholism. The principal symptons of chronic ether-drinking are a weakening of the activity of the special senses, and notably sight and hearing, a lowering of the intelligence and a degree of general paresis (partial paralysis) of motion.

ETHEREDGE [or ETHEREGE], **SIR GEORGE** (*c.* 1635–1691), English dramatist, was born about the year 1635, and belonged to an Oxfordshire family. He is said to have been educated at Cambridge, but Dennis assures us that "to his certain knowledge he understood neither Greek nor Latin." He travelled abroad early, and seems to have resided in France. It is possible that he witnessed in Paris the performances of some of Molière's earliest comedies; and he seems, from an allusion in one of his plays, to have been personally acquainted with Bussy Rabutin. On his return to London he studied the law at one of the Inns of Court. His tastes were those of a fine gentleman, and he indulged freely in pleasure.

Sometime soon after the Restoration he composed his comedy of *The Comical Revenge* or *Love in a Tub*, which introduced him to Lord Buckhurst, afterwards the earl of Dorset. This was brought out at the Duke's theatre in 1664, and a few copies were printed in the same year. It is partly in rhymned heroic verse, like the stilted tragedies of the Howards and Killigrews, but it contains comic scenes that are exceedingly bright and fresh. The sparring between Sir Frederick and the Widow introduced a style of wit hitherto unknown upon the English stage. The success of this play was very great, but Etheredge waited four years before he repeated his experiment. Meanwhile he gained the highest reputation as a poetical beau, and moved in the circle of Sir Charles Sedley, Lord Rochester and the other noble wits of the day. In 1668 he brought out *She would if she could*, a comedy in many respects admirable, full of action, wit and spirit, although to the last degree frivolous and immoral. But in this play Etheredge first shows himself a new power in literature; he has nothing of the rudeness of his predecessors or the grossness of his contemporaries. We move in an airy and fantastic world, where flirtation is the only serious business of life. At this time Etheredge was living a life no less frivolous and unprincipled than those of his Courtals and Freemans. He formed an alliance with the famous actress Mrs Elizabeth Barry; she bore him a daughter, on whom he settled £6000, but who, unhappily, died in her youth. His wealth and wit, the distinction and charm of his manners, won Etheredge the general worship of society, and his temperament is best known by the names his contemporaries gave him, of "gentle George" and "easy Etheredge." Rochester upbraided him for inattention to literature; and at last, after a silence of eight years, he came forward with one more play, unfortunately his last. *The Man of Mode or Sir Fopling Flutter*, indisputably the best comedy of intrigue written in England before the days of Congreve, was acted and printed in 1676, and enjoyed an unbounded success. Besides the merit of its plot and wit, it had the personal charm of being supposed to satirize, or at least to paint, persons well known in London. Sir Fopling Flutter was a portrait of Beau Hewit, the reigning exquisite of the hour; in Dorimant the poet drew the earl of Rochester, and in Medley a portrait of himself; while even the drunken shoemaker was a real character, who made his fortune from being thus brought into public notice. After this brilliant success Etheredge retired from literature; his gallantries and his gambling in a few years deprived him of his fortune, and he looked about for a rich match. He was knighted before 1680, and gained the hand and the money of a rich widow. He was sent by Charles II. on a mission to the Hague, and in March 1685 was appointed resident minister in the imperial German court at Regensburg. He was very uncomfortable in Germany, and after three and a half years' residence left for Paris. He had collected a library at Regensburg, some volumes of which are in the theological college there. His MS. despatches are preserved in the British Museum, where they were discovered and described by Mr Gosse in 1881; they add very largely to our knowledge of Etheredge's career. He died in Paris, probably in 1691, for Narcissus Luttrell notes in February 1692 that "Sir George Etherege, the late King James' ambassador to Vienna, died lately in Paris."

Etheredge deserves to hold a more distinguished place in English literature than has generally been allotted to him. In a dull and heavy age, he inaugurated a period of genuine wit and sprightliness. He invented the comedy of intrigue, and led the way for the masterpieces of Congreve and Sheridan. Before his time the manner of Ben Jonson had prevailed in comedy, and traditional "humours" and typical eccentricities, instead of real characters, had crowded the comic stage. Etheredge paints with a light, faint hand, but it is from nature, and his portraits of fops and beaux are simply unexcelled. No one knows better than he how to present a gay young gentleman, a Dorimant, "an unconfinable rover after amorous adventures." His genius is aslight as thistle-down; he is frivolous, without force of conviction, without principle; but his wit is very sparkling, and his style pure and singularly picturesque. No one approaches Etheredge in delicate touches of dress, furniture and scene; he makes the fine airs of London gentlemen and ladies live before our eyes even more vividly than Congreve does; but he has less insight and less energy than Congreve. Had he been poor or ambitious, he might have been to England almost what Molière was to France, but he was a rich man living at his ease, and he disdained to excel in literature. Etheredge was "a fair, slender, genteel man, but spoiled his countenance with drinking." His contemporaries all agree in acknowledging that he was the soul of affability and sprightly good-nature.

The life of Etheredge was first given in detail by Edmund Gosse in *Seventeenth Century Studies* (1883). His works were edited by A. W. Verity, in 1888. (E. G.)

ETHERIDGE, JOHN WESLEY (1804–1866), English nonconformist divine, was born near Newport, Isle of Wight, on the 24th of February 1804. He received most of his early education from his father. Though he never attended any university he acquired ultimately a thorough knowledge of Greek, Latin, Hebrew, Syriac, French and German. In 1824 he was placed on the Wesleyan Methodist plan as a local preacher. In 1826 his offer to enter the ministry was accepted, and after the usual probationary trial he was received into full connexion at the conference of 1831. For two years after this he remained at Brighton, and in 1833 he removed to Cornwall, being stationed successively at the Truro and Falmouth circuits. From Falmouth he removed to Darlaston, where in 1838 his health gave way. For a good many years he was a supernumerary, and lived for a while at Caen and Paris, where in the public libraries he found great facilities for prosecuting his favourite Oriental studies. His health having considerably improved, he became, in 1843, pastor of the Methodist church at Boulogne. He returned to England in 1847, and was appointed successively to the circuits of Islington, Bristol, Leeds, Penzance, Penryn, Truro and St Austell in east Cornwall. Shortly after his return to England he received the degree of Ph.D. from the university of Heidelberg. He was a patient, modest, hard-working and accurate scholar. He died at Camborne on the 24th of May 1866.

His principal works are *Horae Aramaicae* (1843); *History, Liturgies and Literature of the Syrian Churches* (1847); *The Apostolic Acts and Epistles, from the Peshito or Ancient Syriac* (1849); *Jerusalem and Tiberias, a Survey of the Religious and Scholastic Learning of the Jews* (1856); *The Targums of Onkelos and Jonathan ben Uzziel* (1st vol. in 1862, 2nd in 1865). See *Memoir*, by Rev. Thornley Smith (1871).

ETHERIDGE, ROBERT (1819–1903), English geologist and palaeontologist, was born at Ross, in Herefordshire, on the 3rd of December 1819. After an ordinary school education in his native town, he obtained employment in a business house in Bristol. There he devoted his spare time to natural history pursuits, and in 1850 was appointed curator of the museum attached to the Bristol Philosophical Institution. He also became lecturer on botany in the Bristol medical school. In 1857, through the influence of Sir Roderick I. Murchison, he was appointed to a post in the Museum of Practical Geology in London, and eventually became palaeontologist to the Geological Survey. In 1865 he assisted Prof. Huxley in the preparation of a *Catalogue of Fossils in the Museum of Practical Geology.* His chief work for many years was in naming the fossils collected during the progress of the Geological Survey, and in supplying the lists that were appended to numerous official memoirs. In this way he acquired an exceptional knowledge of British fossils, and he ultimately prepared an elaborate work entitled *Fossils of the British Islands, Stratigraphically and Zoologically arranged.* Only the first volume dealing with the Palaeozoic species was published (1888). Etheridge also was author of several papers on the Rhaetic Beds, and of an important essay on the Physical Structure of North Devon, and on the Palaeontological Value of the Devonian Fossils (1867). He edited, and in the main rewrote, the second part of a new edition of John Phillips' Manual of Geology—entitled *Stratigraphical Geology and Palaeontology* (1885). He was elected F.R.S. in 1871, and was president of the Geological Society in 1881–1882. In 1881 Etheridge was transferred from the Geological Survey to the geological department of the British Museum, where he served as assistant keeper until 1891. He died at Chelsea, London, on the 18th of December 1903.

Memoir by Dr Henry Woodward (with list of works and portrait) in *Geological Magazine*, January 1904; also Memoir by H. B. Woodward (with portrait) in *Proc. Bristol Nat. Soc.* x. 175.

ETHERS, in organic chemistry, compounds of the general formula $R\cdot O\cdot R'$, where R, R' = alkyl or aryl groups. They may be regarded as the anhydrides of the alcohols, being formed by elimination of one molecule of water from two molecules of the alcohols; those in which the two hydrocarbon radicals are similar are known as *simple* ethers, and those in which they are dissimilar as *mixed* ethers. They may be prepared by the action of concentrated sulphuric acid on the alcohols, alkyl sulphuric acids being first formed, which yield ethers on heating with alcohols. The process may be made a continuous one by running a thin stream of alcohol continually into the heated reaction mixture of alcohol and sulphuric acid. Benzene sulphonic acid has been used in place of sulphuric acid (F. Krafft, *Ber.*, 1893, 26, p. 2829). A. W. Williamson (*Ann.*, 1851, 77, p. 38; 1852, 81, p. 77) prepared ether by the action of sodium ethylate on ethyl iodide, and showed that all ethers must possess the structural formula given above (see also *Brit. Assoc. Reports*, 1850, p. 65). They may also be prepared by heating the alkyl halides with silver oxide.

The ethers are neutral volatile liquids (the first member, methyl ether, is a gas at ordinary temperature). Phosphorus pentachloride converts them into alkyl chlorides, a similar decomposition taking place when they are heated with the haloid acids. Nitric acid and chromic acid oxidize them in such a manner that they yield the same products as the alcohols from which they are derived. With chlorine they yield substitution products.

Methyl ether, $(CH_3)_2O$, was first prepared by J. B. Dumas and E. Péligot (*Ann. chim. phys.*, 1835, [2] 58, p. 19) by heating methyl alcohol with sulphuric acid. It is best prepared by heating methyl alcohol and sulphuric acid to 140° C. and leading the evolved gas into sulphuric acid. The sulphuric acid solution is then allowed to drop slowly into an equal volume of water, when the methyl ether is liberated (E. Erlenmeyer and A. Kriechbaumer, *Ber.*, 1874, 7, p. 699). It is a pleasant-smelling gas, which burns when ignited, and may be condensed to a liquid which boils at 23·6° C. It is somewhat soluble in water and readily soluble in alcohol, and concentrated sulphuric acid. It combines with hydrochloric acid gas to form a compound $(CH_3)_2O\cdot HCl$ (C. Friedel, *Comptes rendus*, 1875, 81, p. 152). *Methyl ethyl ether*, $CH_3\cdot O\cdot C_2H_5$, is prepared from methyl iodide and sodium ethylate, or from ethyl iodide and sodium methylate (A. W. Williamson, *Ann.*, 1852, 81, p. 77). It is a liquid which boils at 10·8° C.

For diethyl ether see Ether, and for methyl phenyl ether (anisole) and ethyl phenyl ether (phenetole) see Carbolic Acid.

ETHICS, the name generally given to the science of moral philosophy. The word "ethics" is derived from the Gr. ἠθικός, that which pertains to ἦθος, character.

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Section I. contains a general survey of the subject; it shows in what sense ethics is to be regarded as a special field of philosophical investigation—its relations to other departments of thought, especially to psychology, religion and modern physical science. The article makes no attempt to give a detailed, casuistical examination of the matter of ethical theory. For this, reference must be made to special articles on philosophic schools, writers and terms.

Section II. is a historical sketch in four parts tracing the main lines of development in ethical speculation from its birth to the present day. Here again it has been possible to notice only the salient points or landmarks, leaving all detail to special articles as above. All important writers whose names occur in this sketch are treated in special biographical articles, and references are given as often as possible to supplementary articles which illustrate and explain points which cannot be fully treated here. This is especially the case in connexion with technical terms (whose history and meaning are inevitably taken for granted) and biographical information about minor ethical writers.

I. DEFINITION AND SUBJECT-MATTER OF ETHICS

In its widest sense, the term "ethics" would imply an examination into the general character or habits of mankind, and would even involve a description or history of the habits of men in particular societies living at different periods of time. Such a field of study would obviously be too wide for any particular science or philosophy to investigate, and moreover portions of the field are already occupied by history, by anthropology and by the particular sciences (*e.g.* physiology, anatomy, biology), in so far as the habits and character of men depend upon the material processes which these sciences examine. Even philosophies such as logic and aesthetic would be necessary for such an investigation, if thought and artistic production are normal human habits and elements in character. Ethics then is usually confined to the particular field of human character and conduct so far as they depend upon or exhibit certain general principles commonly known as moral principles. Men in general characterize their own conduct and character and that of other men by such general adjectives as good, bad, right and wrong, and it is the meaning and scope of these adjectives, primarily in relation to human conduct, and ultimately in their final and absolute sense, that ethics investigates.

A not uncommon definition of ethics as the "science of conduct" is inexact for various reasons. (1) The sciences are descriptive or experimental. But a description of what acts or what ends of action men in the present or the past call, or have called, "good" or "bad" is clearly beyond human powers. And experiments in morality (apart from the inconvenient practical consequences likely to ensue) are useless for purposes of ethics, because the moral consciousness would itself at one and the same time be required to make the experiment and to provide the subject upon which the experiment is performed. (2) Ethics is a philosophy and not a science. Philosophy is a process of reflection upon the presuppositions involved in unreflective thought. In logic and metaphysics it investigates either the process of apprehension itself, or conceptions such as cause, substance, space, time, which the ordinary scientific consciousness never criticizes. In moral philosophy the place of the body of sciences, which philosophy as the theory of knowledge investigates, is taken by the developed moral consciousness, which already pronounces moral judgment without hesitation, and claims authority to subject to continual criticism the institutions and forms of social life which it has itself helped to create.

When ethical speculation first begins, conceptions such as those of duty, responsibility, the will as the ultimate subject of moral approbation and disapprobation, are already in existence and already operative. Moral philosophy in a certain sense adds nothing to these conceptions, though it sets them in a clearer light. The problems of the moral consciousness at the time at which it first becomes reflective are not strictly speaking philosophical problems at all. It is occupied with just such questions as each individual man who wishes to act rightly is constantly called upon to answer; *e.g.* questions such as "What particular action will meet the claims of justice under such and such circumstances?" or "What degree of ignorance will excuse this particular person in this particular case from his responsibility?" It tries to attain a knowledge as complete as possible of the circumstances under which the act contemplated must be performed, the personalities of the persons whom it may affect, and the consequences (so far as they can be foreseen) which it will produce, and then by virtue of its own power of moral discrimination pronounces judgment. And the ever-recurring problem of the moral consciousness, "What ought to be done?" is one which receives a clearer and more definite answer as men become more able in the course of moral experience to apply those principles of the moral consciousness which are yet employed in that experience from the outset. Nevertheless there is a sense in which moral philosophy may be said to originate out of difficulties inherent in the nature of morality itself, although it remains true that the questions which ethics attempts to answer are never questions with which the moral consciousness as such is confronted. The fact that men give different answers to moral problems which seem similar in character, or even the mere fact that men disregard, when they act immorally, the dictates and implicit principles of the moral consciousness is certain sooner or later to produce the desire either, on the one hand, to justify immoral action by casting doubt upon the authority of the moral consciousness and the validity of its principles, or, on the other hand, to justify particular moral judgments either by (the only valid method) an analysis of the moral principle involved in the judgment and a demonstration of its universal acceptation, or by some attempted proof that the particular moral judgment is arrived at by a process of inference from some universal conception of the Supreme Good or the Final End from which all particular duties or virtues may be deduced. It may be that criticism of morality first originates with a criticism of existing moral institutions or codes of ethics; such a criticism may be due to the spontaneous activity of the moral consciousness itself. But when such criticism passes into the attempt to find a universal criterion of morality—such an attempt being in effect an effort to make morality scientific—and especially when the attempt is seen, as it must in the end be seen, to fail (the moral consciousness being superior to all standards of morality and realizing itself wholly in particular judgments), then ethics as a *process of reflection* upon the nature of the moral consciousness may be said to begin. If this be true it follows that one of the chief function of ethics must be criticism of mistaken attempts to find a criterion of morality superior to the pronouncements of the moral consciousness itself. The ultimate superiority of the moral consciousness over all other standards is recognized, even by those who impugn its authority, whenever they claim that all men ought to recognize the superior value of the standards which they themselves wish to substitute. Similarly, their opponents refute their arguments by showing that they are based ultimately upon a recognition of certain distinctions which are moral distinctions (*i.e.* imply a moral consciousness capable of discriminating between right and wrong in particular cases), and that these moral distinctions conflict with the conclusions which they reach.

This may briefly be illustrated by reference to some of the great fundamental controversies of ethics. None of these originates out of conflicting statements of the moral consciousness, *i.e.* there is no fundamental contradiction in morality itself. No one (if unsophisticated) ever confused the conception of pleasure with the conception of the Good, or thought that the claims of selfish interest were identical with those of duty. But the controversy between hedonists and antihedonists originates as soon as men reflect that a good which is not in some sense "my" good is not good at all, or that no act can be said to be moral which does not satisfy "me." Or, again, the reflection that the mark or sign of the perfect performance of a particular virtuous act or function is the presence of a characteristic pleasure which always accompanies it, is opposed to the reflection that it is a mark of the highest morality never to rest satisfied, and out of these seemingly contradictory statements of the reflective consciousness might arise a multitude of controversies either concerning pleasure and duty, or the even more difficult and complex conceptions of merit, progress, and the nature of the Supreme Good or Final End.

The Sciences.

Theology.

When and how fresh controversies in ethics will begin it would be impossible for any one to foretell. Sometimes the dominance of a particular science or branch of study is the occasion of an attempt to apply to ethics ideas borrowed from or analogous to the conceptions of that science. False analogies drawn between ethics and mathematics or between morality and the perception of beauty have wrought much mischief in modern and to some degree even in ancient ethics. The influence of ideas borrowed from biology is everywhere manifest in the ethical speculations of modern times. Sometimes, again, whole theories of ethics have been formulated which can be seen in the end to be efforts to subordinate moral conceptions to conceptions belonging properly to institutions or departments of human thought and activity which the moral consciousness has itself originated. Law, for instance, depends, or at least ought to depend, upon men's need for and consciousness of justice. And such institutions as the family and the state are created by the social consciousness, which is the moral consciousness from another aspect. Yet morality has been subordinated to legal and social sanctions, and moral advance has been held to be conditioned by political and social necessities which are not moral needs. Similarly no one since civilization emerged from barbarism has ever really been willing to yield allegiance to a deity who is not moral in the fullest and highest sense of the word. God is not superior to moral law. Yet there have been whole systems of theological ethics which have attempted to base human morality upon the arbitrary will of God or upon the supreme authority of a divinely inspired book or code of laws. One of the greatest of all ethical controversies, that concerning the freedom of the will, arose directly out of what was in reality a theological problem—the necessity, namely, of reconciling God's foreknowledge with human freedom. The unreflective moral consciousness never finds it difficult to distinguish between a man's power of willing and all the forces of circumstance, heredity and the like, which combine to form the temptations to which he may yield or bid defiance; and such facts as "remorse" and "penitence" are a continual testimony to man's sense of freedom. But so soon as men perceive upon reflection an apparent discrepancy between the utterances of their moral consciousness and certain conclusions to which theological speculation (or at a later period metaphysical and scientific inquiries) seems inevitably to lead them, they will not rest satisfied until the belief in the will's freedom (hitherto unquestioned) is upon further reflection justified or condemned. It is clear then that the complexity of the subject-matter of ethics is such that no sharply defined boundary lines can be drawn between it and other branches of inquiry. Just in so far as it presupposes the apprehension of moral facts, it must presuppose a knowledge of the system of social relationships upon which some at least of those facts depend. No one, for instance, could inquire into the nature of justice without being further compelled to undertake an examination of the nature of the state.

Psychology.

It would be difficult to decide how much of the dispute between the advocates of pleasure theories and their opponents turns upon vexed questions of psychology, and how much is strictly relevant to ethics. If, as has already been said, one of the chief tasks of ethics is to prevent the intrusion into its own sphere of inquiry of ideas borrowed from other and alien sources, then obviously these sources must be investigated. One example of this necessity may be given. It is sometimes maintained that the proper method of ethics is the psychological method; ethics, we are told, should examine as its subject-matter moral sentiments wherever found, without raising ultimate questions as to the nature of obligation or moral authority in general. Now if in opposition to such arguments the ultimate character of moral obligation be defended, it will be necessary to point out that no one feels moral sentiments except in connexion with particular objects of moral approbation or disapprobation (*e.g.* gratitude is inexplicable apart from a particular relationship existing between two or more persons), and that these objects are objects of the moral consciousness alone. But such a line of argument is certain to make necessary an inquiry into the nature of the objects of psychological study which may produce quite unforeseen results for psychology.

Nothing therefore is to be gained by confining ethics within limits which must from the nature of the case be arbitrary. The defender at all events of the supremacy of moral intuitions must be prepared to follow whither the argument leads, into whatever strange quarters it may direct him. But this much may be said by way of delimitation of the scope of ethics: however complicated and involved its arguments and processes of inference may become, the facts from which they start and the conclusions to which they point are such as the moral consciousness alone can understand or warrant. (H. H. W.)

II. Historical Sketch

A. *Greek and Graeco-Roman Ethics.*—The ethical speculation of Greece, and therefore of Europe, had no abrupt and absolute beginning. The naive and fragmentary precepts of conduct, which are everywhere the earliest manifestation of nascent moral reflection, are a noteworthy element in the gnomic poetry of the 7th and 6th centuries B.C. Their importance is shown by the traditional enumeration of the Seven Sages of the 6th century, and their influence on ethical thought is attested by the references of Plato and Aristotle. But from these unscientific utterances to a philosophy of morals was a long process. In the practical wisdom of Thales (*q.v.*), one of the seven, we cannot discern any systematic theory of morality. In the case of Pythagoras, conspicuous among pre-Socratic philosophers as the founder not merely of a school, but of a sect or order bound by a common rule of life, there is a closer connexion between moral and metaphysical speculation. The doctrine of the Pythagoreans that the essence of justice (conceived as equal retribution) was a square number, indicates a serious attempt to extend to the region of conduct their mathematical view of the universe; and the same may be said of their classification of good with unity, straightness and the like, and of evil with the opposite qualities. Still, the enunciation of the moral precepts of Pythagoras appears to have been dogmatic, or even prophetic, rather than philosophic, and to have been accepted by his disciples with an unphilosophic reverence as the *ipse dixit*[1] of the master. Hence, whatever influence the Pythagorean blending of ethical and mathematical notions may have had on Plato, and, through him, on later thought, we cannot regard the school as having really forestalled the Socratic inquiry after a completely reasoned theory of conduct. The ethical element in the "dark" philosophizing of Heraclitus (*c.* 530–470 B.C.), though it anticipates Stoicism in its conceptions of a law of the universe, to which the wise man will carefully conform, and a divine harmony, in the recognition of which he will find his truest satisfaction, is more profound, but even less systematic. It is only when we come to Democritus, a contemporary of Socrates, the last of the original thinkers whom we distinguish as pre-Socratic, that we find anything which we can call an ethical system. The fragments that remain of the moral treatises of Democritus are sufficient, perhaps, to convince us that the turn of Greek philosophy in the direction of conduct, which was actually due to Socrates, would have taken place without him, though in a less decided manner; but when we compare the Democritean ethics with the post-Socratic system to which it has most affinity, Epicureanism, we find that it exhibits a very rudimentary apprehension of the formal conditions which moral teaching must fulfil before it can lay claim to be treated as scientific.

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[1] This well-known phrase was originally attributed to the Pythagoreans.

The truth is that no system of ethics could be constructed until attention had been directed to the vagueness and inconsistency of the common moral opinions of mankind. For this purpose was needed the concentration of a philosophic intellect of the first order on the problems of practice. In Socrates first we find the required combination of a paramount interest in conduct and an ardent desire for knowledge. The pre-Socratic thinkers were all primarily devoted to ontological research; but by the middle of the 5th century B.C. the conflict of their dogmatic systems had led some of the keenest minds to doubt the possibility of penetrating the secret of the physical universe. This doubt found expression in the reasoned scepticism of Gorgias, and produced the famous proposition of Protagoras, that human apprehension is the only standard of existence. The same feeling led Socrates to abandon the old physico-metaphysical inquiries. In his case, moreover, it was strengthened by a naïve piety that forbade him to search into things of which the gods seemed to have reserved the knowledge to themselves. The regulation of human action, on the other hand (except on occasions of special difficulty, for which omens and oracles might be vouchsafed), they had left to human reason. On this accordingly Socrates concentrated his efforts.

The Sophists.

Though, however, Socrates was the first to arrive at a proper conception of the problems of conduct, the general idea did not originate with him. The natural reaction against the metaphysical and ethical dogmatism of the early thinkers had reached its climax in the Sophists (*q.v.*). Gorgias and Protagoras are only representatives of what was really a universal tendency to abandon dogmatic theory and take refuge in practical matters, and especially, as was natural in the Greek city-state, in the civic relations of the citizen. The education given by the Sophists aimed at no general theory of life, but professed to expound the art of getting on in the world and of managing public affairs. In their eulogy of the virtues of the citizen, they pointed out the prudential character of justice and the like as a means of obtaining pleasure and avoiding pain. The Greek conception of society was such that the life of the free-born citizen consisted mainly of his public function, and, therefore, the pseudo-ethical disquisitions of the Sophists satisfied the requirements of the age. None thought of ἀρετή (virtue or excellence) as a unique quality possessed of an intrinsic value, but as the virtue of the citizen, just as good flute-playing was the virtue of the flute-player. We see here, as in other activities of the age, a determination to acquire technical knowledge, and to apply it directly to the practical issue; just as music was being enriched by new technical knowledge, architecture by modern theories of plans and T-squares (*sc.* Hippodamus), the handling of soldiers by the new technique of "tactics" and "hoplitics," so citizenship must be analysed afresh, systematized and adapted in relation to modern requirements. The Sophists had studied these matters superficially indeed but with thoroughness as far as they went, and it is not remarkable that they should have taken the methods which were successful in rhetoric, and applied them to the "science and art" of civic virtues. Plato's *Protagoras* claims, not unjustly, that in teaching virtue they simply did systematically what every one else was doing at haphazard. But in the true sense of the word, they had no ethical system at all, nor did they contribute save by contrast to ethical speculation. They merely analysed conventional formulae, much in the manner of certain modern so-called "scientific" moralists. Into this arena of hazy popular common sense Socrates brought a new critical spirit, showing that these popular lecturers, in spite of their fertile eloquence, could not defend their fundamental assumptions, nor even give rational definitions of what they professed to explain. Not only were they thus "ignorant," but they were also perpetually inconsistent with themselves in dealing with particular instances. Thus, by the aid of his famous "dialectic," Socrates arrived first at the negative result that the professed teachers of the people were as ignorant as he himself claimed to be, and in a measure justified the eulogy of Aristotle that he rendered to philosophy the service of "introducing induction and definitions." This description of his work is, however, both too technical and too positive, if we may judge from those earlier dialogues of Plato in which the real Socrates is found least modified. The pre-eminent wisdom which the Delphic oracle attributed to him was held by himself to consist in a unique consciousness of ignorance. Yet it is equally clear from Plato that there was a most important positive element in the teaching of Socrates in virtue of which it is just to say with Alexander Bain, "the first important name in ancient ethical philosophy is Socrates." The union of the negative and the positive elements in his work has caused historians no little perplexity, and we cannot quite save the philosopher's consistency unless we regard some of the doctrines attributed to him by Xenophon as merely tentative and provisional. Still the positions of Socrates that are most important in the history of ethical thought not only are easy to harmonize with his conviction of ignorance, but even render it easier to understand his unwearied cross-examination of common opinion. While he showed clearly the difficulty of acquiring knowledge, he was convinced that knowledge alone could be the source of a coherent system of virtue, as error of evil. Socrates, therefore, first in the history of thought, propounds a positive scientific law of conduct. Virtue is knowledge. This principle involved the paradox that no man, knowing good, would do evil. But it was a paradox derived from his unanswerable truisms, "Every one wishes for his own good, and would get it if he could," and "No one would deny that justice and virtue generally are goods, and of all goods the best." All virtues are, therefore, summed up in knowledge of the good. But this good is not, for Socrates, duty as distinct from interest. The force of the paradox depends upon a blending of duty and interest in the single notion of good, a blending which was dominant in the common thought of the age. This it is which forms the kernel of the positive thought of Socrates according to Xenophon. He could give no satisfactory account of Good in the abstract, and evaded all questions on this point by saying that he knew "no good that was not good *for something in particular*," but that good is consistent with itself. For himself he prized above all things the wisdom that is virtue, and in the task of producing it he endured the hardest penury, maintaining that such life was richer in enjoyment than a life of luxury. This many-sidedness of view is illustrated by the curious blending of noble and merely utilitarian sentiment in his account of friendship: a friend who can be of no service is valueless; yet the highest service that a friend can render is moral improvement.

Socrates.

The historically important characteristics of his moral philosophy, if we take (as we must) his teaching and character together, may be summarized as follows:—(1) an ardent inquiry for knowledge nowhere to be found, but which, if found, would perfect human conduct; (2) a demand meanwhile that men should act as far as possible on some consistent theory; (3) a provisional adhesion to the commonly received view of good, in all its incoherent complexity, and a perpetual readiness to maintain the harmony of its different elements, and demonstrate the superiority of virtue by an appeal to the standard of self-interest; (4) personal firmness, as apparently easy as it was actually invincible, in carrying out consistently such practical convictions as he had attained. It is only when we keep all these points in view that we can understand how from the spring of Socratic conversation flowed the divergent streams of Greek ethical thought.

The Socratic Schools.

Four distinct philosophical schools trace their immediate origin to the circle that gathered round Socrates—the Megarian, the Platonic, the Cynic and the Cyrenaic. The impress of the master is manifest on all, in spite of the wide differences that divide them; they all agree in holding the most important possession of man to be wisdom or knowledge, and the most important knowledge to be knowledge of Good. Here, however, the agreement ends. The more philosophic part of the circle, forming a group in which Euclid of Megara (see MEGARIAN SCHOOL) seems at first to have taken the lead, regarded this Good as the object of a still unfulfilled quest, and were led to identify it with the hidden secret of the universe, and thus to pass from ethics to metaphysics. Others again, whose demand for knowledge was more easily satisfied, and who were more impressed with the positive and practical side of the master's teaching, made the quest a much simpler affair. They took the Good as already known, and held philosophy to consist in the steady application of this knowledge to conduct. Among these were Antisthenes the Cynic and Aristippus of Cyrene. It is by their recognition of the duty of living consistently by theory instead of mere impulse or custom, their sense of the new value given to life through this rationalization, and their effort to maintain the easy, calm, unwavering firmness of the Socratic temper, that we recognize both Antisthenes and Aristippus as "Socratic men," in spite of the completeness with which they divided their master's positive doctrine into systems diametrically opposed. Of their contrasted principles we may perhaps say that, while Aristippus took the most obvious logical step for reducing the teaching of Socrates to clear dogmatic unity, Antisthenes certainly drew the most natural inference from the Socratic life.

Aristippus.

Aristippus (see CYRENAICS) argued that, if all that is beautiful or admirable in conduct has this quality as being useful, *i.e.* productive of some further good; if virtuous action is essentially action done with insight, or rational apprehension of the act as a means to this good, this good must be pleasure. Bodily pleasures and pains Aristippus held to be the keenest, though he does not seem to have maintained this on any materialistic theory, as he admitted the existence of purely mental pleasures, such as joy in the prosperity of one's native land. He fully recognized that his good was capable of being realized only in successive parts, and gave even exaggerated emphasis to the rule of seeking the pleasure of the moment, and not troubling oneself about a dubious future. It was in the calm, resolute, skilful culling of such pleasures as circumstances afforded from moment to moment, undisturbed by passion, prejudices or superstition, that he conceived the quality of wisdom to be exhibited; and tradition represents him as realizing this ideal to an impressive degree. Among the prejudices from which the wise man was free he included all regard to customary morality beyond what was due to the actual penalties attached to its violation; though he held, with Socrates, that these penalties actually render conformity reasonable. Thus early in the history of ethical theory appeared the most thoroughgoing exposition of hedonism.

The Cynics.

Far otherwise was the Socratic spirit understood by Antisthenes and the Cynics (*q.v.*). They equally held that no speculative research was needed for the discovery of good and virtue, and maintained that the Socratic wisdom was exhibited, not in the skilful pursuit, but in the rational disregard of pleasure,—in the clear apprehension of the intrinsic worthlessness of this and most other objects of men's ordinary desires and aims. Pleasure, indeed, Antisthenes declared roundly to be an evil; "Better madness than a surrender to pleasure." He did not overlook the need of supplementing merely intellectual insight by "Socratic force of soul"; but it seemed to him that, by insight and self-mastery combined, an absolute spiritual independence might be attained which left nothing wanting for perfect well-being (see also DIOGENES). For as for poverty, painful toil, disrepute, and such evils as men dread most, these, he argued, were positively useful as means of progress in spiritual freedom and virtue. There is, however, in the Cynic notion of wisdom, no positive criterion beyond the mere negation of irrational desires and prejudices. We saw that Socrates, while not claiming to have found the abstract theory of good or wise conduct, practically understood by it the faithful performance of customary duties, maintaining always that his own happiness was therewith bound up. The Cynics more boldly discarded both pleasure and mere custom as alike irrational; but in so doing they left the freed reason with no definite aim but its own freedom. It is absurd, as Plato urged, to say that knowledge is the good, and then when asked "knowledge of what?" to have no positive reply but "of the good"; but the Cynics do not seem to have made any serious effort to escape from this absurdity.

The ultimate views of these two Socratic schools we shall have to notice presently when we come to the post-Aristotelian schools. We must now proceed to trace the fuller development of the Socratic theory in the hands of Plato and Aristotle.

Plato.

The ethics of Plato cannot properly be treated as a finished result, but rather as a continual movement from the position of Socrates towards the more complete, articulate system of Aristotle; except that there are ascetic and mystical suggestions in some parts of Plato's teaching which find no counterpart in Aristotle, and in fact disappear from Greek philosophy soon after Plato's death until they are revived and fantastically developed in Neopythagoreanism and Neoplatonism. The first stage at which we can distinguish Plato's ethical view from that of Socrates is presented in the *Protagoras*, where he makes a serious, though clearly tentative effort to define the object of that knowledge which he with his master regards as the essence of all virtue. Such knowledge, he here maintains, is really mensuration of pleasures and pains, whereby the wise man avoids those mistaken under-estimates of future feelings in comparison with present which we commonly call "yielding to fear or desire." This hedonism has perplexed Plato's readers needlessly (as we have said in speaking of the Cyrenaics), inasmuch as hedonism is the most obvious corollary of the Socratic doctrine that the different common notions of good—the beautiful, the pleasant and the useful—were to be somehow interpreted by each other. By Plato, however, this conclusion could have been held only before he had accomplished the movement of thought by which he carried the Socratic method beyond the range of human conduct and developed it into a metaphysical system.

This movement may be expressed thus. "If we know," said Socrates, "what justice is, we can give an account or definition of it"; true knowledge must be knowledge of the general fact, common to all the individual cases to which we apply our general notion. But this must be no less true of other objects of thought and discourse; the same relation of general notions to particular examples extends through the whole physical universe; we can think and talk of it only by means of such notions. True or scientific knowledge then must be general knowledge, relating, not to individuals primarily, but to the general facts or qualities which individuals exemplify; in fact, our notion of an individual, when examined, is found to be an aggregate of such general qualities. But, again, the object of true knowledge must be what really exists; hence the reality of the universe must lie in general facts or relations, and not in the individuals that exemplify them.

So far the steps are plain enough; but we do not yet see how this logical Realism (as it was afterwards called) comes to have the essentially ethical character that especially interests us in Platonism. Plato's philosophy is now concerned with the whole universe of being; yet the ultimate object of his philosophic contemplation is still "the good," now conceived as the ultimate ground of all being and knowledge. That is, the essence of the universe is identified with its end,—the "formal" with the "final" cause of things, to use the later Aristotelian phraseology. How comes this about?

Perhaps we may best explain this by recurring to the original application of the Socratic method to human affairs. Since all rational activity is for some end, the different arts or functions of human industry are naturally defined by a statement of their ends or uses; and similarly, in giving an account of the different artists and functionaries, we necessarily state their end, "what they are good for." In a society well ordered on Socratic principles, every human being would be put to some use; the essence of his life would consist in doing what he was good for (his proper ἔργον). But again, it is easy to extend this view throughout the whole region of organized life; an eye that does not attain its end by seeing is without the essence of an eye. In short, we may say of all organs and instruments that they are what we think them in proportion as they fulfil their function and attain their end. If, then, we conceive the whole universe organically, as a complex arrangement of means to ends, we shall understand how Plato might hold that all things really *were*, or (as we say) "realized their idea," in proportion as they accomplished the special end or good for which they were adapted. Even Socrates, in spite of his aversion to physics, was led by pious reflection to expound a teleological view of the physical world, as ordered in all its parts by divine wisdom for the realization of some divine end; and, in the metaphysical turn which Plato gave to this view, he was probably anticipated by Euclid of Megara, who held that the one real being is "that which we call by many names, Good, Wisdom, Reason or God," to which Plato, raising to a loftier significance the Socratic identification of the beautiful with the useful, added the further name of Absolute Beauty, explaining how man's love of the beautiful finally reveals itself as the yearning for the end and essence of being.

Plato, therefore, took this vast stride of thought, and identified the ultimate notions of ethics and ontology. We have now to see what attitude he will adopt towards the practical inquiries from which he started. What will now be his view of wisdom, virtue, pleasure and their relation to human well-being?

The answer to this question is inevitably somewhat complicated. In the first place we have to observe that philosophy has now passed definitely from the market-place into the lecture-room. The quest of Socrates was for the true art of conduct for a man living a practical life among his fellows. But if the objects of abstract thought constitute the real world, of which this world of individual things is but a shadow, it is plain that the highest, most real life must lie in the former region and not in the latter. It is in contemplating the abstract reality which concrete things obscurely exhibit, the type or ideal which they imperfectly imitate, that the true life of the mind in man must consist; and as man is most truly man in proportion as he is mind, the desire of one's own good, which Plato, following Socrates, held to be permanent and essential in every living thing, becomes in its highest form the philosophic yearning for knowledge. This yearning, he held, springs—like more sensual impulses—from a sense of want of something formerly possessed, of which there remains a latent memory in the soul, strong in proportion to its philosophic capacity; hence it is that in learning any abstract truth by scientific demonstration we merely make explicit what we already implicitly know; we bring into clear consciousness hidden memories of a state in which the soul looked upon Reality and Good face to face, before the lapse that imprisoned her in an alien body and mingled her true nature with fleshly feelings and impulses. We thus reach the paradox that the true art of living is really an "art of dying" as far as possible to mere sense, in order more fully to exist in intimate union with absolute goodness and beauty. On the other hand, since the philosopher must still live and act in the concrete sensible world, the Socratic identification of wisdom and virtue is fully maintained by Plato. Only he who apprehends good in the abstract can imitate it in such transient and imperfect good as may be realized in human life, and it is impossible that, having this knowledge, he should not act on it, whether in private or public affairs. Thus, in the true philosopher, we shall necessarily find the practically good man, who being "likest of men to the gods is best loved by them"; and also the perfect statesman, if only the conditions of his society allow him a sphere for exercising his statesmanship.

Virtue a harmony.

The characteristics of this practical goodness in Plato's matured thought correspond to the fundamental conceptions in his view of the universe. The soul of man, in its good or normal condition, must be ordered and harmonized under the guidance of reason. The question then arises, "Wherein does this order or harmony precisely consist?" In explaining how Plato was led to answer this question, it will be well to notice that, while faithfully maintaining the Socratic doctrine that the highest virtue was inseparable from knowledge of the good, he had come to recognize an inferior kind of virtue, possessed by men who were not philosophers. It is plain that if the good that is to be known is the ultimate ground of the whole of things, it is attainable only by a select and carefully trained few. Yet we can hardly restrict all virtue to these alone. What account, then, was to be given of ordinary "civic" bravery, temperance and justice? It seemed clear that men who did their duty, resisting the seductions of fear and desire, must have right opinions, if not knowledge, as to the good and evil in human life; but whence comes this right "opinion"? Partly, Plato said, it comes by nature and "divine allotment," but for its adequate development "custom and practice" are required. Hence the paramount importance of education and discipline for civic virtue; and even for future philosophers such moral culture, in which physical and aesthetic training must co-operate, is indispensable; no merely intellectual preparation will suffice. His point is that perfect knowledge cannot be implanted in a soul that has not gone through a course of preparation including much more than physical training. What, then, is this preparation? A distinct step in psychological analysis was taken when Plato recognised that its effect was to produce the "harmony" above mentioned among different parts of the soul, by subordinating the impulsive elements to reason. These non-rational elements he further distinguished as appetitive (τὸ ἐπιθυμητικόν) and spirited (τὸ θυμοειδὲς or θυμός)—the practical separateness of which from each other and from reason he held to be established by our inner experience.

On this triple division of the soul he founded a systematic view of the four kinds of goodness recognized by the common moral consciousness of Greece, and in later times known as the Cardinal Virtues (*q.v.*). Of these the two most fundamental were (as has been already indicated) wisdom—in its highest form philosophy—and that harmonious and regulated activity of all the elements of the soul which Plato regards as the essence of uprightness in social relations (δικαιοσύνη). The import of this term is essentially social; and we can explain Plato's use of it only by reference to the analogy which he drew between the individual man and the community. In a rightly ordered polity social and individual well-being alike would depend on that harmonious action of diverse elements, each performing its proper function, which in its social application is more naturally termed δικαιοσύνη. We see, moreover, how in Plato's view the fundamental virtues, Wisdom and Justice in their highest forms, are mutually involved. Wisdom will necessarily maintain orderly activity, and this latter consists in regulation by wisdom, while the two more special virtues of Courage (ἀνδρεία) and Temperance (σωφροσύνη) are only different sides or aspects of this wisely regulated action of the complex soul.

Such, then, are the forms in which essential good seemed to manifest itself in human life. It remains to ask whether the statement of these gives a complete account of human well-being, or whether pleasure also is to be included. On this point Plato's view seems to have gone through several oscillations. After apparently maintaining (*Protagoras*) that pleasure is *the* good, he passes first to the opposite extreme, and denies it (*Phaedo, Gorgias*) to be a good at all. For (1), as concrete and transient, it is obviously not the real essential good that the philosopher seeks; (2) the feelings most prominently recognized as pleasures are bound up with pain, as good can never be with evil; in so far, then, as common sense rightly recognizes some pleasures as good, it can only be from their tendency to produce some further good. This view, however, was too violent a divergence from Socratism for Plato to remain in it. That pleasure is not the real absolute good, was no ground for not including it in the good of concrete human life; and after all only coarse and vulgar pleasures were indissolubly linked to the pains of want. Accordingly, in the *Republic* he has no objection to trying the question of the intrinsic superiority of philosophic or virtuous[1] life by the standard of pleasure, and argues that the philosophic (or good) man alone enjoys real pleasure, while the sensualist spends his life in oscillating between painful want and the merely neutral state of painlessness, which he mistakes for positive pleasure. Still more emphatically is it declared in the *Laws* that when we are "discoursing to men, not to gods," we must show that the life which we praise as best and noblest is also that in which there is the greatest excess of pleasure over pain. But though Plato holds this inseparable connexion of best and pleasantest to be true and important, it is only for the sake of the vulgar that he lays this stress on pleasure. For in the most philosophical comparison in the *Philebus* between the claims of pleasure and wisdom the former is altogether worsted; and though a place is allowed to the pure pleasures of colour, form and sound, and of intellectual exercise, and even to the "necessary" satisfaction of appetite, it is only a subordinate one. At the same time, in his later view, Plato avoids the exaggeration of denying all positive quality of pleasure even to the coarser sensual gratifications; they are undoubtedly cases of that "replenishment" or "restoration" to its "natural state" of a bodily organ, in which he defines pleasure to consist (see *Timaeus*, pp. 64, 65); he merely maintains that the common estimate of them is to a large extent illusory, or a false appearance of pleasure is produced by contrast with the antecedent or concomitant painful condition of the organ. It is not surprising that this somewhat complicated and delicately balanced view of the relations of "good" and "pleasure" was not long maintained within the Platonic school, and that under Speusippus, Plato's successor, the main body of Platonists took up a simply anti-hedonistic position, as we learn from the polemic of Aristotle. In the *Philebus*, however, though a more careful psychological analysis leads him to soften down the exaggerations of this attack on sensual pleasure, the antithesis of knowledge and pleasure is again sharpened, and a desire to depreciate even good pleasures is more strongly shown; still even here pleasure is recognized as a constituent of that philosophic life which is the highest human good, while in the *Laws*, where the subject is more popularly treated, it is admitted that we cannot convince man that the just life is the best unless we can also prove it to be the pleasantest.

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[1] It is highly characteristic of Platonism that the issue in this dialogue, as originally stated, is between virtue and vice, whereas, without any avowed change of ground, the issue ultimately discussed is between the philosophic life and the life of vulgar ambition or sensual enjoyment.

Plato and Aristotle.

When a student passes from Plato to Aristotle, he is so forcibly impressed by the contrast between the habits of mind of the two authors, and the literary manners of the two philosophers, that it is easy to understand how their systems have come to be popularly conceived as diametrically opposed to each other; and the uncompromising polemic which Aristotle, both in his ethical and in his metaphysical treatises, directs against Plato and the platonists, has tended strongly to confirm this view. Yet a closer inspection shows us that when a later president of the Academy (Antiochus of Ascalon) repudiated the scepticism which for two hundred years had been accepted as the traditional Platonic doctrine, he had good grounds for claiming Plato and Aristotle as consentient authorities for the ethical position which he took up. For though Aristotle's divergence from Plato is very conspicuous when we consider either his general conception of the subject of ethics, or the details of his system of virtues, still his agreement with his master is almost complete as regards the main outline of his theory of human good; the difference between the two practically vanishes when we view them in relation to the later controversy between Stoics and Epicureans. Even on the cardinal point on which Aristotle entered into direct controversy with Plato, the definite disagreement between the two is less than at first appears; the objections of the disciple hit that part of the master's system that was rather imagined than thought; the main positive result of Platonic speculation only gains in distinctness by the application of Aristotelian analysis.

Plato, we saw, held that there is one supreme science or wisdom, of which the ultimate object is absolute good; in the knowledge of this, the knowledge of all particular goods—that is, of all that we rationally desire to know—is implicitly contained; and also all practical virtue, as no one who truly knows what is good can fail to realize it. But in spite of the intense conviction with which he thus identified metaphysical speculation and practical wisdom, we find in his writings no serious attempt to deduce the particulars of human well-being from his knowledge of absolute good, still less to unfold from it the particular cognitions of the special arts and sciences. Indeed, we may say that the distinction which Aristotle explicitly draws between speculative science or wisdom and practical wisdom (on its political side statesmanship) is really indicated in Plato's actual treatment of the subjects, although the express recognition of it is contrary to his principles. The discussion of good (*e.g.*) in his *Philebus* relates entirely to human good, and the respective claims of Thought and Pleasure to constitute this; he only refers in passing to the Divine Thought that is the good of the ordered world, as something clearly beyond the limits of the present discussion. So again, in his last great ethico-political treatise (the *Laws*) there is hardly a trace of his peculiar metaphysics. On the other hand, the relation between human and divine good, as presented by Aristotle, is so close that we can hardly conceive Plato as having definitely thought it closer. The substantial good of the universe, in Aristotle's view, is the pure activity of universal abstract thought, at once subject and object, which, itself changeless and eternal, is the final cause and first source of the whole process of change in the concrete world. And both he and Plato hold that a similar activity of pure speculative intellect is that in which the philosopher will seek to exist, though he must, being a man, concern himself with the affairs of ordinary human life, a region in which his highest good will be attained by realizing perfect moral excellence. No doubt Aristotle's demonstration of the inappropriateness of attributing moral excellence to the Deity seems to contradict Plato's doctrine that the just man as such is "likest the gods," but here again the discrepancy is reduced when we remember that the essence of Plato's justice (δικαιοσύνη) is harmonious activity. No doubt, too, Aristotle's attribution of pleasure to the Divine Existence shows a profound metaphysical divergence from Plato; but it is a divergence which has no practical importance. Nor, again, is Aristotle's divergence from the Socratic principle that all "virtue is knowledge" substantially greater than Plato's, though it is more plainly expressed. Both accept the paradox in the qualified sense that no one can deliberately act contrary to what appears to him good, and that perfect virtue is inseparably bound up with perfect wisdom or moral insight. Both, however, recognize that this actuality of moral insight is not a function of the intellect only, but depends rather on careful training in good habits applied to minds of good natural dispositions, though the doctrine has no doubt a more definite and prominent place in Aristotle's system. The disciple certainly takes a step in advance by stating definitely, as an essential characteristic of virtuous action, that it is chosen for its own sake, for the beauty of virtue alone; but herein he merely formulates the conviction that his master inspires. Nor, finally, does Aristotle's account of the relation of pleasure to human well-being (although he has to combat the extreme anti-hedonism to which the Platonic school under Speusippus had been led) differ materially from the outcome of Plato's thought on this point, as the later dialogues present it to us. Pleasure, in Aristotle's view, is not the primary constituent of well-being, but rather an inseparable accident of it; human well-being is essentially well-doing, excellent activity of some kind, whether its aim and end be abstract truth or noble conduct; knowledge and virtue are objects of rational choice apart from the pleasure attending them; still all activities are attended and in a manner perfected by pleasure, which is better and more desirable in proportion to the excellence of the activity. He no doubt criticizes Plato's account of the nature of pleasure, arguing that we cannot properly conceive pleasure either as a "process" or as "replenishment"[1]—the last term, he truly says, denotes a material rather than a psychical fact. But this does not interfere with the general ethical agreement between the two thinkers; and the doctrine that vicious pleasures are not true or real pleasures is so characteristically Platonic that we are almost surprised to find it in Aristotle.

In so far as there is any important difference between the Platonic and the Aristotelian views of human good, we may observe that the latter has substantially a closer correspondence to the positive element in the ethical teaching of Socrates, *Aristotle's ethics.*

though it is presented in a far more technical and scholastic form, and involves a more distinct rejection of the fundamental Socratic paradox. The same result appears when we compare the methods of the three philosophers. Although the Socratic induction forms a striking feature of Plato's dialogues, his ideal method of ethics is purely deductive; he admits common sense only as supplying provisional steps and starting-points from which the mind is to ascend to knowledge of absolute good, through which knowledge alone, as he conceives, the lower notions of particular goods are to be truly conceived. Aristotle, discarding the transcendentalism of Plato, naturally retained from Plato's teaching the original Socratic method of induction from and verification by common opinion. Indeed, the windings of his exposition are best understood if we consider his literary manner as a kind of Socratic dialogue formalized and reduced to a monologue. He first leads us by an induction to the fundamental notion of ultimate end or good for man. All men, in acting, aim at some result, either for its own sake or as a means to some further end; but obviously not everything can be sought merely as a means; there must be some ultimate end. In fact men commonly recognise such an end, and agree to call it well-being[1] (*εὐδαιμονία*). But they take very different views of its nature; how shall we find the true view? We observe that men are classified according to their functions; all kinds of man, and indeed all organs of man, have their special functions, and are judged as functionaries and organs according as they perform their functions well or ill. May we not then infer that man, as man, has his proper function, and that the well-being or "doing well" that all seek really lies in fulfilling well the proper function of man,—that is, in living well that life of the rational soul which we recognize as man's distinctive attribute?

Again, this Socratic deference to common opinion is not shown merely in the way by which Aristotle reaches his fundamental conception; it equally appears in his treatment of the conception itself. In the first place, though in Aristotle's view the most perfect well-being consists in the exercise of man's "divinest part," pure speculative reason, he keeps far from the paradox of putting forward this and nothing else as human good; so far, indeed, that the greater part of his treatise is occupied with an exposition of the inferior good which is realized in practical life when the appetitive or impulsive (semi-rational) element of the soul operates under the due regulation of reason. Even when the notion of "good performance of function" was thus widened, and when it had further taken in the pleasure that is inseparably connected with such functioning, it did not yet correspond to the whole of what a Greek commonly understood as "human well-being." We may grant, indeed, that a moderate provision of material wealth is indirectly included, as an indispensable pre-requisite of a due performance of many functions as Aristotle conceives it—his system admits of no beatitudes for the poor; still there remain other goods, such as beauty, good birth, welfare of progeny, the presence or absence of which influenced the common view of a man's well-being, though they could hardly be shown to be even indirectly important to his "well-acting." These Aristotle attempts neither to exclude from the philosophic conception of well-being nor to include in his formal definition of it. The deliberate looseness which is thus given to his fundamental doctrine characterizes more or less his whole discussion of ethics. He plainly says that the subject does not admit of completely scientific treatment; his aim is to give not a definite theory of human good, but a practically adequate account of its most important constituents.

The most important element, then, of well-being or good life for ordinary men Aristotle holds to consist in well-doing as determined by the notions of the different moral excellences. In expounding these, he gives throughout the pure result of analytical observation of the common moral consciousness of his age. Ethical truth, in his view, is to be attained by careful comparison of particular moral opinions, just as physical truth is to be obtained by induction from particular physical observations. On account of the conflict of opinion in ethics we cannot hope to obtain certainty upon all questions; still reflection will lead us to discard some of the conflicting views and find a reconciliation for others, and will furnish, on the whole, a practically sufficient residuum of moral truth. This adhesion to common sense, though it involves a sacrifice of both depth and completeness in Aristotle's system, gives at the same time an historical interest which renders it deserving of special attention as an analysis of the current Greek ideal of "fair and good life" (*καλοκἀγαθία*). His virtues are not arranged on any clear philosophic plan; the list shows no serious attempt to consider human life exhaustively, and exhibit the standard of excellence appropriate to its different departments or aspects. He seems to have taken as a starting-point Plato's four cardinal virtues. The two comprehensive notions of Wisdom and Justice (*δικαιοσύνη*) he treats separately. As regards both his analysis leads him to diverge considerably from Plato. As we saw, his distinction between practical and speculative Wisdom belongs to the deepest of his disagreements with his master; and in the case of *δικαιοσύνη* again he distinguishes the wider use of the term to express Law-observance, which (he says) coincides with the social side of virtue generally, and its narrower use for the virtue that "aims at a kind of equality," whether (1) in the distribution of wealth, honour, &c., or (2) in commercial exchange, or (3) in the reparation of wrong done. Then, in arranging the other special virtues, he begins with courage and temperance, which (after Plato) he considers as the excellences of the "irrational element" of the soul. Next follow two pairs of excellences, concerned respectively with wealth and honour: (1) liberality and magnificence, of which the latter is exhibited in greater matters of expenditure, and (2) laudable ambition and high-mindedness similarly related to honour. Then comes gentleness—the virtue regulative of anger; and the list is concluded by the excellences of social intercourse, friendliness (as a mean between obsequiousness and surliness), truthfulness and decorous wit.

The abundant store of just and close analytical observation contained in Aristotle's account of these notions give it a permanent interest, even beyond its historical value as a delineation of the Greek ideal of "fair and good" life.[2] But its looseness of arrangement and almost grotesque co-ordination of qualities widely differing in importance are obvious. Thus his famous general formula for virtue, that it is a mean or middle state, always to be found somewhere between the vices which stand to it in the relation of excess and defect, scarcely avails to render his treatment more systematic. It was important, no doubt, to express the need of observing due measure and proportion, in order to attain good results in human life no less than in artistic products; but the observation of this need was no new thing in Greek literature; indeed, it had already led the Pythagoreans and Plato to find the ultimate essence of the ordered universe in number. But Aristotle's purely quantitative statement of the relation of virtue and vice is misleading, even where it is not obviously inappropriate; and sometimes leads him to such eccentricities as that of making simple veracity a mean between boastfulness and mock-modesty.[3]

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[1] This cardinal term is commonly translated "happiness"; and it must be allowed that it is the most natural term for what we (in English) agree to call "our being's end and aim." But happiness so definitely signifies a state of feeling that it will not admit the interpretation that Aristotle (as well as Plato and the Stoics) expressly gives to *εὐδαιμονία*; the confusion is best avoided by rendering the word by the less familiar "well-being."

[2] Aristotle follows Plato and Socrates in identifying the notions of *καλὸς* ("fair," "beautiful") and *ἀγαθὸς* ("good") in their application to conduct. We may observe, however, that while the latter term is used to denote the virtuous man, and (in the neuter) equivalent to End generally, the former is rather chosen to express the quality of virtuous acts which in any particular case is the end of the virtuous agent. Aristotle no doubt faithfully represents the common sense of Greece in considering that, in so far as virtue is in itself good to the virtuous agent, it belongs to that species of good which we distinguish as beautiful. In later Greek philosophy the term *καλὸν* ("honestum") became still more technical in the signification of "morally good."

[3] The above account is considerably expanded in H. Sidgwick's *Hist. of Ethics* (5th ed., 1902), pp. 59-70.

It ought to be said that Aristotle does not present the formula just discussed as supplying a criterion of good conduct in any particular case; he expressly leaves this to be determined by "correct reasoning, and the judgment of the practically-wise man (ὁ φρόνιμος)." We cannot, however, find that he has furnished any substantial principles for its determination; indeed, he hardly seems to have formed a distinct general idea of the practical syllogism by which he conceives it to be effected.[1] The kind of reasoning which his view of virtuous conduct requires is one in which the ultimate major premise states a distinctive characteristic of some virtue, and one or more minor premises show that such characteristic belongs to a certain mode of conduct under given circumstances; since it is essential to good conduct that it should contain its end in itself, and be chosen for its own sake. But he has not failed to observe that practical reasonings are not commonly of this kind, but are rather concerned with actions as means to ulterior ends; indeed, he lays stress on this as a characteristic of the "political" life, when he wishes to prove its inferiority to the life of pure speculation. Though common sense will admit that virtues are the best of goods, it still undoubtedly conceives practical wisdom as chiefly exercised in providing those inferior goods which Aristotle, after recognizing the need or use of them for the realization of human well-being, has dropped out of sight; and the result is that, in trying to make clear his conception of practical wisdom, we find ourselves fluctuating continually between the common notion, which he does not distinctly reject, and the notion required as the keystone of his ethical system.

Transition to Stoicism.

On the whole, there is probably no treatise so masterly as Aristotle's *Ethics*, and containing so much close and valid thought, that yet leaves on the reader's mind so strong an impression of dispersive and incomplete work. It is only by dwelling on these defects that we can understand the small amount of influence that his system exercised during the five centuries after his death, as compared with the effect which it has had, directly or indirectly, in shaping the thought of modern Europe. Partly, no doubt, the limited influence of his disciples, the Peripatetics (*q.v.*), is to be attributed to that exaltation of the purely speculative life which distinguished the Aristotelian ethics from other later systems, and which was too alien from the common moral consciousness to find much acceptance in an age in which the ethical aims of philosophy had again become paramount. Partly, again, the analytical distinctness of Aristotle's manner brings into special prominence the difficulties that attend the Socratic effort to reconcile the ideal aspirations of men with the principles on which their practical reasonings are commonly conducted. The conflict between these two elements of Common Sense was too profound to be compromised; and the moral consciousness of mankind demanded a more trenchant partisanship than Aristotle's. Its demands were met by the Stoic school which separated the moral from the worldly view of life, with an absoluteness and definiteness that caught the imagination; which regarded practical goodness as the highest manifestation of its ideal of wisdom; and which bound the common notions of duty into an apparently coherent system, by a formula that comprehended the whole of human life, and exhibited its relation to the ordered process of the universe. The intellectual descent of its ethical doctrines is principally to be traced to Socrates through the Cynics, though an important element in them seems attributable to the school that inherited the "Academy" of Plato. Both Stoic and Cynic maintained, in its sharpest form, the fundamental tenet that the practical knowledge which is virtue, with the condition of soul that is inseparable from it, is alone to be accounted good. He who exercises this wisdom or knowledge has complete well-being; all else is indifferent to him. It is true that the Cynics were more concerned to emphasize the negative side of the sage's well-being, while the Stoics brought into more prominence its positive side. This difference, however, did not amount to disagreement. The Stoics, in fact, seem generally to have regarded the eccentricities of Cynicism as an emphatic manner of expressing the essential antithesis between philosophy and the world; a manner which, though not necessary or even normal, might yet be advantageously adopted by the sage under certain circumstances.[2]

Stoicism.

Wherein, then, consists this knowledge or wisdom that makes free and perfect? Both Cynics and Stoics (*q.v.*) agreed that the most important part of it was the knowledge that the sole good of man lay in this knowledge or wisdom itself. It must be understood that by wisdom they meant wisdom realized in act; indeed, they did not conceive the existence of wisdom as separable from such realization. We may observe, too, that the Stoics rejected the divergence which we have seen gradually taking place in Platonic-Aristotelian thought from the position of Socrates, "that no one aims at what he knows to be bad." The stress that their psychology laid on the essential unity of the rational self that is the source of voluntary action prevented them from accepting Plato's analysis of the soul into a regulative element and elements needing regulation. They held that what we call passion is a morbid condition of the rational soul, involving erroneous judgment as to what is to be sought or shunned. From such passionate errors the truly wise man will of course be free. He will be conscious indeed of physical appetite; but he will not be misled into supposing that its object is really a good; he cannot, therefore, hope for the attainment of this object or fear to miss it, as these states involve the conception of it as a good. Similarly, though like other men he will be subject to bodily pain, this will not cause him mental grief or disquiet, as his worst agonies will not disturb his clear conviction that it is really indifferent to his true reasonable self.

That this impassive sage was a being not to be found among living men the later Stoics at least were fully aware. They faintly suggested that one or two moral heroes of old time might have realized the ideal, but they admitted that all other philosophers (even) were merely in a state of progress towards it. This admission did not in the least diminish the rigour of their demand for absolute loyalty to the exclusive claims of wisdom. The assurance of its own unique value that such wisdom involved they held to be an abiding possession for those who had attained it;[3] and without this assurance no act could be truly wise or virtuous. Whatever was not of knowledge was of sin; and the distinction between right and wrong being absolute and not admitting of degrees all sins were equally sinful; whoever broke the least commandment was guilty of the whole law. Similarly, all wisdom was somehow involved in any one of the manifestations of wisdom, commonly distinguished as particular virtues; though whether these virtues were specifically distinct, or only the same knowledge in different relations, was a subtle question on which the Stoics do not seem to have been agreed.

Aristotle had already been led to attempt a refutation of the Socratic identification of virtue with knowledge; but his attempt had only shown the profound difficulty of attacking the paradox, so long as it was admitted that no one could of deliberate purpose act contrary to what seemed to him best. Now, Aristotle's divergence from Socrates had not led him so far as to deny this; while for the Stoics who had receded to the original Socratic position, the difficulty was still more patent. This theory of virtue led them into two dilemmas. Firstly, if virtue is knowledge, does it follow that vice is involuntary? If not, it must be that ignorance is voluntary. This alternative is the less dangerous to morality, and as such the Stoics chose it. But they were not yet at the end of their perplexities; for while they were thus driven to an extreme extension of the range of human volition, their view of the physical universe involved an equally thorough-going determinism. How could the vicious man be responsible if his vice were strictly pre-determined? The Stoics answered that the error which was the essence of vice was so far voluntary that it could be avoided if men chose to exercise their reason. No doubt it depended on the innate force and firmness[1] of a man's soul whether his reason was effectually exercised; but moral responsibility was saved if the vicious act proceeded from the man himself and not from any external cause.

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[1] There is a certain difficulty in discussing Aristotle's views on the subject of practical wisdom, and the relation of the intellect to moral action, since it is most probable that the only accounts that we have of these views are not part of the genuine writings of Aristotle. Still books vi. and vii. of the *Nicomachean Ethics* contain no doubt as pure Aristotelian doctrine as a disciple could give, and appear to supply a sufficient foundation for the general criticism expressed in the text.

[2] It has been suggestively said that Cynicism was to Stoicism what monasticism was to early Christianity. The analogy, however, must not be pressed too far, since orthodox Stoics do not ever seem to have regarded Cynicism as the more perfect way.

[3] The Stoics were not quite agreed as to the immutability of virtue, but they were agreed that, when once possessed, it could only be lost through the loss of reason itself.

With all this we have not ascertained the positive practical content of this wisdom. How are we to emerge from the barren circle of affirming (1) that wisdom is the sole good and unwisdom the sole evil, and (2) that wisdom is the knowledge of good and evil; and attain some method for determining the particulars of good conduct? The Cynics made no attempt to solve this difficulty; they were content to mean by virtue what any plain man meant by it, except in so far as their sense of independence led them to reject certain received precepts and prejudices. The Stoics, on the other hand, not only worked out a detailed system of duties—or, as they termed them, "things meet and fit" (καθήκοντα) for all occasions of life; they were further especially concerned to comprehend them under a general formula. They found this by bringing out the positive significance of the notion of Nature, which the Cynic had used chiefly in a negative way, as an antithesis to the "conventions" (νόμος), from which his knowledge had made him free. Even in this negative use of the notion it is necessarily implied that whatever active tendencies in man are found to be "natural"—that is, independent of and uncorrupted by social customs and conventions—will properly take effect in outward acts, but the adoption of "conformity to nature" as a general positive rule for outward conduct seems to have been due to the influence on Zeno of Academic teaching. Whence, however, can this authority belong to the natural, unless nature be itself an expression or embodiment of divine law and wisdom? The conception of the world, as organized and filled by divine thought, was common, in some form, to all the philosophies that looked back to Socrates as their founder,—some even maintaining that this thought was the sole reality. This pantheistic doctrine harmonized thoroughly with the Stoic view of human good; but being unable to conceive substance idealistically, they (with considerable aid from the system of Heraclitus) supplied a materialistic side to their pantheism,—conceiving divine thought as an attribute of the purest and most primary of material substances, a subtle fiery aether. This theological view of the physical universe had a double effect on the ethics of the Stoic. In the first place it gave to his cardinal conviction of the all-sufficiency of wisdom for human well-being a root of cosmical fact, and an atmosphere of religious and social emotion. The exercise of wisdom was now viewed as the pure life of that particle of divine substance which was in very truth the "god within him"; the reason whose supremacy he maintained was the reason of Zeus, and of all gods and reasonable men, no less than his own; its realization in any one individual was thus the common good of all rational beings as such; "the sage could not stretch out a finger rightly without thereby benefiting all other sages,"—nay, it might even be said that he was "as useful to Zeus as Zeus to him."[2] But again, the same conception served to harmonize the higher and the lower elements of human life. For even in the physical or non-rational man, as originally constituted, we may see clear indications of the divine design, which it belongs to his rational will to carry into conscious execution; indeed, in the first stage of human life, before reason is fully developed, uncorrupted natural impulse effects what is afterwards the work of reason. Thus the formula of "living according to nature," in its application to man as the "rational animal," may be understood both as directing that reason is to govern, and as indicating how that government is to be practically exercised. In man, as in every other animal, from the moment of birth natural impulse prompts to the maintenance of his physical frame; then, when reason has been developed and has recognized itself as its own sole good, these "primary ends of nature" and whatever promotes these still constitute the outward objects at which reason is to aim, there is a certain value (ἀξία) in them, in proportion to which they are "preferred" (προηγμένα) and their opposites "rejected" (ἀποπροηγμένα); indeed it is only in the due and consistent exercise of such choice that wisdom can find its practical manifestation. In this way all or most of the things commonly judged to be "goods"—health, strength, wealth, fame,[1] &c.,—are brought within the sphere of the sage's choice, though his real good is solely in the wisdom of the choice, and not in the thing chosen.

The doctrine of conformity to Nature as the rule of conduct was not peculiar to Stoicism. It is found in the theories of Speusippus, Xenocrates, and also to some extent in those of the Peripatetics. The peculiarity of the Stoics lay in their refusing to use the terms "good and evil" in connexion with "things indifferent," and in pointing out that philosophers, though independent of these things, must yet deal with them in practical life.

So far we have considered the "nature" of the individual man as apart from his social relations; but the sphere of virtue, as commonly conceived, lies chiefly in these, and this was fully recognized in the Stoic account of duties (καθήκοντα); indeed, in their exposition of the "natural" basis of justice, the evidence that man was born not for himself but for mankind is the most important part of their work in the region of practical morality. Here, however, we especially notice the double significance of "natural," as applied to (1) what actually exists everywhere or for the most part, and (2) what would exist if the original plan of man's life were fully carried out; and we find that the Stoics have not clearly harmonized the two elements of the notion. That man was "naturally" a social animal Aristotle had already taught, that all rational beings, in the unity of the reason that is common to all, form naturally one community with a common law was (as we saw) an immediate inference from the Stoic conception of the universe as a whole. That the members of this "city of Zeus" should observe their contracts, abstain from mutual harm, combine to protect each other from injury, were obvious points of natural law; while again, it was clearly necessary to the preservation of human society that its members should form sexual unions, produce children, and bestow care on their rearing and training. But beyond this nature did not seem to go in determining the relations of the sexes; accordingly, we find that community of wives was a feature of Zeno's ideal commonwealth, just as it was of Plato's; while, again, the strict theory of the school recognized no government or laws as true or binding except those of the sage; he alone is the true ruler, the true king. So far, the Stoic "nature" seems in danger of being as revolutionary as Rousseau's. Practically, however, this revolutionary aspect of the notion was kept for the most part in the background; the rational law of an ideal community was not distinguished from the positive ordinances and customs of actual society; and the "natural" ties that actually bound each man to family, kinsmen, fatherland, and to unwise humanity generally, supplied the outline on which the external manifestation of justice was delineated. It was a fundamental maxim that the sage was to take part in public life; and it does not appear that his political action was to be regulated by any other principles than those commonly accepted in his community. Similarly, in the view taken by the Stoics of the duties of social decorum, and in their attitude to the popular religion, we find a fluctuating compromise between the disposition to repudiate what is conventional, and the disposition to revere what is established, each tendency expressing in its own way the principle of "conforming to nature."

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[1] Hence some members of the school, without rejecting the definition of virtue = knowledge, also defined it as "strength and force."

[2] It is apparently in view of this union in reason of rational beings that friends are allowed to be "external goods" to the sage, and that the possession of good children is also counted a good.

[1] The Stoics seem to have varied in their view of "good repute," ἀδοξία; at first, when the school was more under the influence of Cynicism, they professed an outward as well as an inward indifference to it; ultimately they conceded the point to common sense, and included it among προηγμένα.

Stoics and hedonists.

Among the primary ends of nature, in which wisdom recognized a certain preferability, the Stoics included freedom from bodily pain; but they refused, even in this outer court of wisdom, to find a place for pleasure. They held that the latter was not an object of uncorrupted natural impulse, but an "aftergrowth" (*ἐπιγέννημα*). They thus endeavoured to resist Epicureanism even on the ground where the latter seems prima facie strongest; in its appeal, namely, to the natural pleasure-seeking of all living things. Nor did they merely mean by pleasure (*ἡδονή*) the gratification of bodily appetite; we find (*e.g.*) Chrysippus urging, as a decisive argument against Aristotle, that pure speculation was "a kind of amusement, that is, pleasure." Even the "joy and gladness" (*χαρά, εὐφροσύνη*) that accompany the exercise of virtue seem to have been regarded by them as merely an inseparable accident, not the essential constituent of well-being. It is only by a later modification of Stoicism that cheerfulness or peace of mind is taken as the real ultimate end, to which the exercise of virtue is merely a means. At the same time it is probable that the serene joys of virtue and the grieflessness which the sage was conceived to maintain amid the worst tortures, formed the main attractions of Stoicism for ordinary minds. In this sense it may be fairly said that Stoics and Epicureans made rival offers to mankind of the same kind of happiness; and the philosophical peculiarities of either system may be traced to the desire of being undisturbed by the changes and chances of life. The Stoic claims on this head were the loftiest; as the well-being of their sage was independent, not only of external things and bodily conditions, but of time itself; it was fully realized in a single exercise of wisdom and could not be increased by duration. This paradox is violent, but it is quite in harmony with the spirit of Stoicism; and we are more startled to find that the Epicurean sage, no less than the Stoic, is to be happy even on the rack; that his happiness, too, is unimpaired by being restricted in duration, when his mind has apprehended the natural limits of life; that, in short, Epicurus makes no less strenuous efforts than Zeno to eliminate imperfection from the conditions of human existence. This characteristic, however, is the key to the chief differences between Epicureanism and the more naïve hedonism of Aristippus. The latter system gave the simplest and most obvious answer to the inquiry after ultimate good for man; but besides being liable, when developed consistently, to offend the common moral consciousness, it conspicuously failed to provide the "completeness" and "security" which, as Aristotle says, "one divines to belong to man's true Good." Philosophy, in the Greek view, should be the art as well as the science of good life; and hedonistic philosophy would seem a bungling and uncertain art of pleasure, as pleasure is ordinarily conceived. Nay, it would even be found that the habit of philosophical reflection often operated adversely to the attainment of this end, by developing the thinker's self-consciousness, so as to disturb that normal relation to external objects on which the zest of ordinary enjoyment depends. Hence we find that later thinkers of the Cyrenaic school felt themselves compelled to change their fundamental notion; thus Theodorus defined the good as "gladness" (*χαρά*) depending on wisdom, as distinct from mere pleasure, while Hegesias proclaimed that happiness was unattainable, and that the chief function of wisdom was to render life painless by producing indifference to all things that give pleasure. But by such changes their system lost the support that it had had in the pleasure-seeking tendencies of ordinary men. It was clear that if philosophic hedonism was to be established on a broad and firm basis, it must in its notion of good combine what the plain man naturally sought with what philosophy could plausibly offer. Such a combination was effected, with some little violence, by Epicurus; whose system with all its defects showed a remarkable power of standing the test of time, as it attracted the unqualified adhesion of generation after generation of disciples for a period of some six centuries.

Epicurus.

In the fundamental principle of his philosophy Epicurus is not original. Aristippus (cf. also Plato in the *Protagoras* and Eudoxus) had already maintained that pleasure is the sole ultimate good, and pain the sole evil; that no pleasure is to be rejected except for its painful consequences, and no pain to be chosen except as a means to greater pleasure; that the stringency of all laws and customs depends solely on the legal and social penalties attached to their violation; that, in short, all virtuous conduct and all speculative activity are empty and useless, except as contributing to the pleasantness of the agent's life. And Epicurus assures us that he means by pleasure what plain men mean by it; and that if the gratifications of appetite and sense are discarded, the notion is emptied of its significance. So far the system would seem to suit the inclinations of the most thorough-going voluptuary. The originality of Epicurus lay in his theory that the highest point of pleasure, whether in body or mind, is to be attained by the mere removal of pain or disturbance, after which pleasure admits of variation only and not of augmentation; that therefore the utmost gratification of which the body is capable may be provided by the simplest means, and that "natural wealth" is no more than any man can earn. When further he teaches that the attainment of happiness depends almost entirely upon insight and right calculation, fortune having very little to do with it; that the pleasures and pains of the mind are far more important than those of the body, owing to the accumulation of feeling caused by memory and anticipation; and that an indispensable condition of mental happiness lies in relieving the mind of all superstitions, which can be effected only by a thorough knowledge of the physical universe—he introduces an ample area for the exercise of the philosophic intellect. So again, in the stress that he lays on the misery which the most secret wrong-doing must necessarily cause from the perpetual fear of discovery, and in his exuberant exaltation of the value of disinterested friendship, he shows a sincere, though not completely successful, effort to avoid the offence that consistent egoistic hedonism is apt to give to ordinary human feeling. As regards friendship, Epicurus was a man of peculiarly unexclusive sympathies.[1] The genial fellowship of the philosophic community that he collected in his garden remained a striking feature in the traditions of his school; and certainly the ideal which Stoics and Epicureans equally cherished of a brotherhood of sages was most easily realized on the Epicurean plan of withdrawing from political and dialectical conflict to simple living and serene leisure, in imitation of the gods apart from the fortuitous concourse of atoms that we call a world. No doubt it was rather the practical than the theoretical side of Epicureanism which gave it so strong a hold on succeeding generations.

Later Greek philosophy. Stoicism in Rome.

The two systems that have just been described were those that most prominently attracted the attention of the ancient world, so far as it was directed to ethics, from their almost simultaneous origin to the end of the 2nd century A.D., when Stoicism almost vanishes from our view. But side by side with them the schools of Plato and Aristotle still maintained a continuity of tradition, and a more or less vigorous life; and philosophy, as a recognized element of Graeco-Roman culture, was understood to be divided among these four branches. The internal history, however, of the four schools was very different. We find no development worthy of notice in Aristotelian ethics (see PERIPATETICS). The Epicureans, again, from their unquestioning acceptance of the "dogmas"[2] of their founder, almost deserve to be called a sect rather than a school. On the other hand, the changes in Stoicism are very noteworthy, and it is the more easy to trace them, as the only original writings of this school which we possess are those of the later Roman Stoics. These changes may be attributed partly to the natural inner development of the system, partly to the reaction of the Roman mind on the essentially Greek doctrine which it received,—a reaction all the more inevitable from the very affinity between the Stoic sage and the ancient Roman ideal of manliness. It was natural that the earlier Stoics should be chiefly occupied with delineating the inner and outer characteristics of ideal wisdom and virtue, and that the gap between the ideal sage and the actual philosopher, though never ignored, should yet be somewhat overlooked. But when the question "What is man's good?" had been answered by an exposition of perfect wisdom, the practical question "How may a man emerge from the folly of the world, and get on the way towards wisdom?" naturally attracted attention; and the preponderance of moral over scientific interest, which was characteristic of the Roman mind, gave this question especial prominence. The sense of the gap between theory and fact gives to the religious element of Stoicism a new force; the soul, conscious of its weakness, leans on the thought of God, and in the philosopher's attitude towards external events, pious resignation preponderates over self-poised indifference; the old self-reliance of the reason, looking down on man's natural life as a mere field for its exercise, makes room for a positive aversion to the flesh as an alien element imprisoning the spirit; the body has come to be a "corpse which the soul sustains,"[1] and life a "sojourn in a strange land",[2] in short, the ethical idealism of Zeno has begun to borrow from the metaphysical idealism of Plato.

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[1] It is noted of him that he did not disdain the co-operation either of women or of slaves in his philosophical labours.

[2] The last charge of Epicurus to his disciples is said to have been, *τῶν δογμάτων μεμνῆσθαι*.

In no one of these schools was the outward coherence of tradition so much strained by inner changes as it was in Plato's.

History of Plato's school.

The alterations, however, in the metaphysical position of the Academics had little effect on their ethical teaching, as, even during the period of Scepticism, they appear to have presented as probable the same general view of human good which Antiochus afterwards dogmatically announced as a revival of the common doctrine of Plato and Aristotle. And during the period of a century and a half between Antiochus and Plutarch, we may suppose the school to have maintained the old controversy with Stoicism on much the same ground, accepting the formula of "life according to nature," but demanding that the "good" of man should refer to his nature as a whole, the good of his rational part being the chief element, and always preferable in case of conflict, but yet not absolutely his sole good. In Plutarch, however, we see the same tendencies of change that we have noticed in later Stoicism. The conception of a normal harmony between the higher and lower elements of human life has begun to be disturbed, and the side of Plato's teaching that deals with the inevitable imperfections of the world of concrete experience becomes again prominent. For example, we find Plutarch amplifying the suggestion in Plato's latest treatise (the *Laws*) that this imperfection is due to a bad world-soul that strives against the good,—a suggestion which is alien to the general tenor of Plato's doctrine, and had consequently been unnoticed during the intervening centuries. We observe, again, the value that Plutarch attaches, not merely to the sustainment and consolation of rational religion, but to the supernatural communications vouchsafed by the divinity to certain human beings in dreams, through oracles, or by special warnings, like those of the genius of Socrates. For these flashes of intuition, he holds, the soul should be prepared by tranquil repose and the subjugation of sensuality through abstinence. The same ascetic effort to attain by aloofness from the body a pure receptivity for supernatural influences, is exhibited in Neo-Pythagoreanism. But the general tendency that we are noting did not find its full expression in a reasoned system until we come to the Egyptian Plotinus.

Neo-platonism.

The system of Plotinus (205–270 A.D.) is a striking development of that element of Platonism which has had most fascination for the medieval and even for the modern mind, but which had almost vanished out of sight in the controversies of the post-Aristotelian schools. At the same time the differences are the more noteworthy from the reverent adhesion which the Neoplatonists always maintain to Plato. Plato identified good with the real essence of things; with that in them which is definitely conceivable and knowable. It belongs to this view to regard the imperfection of things as devoid of real being, and so incapable of being definitely thought or known; accordingly, we find that Plato has no technical term for that in the concrete sensible world which hinders it from perfectly expressing the abstract ideal world, and which in Aristotle's system is distinguished as absolutely formless matter (ὕλη). And so, when we pass from the ontology to the ethics of Platonism, we find that, though the highest life is only to be realized by turning away from concrete human affairs and their material environment, still the sensible world is not yet an object of positive moral aversion; it is rather something which the philosopher is seriously concerned to make as harmonious, good and beautiful as possible. But in Neoplatonism the inferiority of the condition in which the embodied human soul finds itself is more intensely and painfully felt; hence an express recognition of formless matter (ὕλη) as the "first evil," from which is derived the "second evil," body (σῶμα), to whose influence all the evil in the soul's existence is due. Accordingly the ethics of Plotinus represent, we may say, the moral idealism of the Stoics cut loose from nature. The only good of man is the pure existence of the soul, which in itself, apart from the contagion of the body, is perfectly free from error or defect; if only it can be restored to the untrammelled activity of its original being, nothing external, nothing bodily, can positively impair its perfect welfare. It is only the lowest form of virtue—the "civic" virtue of Plato's *Republic*—that is employed in regulating those animal impulses whose presence in the soul is due to its mixture with the body; higher or philosophic wisdom, temperance, courage and justice are essentially purifications from this contagion; until finally the highest mode of goodness is reached, in which the soul has no community with the body, and is entirely turned towards reason. It should be observed that Plotinus himself is still too Platonic to hold that the absolute mortification of natural bodily appetites is required for purifying the soul; but this ascetic inference was drawn to the fullest extent by his disciple Porphyry.

There is, however, a yet higher point to be reached in the upward ascent of the Neoplatonist from matter; and here the divergence of Plotinus from Platonic idealism is none the less striking, because it is a *bona fide* result of reverent reflection on Plato's teaching. The cardinal assumption of Plato's metaphysic is, that the real is definitely thinkable and knowable in proportion as it is real, so that the further the mind advances in abstraction from sensible particulars and apprehension of real being, the more definite and clear its thought becomes. Plotinus, however, urges that, as all thought involves difference or duality of some kind, it cannot be the primary fact in the universe, what we call God. He must be an essential unity prior to this duality, a Being wholly without difference or determination; and, accordingly, the highest mode of human existence, in which the soul apprehends this absolute, must be one in which all definite thought is transcended, and all consciousness of self lost in the absorbing ecstasy. Porphyry tells us that his master Plotinus attained the highest state four times during the six years which he spent with him.

Neoplatonism, originally Alexandrine, is often regarded as Hellenistic rather than Hellenic, a product of the mingling of Greek with Oriental civilization. But however Oriental may have been the cast of mind that welcomed this theosophic asceticism, the forms of thought by which these views were philosophically reached are essentially Greek, and it is by a thoroughly intelligible process of natural development, in which the intensification of the moral consciousness represented by Stoicism plays an important part, that the Hellenic pursuit of knowledge culminates in a preparation for ecstasy, and the Hellenic idealization of man's natural life ends in a settled antipathy to the body and its works. At the same time we ought not to overlook the affinities between the doctrine of Plotinus and that remarkable combination of Greek and Hebrew thought which Philo Judaeus had expounded two centuries before; nor the fact that Neoplatonism was developed in conscious antagonism to the new religion which had spread from Judea, and was already threatening the conquest of the Graeco-Roman world, and also to the Gnostic systems (see GNOSTICISM); nor, finally, that it furnished the chief theoretical support in the last desperate struggle that was made under Julian to retain the old polytheistic worship.

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[1] Epictetus.

[2] Marcus Aurelius.

B. *Christianity and Medieval Ethics.*—In the present article we are not concerned with the origin of the Christian religion, nor with its outward history. Nor have we to consider the special doctrines that have formed the bond of union of the Christian communities except in their ethical aspect, their bearing on the systematization of human aims and activities. This aspect, however, must necessarily be prominent in discussing Christianity, which cannot be adequately treated merely as a system of theological beliefs divinely revealed, and special observances divinely sanctioned; for it claims to regulate the whole man, in all departments of his existence. It was not till the 4th century A.D. that the first attempt was made to offer a systematic exposition of Christian morality; and nine centuries more had passed away before a genuinely philosophic intellect, trained by a full study of Aristotle, undertook to give complete scientific form to the ethical doctrine of the Catholic church. Before, however, we take a brief survey of the progress of systematic ethics from Ambrose to Thomas Aquinas, it may be well to examine the chief features of the new moral consciousness that had spread through Graeco-Roman civilization, and was awaiting philosophic synthesis. It will be convenient to consider first the new *form* or universal characteristics of Christian morality, and afterwards to note the chief points in the *matter* or particulars of duty and virtue which received development or emphasis from the new religion.

Christian and Jewish "law of God."

The first point to be noticed is the new conception of morality as the positive law of a theocratic community possessing a written code imposed by divine revelation, and sanctioned by divine promises and threatenings. It is true that we find in ancient thought, from Socrates downwards, the notion of a law of God, eternal and immutable, partly expressed and partly obscured by the shifting codes and customs of actual human societies. But the sanctions of this law were vaguely and, for the most part, feebly imagined; its principles were essentially unwritten, and thus referred not to the external will of an Almighty Being who claimed unquestioning submission, but rather to the reason that gods and men shared, by the exercise of which alone they could be adequately known and defined. Hence, even if the notion of law had been more prominent than it was in ancient ethical thought, it could never have led to a juridical, as distinct from a philosophical, treatment of morality. In Christianity, on the other hand, we early find that the method of moralists determining right conduct is to a great extent analogous to that of jurisconsults interpreting a code. It is assumed that divine commands have been implicitly given for all occasions of life, and that they are to be ascertained in particular cases by interpretation of the general rules obtained from texts of scripture, and by inference from scriptural examples. This juridical method descended naturally from the Jewish theocracy, of which Christendom was a universalization. Moral insight, in the view of the most thoughtful Jews of the age immediately preceding Christianity, was conceived as knowledge of a divine code, emanating from an authority external to human reason which had only the function of interpreting and applying its rules. This law was derived partly from Moses, partly from the utterances of the later prophets, partly from oral tradition and from the commentaries and supplementary maxims of generations of students. Christianity inherited the notion of a written divine code acknowledged as such by the "true Israel"—now potentially including the whole of mankind, or at least the chosen of all nations,—on the sincere acceptance of which the Christian's share of the divine promises to Israel depended. And though the ceremonial part of the old Hebrew code was altogether rejected, and with it all the supplementary jurisprudence resting on tradition and erudite commentary, still God's law was believed to be contained in the sacred books of the Jews, supplemented by the teaching of Christ and his apostles. By the recognition of this law the church was constituted as an ordered community, essentially distinct from the State; the distinction between the two was emphasized by the withdrawal of the early Christians from civic life, to avoid the performance of idolatrous ceremonies imposed as official expressions of loyalty, and by the persecutions which they had to endure, when the spread of an association apparently so hostile to the framework of ancient society had at length alarmed the imperial government. Nor was the distinction obliterated by the recognition of Christianity as the state religion under Constantine.

Thus the jural form in which morality was conceived only emphasized the fundamental difference between it and the laws of the state. The ultimate sanctions of the moral code were the infinite rewards and punishments awaiting the immortal soul hereafter; but the church early felt the necessity of withdrawing the privileges of membership from apostates and allowing them to be gradually regained only by a solemn ceremonial expressive of repentance, protracted through several years. This formal and regulated "penitence" was extended from apostasy to other grave—or, as they were subsequently called, "deadly"—sins; while for minor offences all Christians were called upon to express contrition by fasting and abstinence from ordinarily permitted pleasures, as well as verbally in public and private devotions. "Excommunication" and "penance" thus came to be temporal ecclesiastical sanctions of the moral law. As the graduation of these sanctions naturally became more minute, a correspondingly detailed classification of offences was rendered necessary, and thus a system of ecclesiastical jurisprudence was gradually produced, somewhat analogous to that of Judaism. At the same time this tendency to make prominent a scheme of external duties has always been counteracted in Christianity by the remembrance of its original antithesis to Jewish legalism. We find that this antithesis, as exaggerated by some of the Gnostic sects of the 2nd and 3rd centuries A.D., led, not merely to theoretical antinomianism, but even (if the charges of their orthodox opponents are not entirely to be discredited) to gross immorality of conduct. A similar tendency has shown itself at other periods of church history. And though such antinomianism has always been sternly repudiated by the moral consciousness of Christendom, it has never been forgotten that "inwardness," rightness of heart or spirit, is the pre-eminent characteristic of Christian goodness. It must not, of course, be supposed that the need of something more than mere fulfilment of external duty was ignored even by the later Judaism. Rabbinic erudition could not forget the repression of vicious desires in the tenth commandment, the stress laid in Deuteronomy on the necessity of service to God, or the inculcation by later prophets of humility and faith. "The real and only Pharisee," says the Talmud, "is he who does the will of his Father because he loves Him." But it remains true that the contrast with the "righteousness of the scribes and pharisees" has always served to mark the requirement of "inwardness" as a distinctive feature of the Christian code—an inwardness not merely negative, tending to the repression of vicious desires as well as vicious acts, but also involving a positive rectitude of the inner state of the soul.

Christian and Pagan inwardness.

In this aspect Christianity invites comparison with Stoicism, and indeed with pagan ethical philosophy generally, if we except the hedonistic schools. Rightness of purpose, preference of virtue for its own sake, suppression of vicious desires, were made essential points by the Aristotelians, who attached the most importance to outward circumstances in their view of virtue, no less than by the Stoics, to whom all outward things were indifferent. The fundamental differences between pagan and Christian ethics depend not on any difference in the value set on rightness of heart, but on different views of the essential form or conditions of this inward rightness. In neither case is it presented purely and simply as moral rectitude. By the pagan philosophers it was always conceived under the form of Knowledge or Wisdom, *Faith.*

it being inconceivable to all the schools sprung from Socrates that a man could truly know his own good and yet deliberately choose anything else. This knowledge, as Aristotle held, might be permanently precluded by vicious habits, or temporarily obliterated by passion, but if present in the mind it must produce rightness of purpose. Or even if it were held with some of the Stoics that true wisdom was out of the reach of the best men actually living, it none the less remained the ideal condition of perfect human life. By Christian teachers, on the other hand, the inner springs of good conduct were generally conceived as Faith and Love. Of these notions the former has a somewhat complex ethical import; it seems to blend several elements differently prominent in different minds. Its simplest and commonest meaning is that emphasized in the contrast of "faith" with "sight"; where it signifies belief in the invisible divine order represented by the church, in the actuality of the law, the threats, the promises of God, in spite of all the influences in man's natural life that tend to obscure this belief. Out of this contrast there ultimately grew an essentially different opposition between faith and knowledge or reason, according to which the theological basis of ethics was contrasted with the philosophical; the theologians maintaining sometimes that the divine law is essentially arbitrary, the expression of will, not reason; more frequently that its reasonableness is inscrutable, and that actual human reason should confine itself to examining the credentials of God's messengers, and not the message itself. But in early Christianity this latter antithesis was as yet undeveloped; faith means simply force in clinging to moral and religious conviction, whatever their rational grounds may be; this force, in the Christian consciousness, being inseparably bound up with personal loyalty and trust towards Christ, the leader in the battle with evil, the ruler of the kingdom to be realized. So far, however, there is no ethical difference between Christian faith and that of Judaism, or its later imitation, Mahommedanism; except that the personal affection of loyal trust is peculiarly stirred by the blending of human and divine natures in Christ, and the rule of duty impressively taught by the manifestation of his perfect life. A more distinctively Christian, and a more deeply moral, significance is given to the notion in the antithesis of "faith" and "works." Here faith means more than loyal acceptance of the divine law and reverent trust in the lawgiver; it implies a consciousness, at once continually present and continually transcended, of the radical imperfection of all human obedience to the law, and at the same time of the irremissible condemnation which this imperfection entails. The Stoic doctrine of the worthlessness of ordinary human virtue, and the stern paradox that all offenders are equally, in so far as all are absolutely, guilty, find their counterparts in Christianity; but the latter (maintaining this ideal severity in the moral standard, with an emotional consciousness of what is involved in it quite unlike that of the Stoic) overcomes its practical exclusiveness through faith. This faith, again, may be conceived in two modes, essentially distinct though usually combined. In one view it gives the believer strength to attain, by God's supernatural aid or "grace," a goodness of which he is naturally incapable; in the other view it gives him an assurance that, though he knows himself a sinner deserving of utter condemnation, a perfectly just God still regards him with favour on account of the perfect services and suffering of Christ. Of these views the former is the more catholic, more universally present in the Christian consciousness; the latter more deeply penetrates the mystery of the Atonement, as expounded in the Pauline epistles.

Love.

Purity.

But faith, however understood, is rather an indispensable pre-requisite than the essential motive principle of Christian good conduct. This motive is supplied by the other central notion, love. On love depends the "fulfilling of the law," and the sole moral value of Christian duty—that is, on love to God, in the first place, which in its fullest development must spring from Christian faith; and, secondly, love to all mankind, as the objects of divine love and sharers in the humanity ennobled by the incarnation. This derivative philanthropy characterizes the spirit in which all Christian performance of social duty is to be done; loving devotion to God being the fundamental attitude of mind that is to be maintained throughout the whole of the Christian's life. But further, as regards abstinence from unlawful acts and desires prompting to them, we have to notice another form in which the inwardness of Christian morality manifests itself, which, though less distinctive, should yet receive attention in any comparison of Christian ethics with the view of Graeco-Roman philosophy. The profound horror with which the Christian's conception of a suffering as well as an avenging divinity tended to make him regard all condemnable acts was tinged with a sentiment which we may perhaps describe as a ceremonial aversion moralized—the aversion, that is, to foulness or impurity. In Judaism, as in other, especially Oriental, religions, the natural dislike of material defilement has been elevated into a religious sentiment, and made to support a complicated system of quasi-sanitary abstinences and ceremonial purifications; then, as the ethical element predominated in the Jewish religion, a moral symbolism was felt to reside in the ceremonial code, and thus aversion to impurity came to be a common form of the ethico-religious sentiment. Then, when Christianity threw off the Mosaic ritual, this religious sense of purity was left with no other sphere besides morality; while, from its highly idealized character, it was peculiarly well adapted for that repression of vicious desires which Christianity claimed as its special function.

Distinctive particulars of Christian morality.

The distinctive features of Christian ethics are obedience, unworldliness, benevolence, purity and humility. They are naturally connected with the more general characteristics just stated; though many of them may also be referred directly to the example and precepts of Christ, and in several cases they are clearly due to both causes, inseparably combined.

1. We may notice, in the first place, that the conception of morality as a code which, if not in itself arbitrary, is yet to be accepted by men with unquestioning submission, tends naturally to bring into prominence the virtue of *obedience to authority*; just as the philosophic view of goodness as the realization of reason gives a special value to *self-determination* and independence (as we see more clearly in the post-Aristotelian schools where ethics is distinctly separated from politics).

2. Again, the opposition between the natural world and the spiritual order into which the Christian has been born anew led not merely to a contempt equal to that of the Stoic for wealth, fame, power, and other objects of worldly pursuit, but also, for some time at least, to a comparative depreciation of the domestic and civic relations of the natural man. This tendency was exhibited most simply and generally in the earliest period of the church's history. In the view of primitive Christians, ordinary human society was a world temporarily surrendered to Satanic rule, over which a swift and sudden destruction was impending; in such a world the little band who were gathered in the ark of the church could have no part or lot,—the only attitude they could maintain was that of passive alienation. On the other hand, it was difficult practically to realize this alienation, and a keen sense of this difficulty induced the same hostility to the body as a clog and hindrance, that we find to some extent in Plato, but more fully developed in Neoplatonism, Neopythagoreanism, and other products of the mingling of Greek with Oriental thought. This feeling is exhibited in the value set on fasting in the Christian church from the earliest times, and in an extreme form in the self-torments of later monasticism; while both tendencies, anti-worldliness and anti-sensualism, seem to have combined in causing the preference of celibacy over marriage which is common to most early Christian writers.[1] Patriotism, again, and the sense of civic duty, the most elevated of all social sentiments in the Graeco-Roman civilization, tended, under the influence of Christianity, either to expand itself into universal philanthropy, or to concentrate

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[1] *E.g.* Justin Martyr, Origen, Tertullian, Cyprian.

itself on the ecclesiastical community. "We recognize one commonwealth, the world," says Tertullian; "we know," says Origen, "that we have a fatherland founded by the word of God." We might further derive from the general spirit of Christian unworldliness that repudiation of the secular modes of conflict, even in a righteous cause, which substituted a passive patience and endurance for the old pagan virtue of courage, in which the active element was prominent. Here, however, we clearly trace the influence of Christ's express prohibition of violent resistance to violence, and his inculcation, by example and precept, of a love that was to conquer even natural resentment. An extreme result of this influence is shown in Tertullian's view, that no Christian could properly hold the office of a secular magistrate in which he would have to doom to death, chains, imprisonment; but even more sober writers, such as Ambrose, extend Christian passivity so far as to preclude self-defence even against a murderous assault. The common sense of Christendom gradually shook off these extravagances; but the reluctance to shed blood lingered long, and was hardly extinguished even by the growing horror of heresy. We have a curious relic of this in the later times of ecclesiastical persecution, when the heretic was doomed to the stake that he might be punished in some manner "short of bloodshed."[1]

Benevolence.

3. It is, however, in the impulse given to practical beneficence in all its forms, by the exaltation of love as the root of all virtues, that the most important influence of Christianity on the particulars of civilized morality is to be found, although the exact amount of this influence is here somewhat difficult to ascertain, since it merely carries further a development traceable in the history of pagan morality. This development appears when we compare the different post-Socratic systems of ethics. In Plato's exposition of the different virtues there is no mention whatever of benevolence, although his writings show a keen sense of the importance of friendship as an element of philosophic life, especially of the intense personal affection naturally arising between master and disciple. Aristotle goes somewhat further in recognizing the moral value of friendship (φιλία); and though he considers that in its highest form it can be realized only by the fellowship of the wise and good, he yet extends the notion so as to include the domestic affections, and takes notice of the importance of mutual kindness in binding together all human societies. Still in his formal statement of the different virtues, positive beneficence is discernible only under the notion of "liberality," in which form its excellence is hardly distinguished from that of graceful profusion in self-regarding expenditure (*Nic. Eth.* iv. 1). Cicero, on the other hand, in his paraphrase of a Stoic treatise on external duties (*De officiis*), ranks the rendering of positive services to other men as a chief department of social duty; and the Stoics generally recognized the universal fellowship and natural mutual claims of human beings as such. Indeed, this recognition in later Stoicism is sometimes expressed with so much warmth of feeling as to be hardly distinguishable from Christian philanthropy. Nor was this regard for humanity merely a doctrine of the school. Partly through the influence of Stoic and other Greek philosophy, partly from the natural expansion of human sympathies, the legislation of the Empire, during the first three centuries, shows a steady development in the direction of natural justice and humanity; and some similar progress may be traced in the general tone of moral opinion. Still the utmost point that this development reached fell considerably short of the standard of Christian charity. Without dwelling on the immense impetus given to the practice of social duty generally by the religion that made beneficence a form of divine service, and identified "piety" with "pity," we have to put down as definite changes introduced by Christianity—(1) the severe condemnation and final suppression of the practice of exposing infants; (2) effective abhorrence of the barbarism of gladiatorial combats; (3) immediate moral mitigation of slavery, and a strong encouragement of emancipation; (4) great extension of the eleemosynary provision made for the sick and the poor. As regards almsgiving, however—the importance of which has caused it to usurp, in modern languages, the general name of "charity"—it ought to be observed that Christianity merely universalized a duty which has always been inculcated by Judaism, within the limits of the chosen people.

4. The same may be said of the stricter regulation which Christianity enforced on the relations of the sexes; except so far as the prohibition of divorce is concerned, and the stress laid on "purity of heart" as contrasted with merely outward chastity.

5. Even the peculiarly Christian virtue of humility, which presents so striking a contrast to the Greek "highmindedness," was to some extent anticipated in the Rabbinic teaching. Its far greater prominence under the new dispensation may be partly referred to the express teaching and example of Christ; partly, in so far as the virtue is manifested in the renunciation of external rank and dignity, or the glory of merely secular gifts and acquirements, it is one aspect of the unwordliness which we have already noticed; while the deeper humility that represses the claim of personal merit even in the saint belongs to the strict self-examination, the continual sense of imperfection, the utter reliance on strength not his own, which characterize the inner moral life of the Christian. Humility in this latter sense, "before God," is an essential condition of all truly Christian goodness.

We have, however, yet to notice the enlargement of the sphere of ethics due to its close connexion with theology; for while this added religious force and sanction to ordinary moral obligations, it equally tended to impart a moral aspect to religious belief and worship. "Duty to God"—as distinct from duty to man—had not been altogether unrecognized by pagan moralists; but the rather dubious relations of even the more orthodox philosophy to the established polytheism had generally prevented them from laying much stress upon it. Again,—just as the Stoics held wisdom to be indispensable to real rectitude of conduct, while at the same time they included under the notion of wisdom a grasp of physical as well as ethical truth,—so the similar emphasis laid on inwardness in Christian ethics caused orthodoxy or correctness of religious belief to be regarded as essential to goodness, and heresy as the most fatal of vices, corrupting as it did the very springs of Christian life. To the philosophers (with the single exception of Plato), however, convinced as they were that the multitude must necessarily miss true well-being through their folly and ignorance, it could never occur to guard against these evils by any other method than that of providing philosophic instruction for the few; whereas the Christian clergy, whose function it was to offer truth and eternal life to all mankind, naturally regarded theological misbelief as insidious preventible contagion. Indeed, their sense of its deadliness was so keen that, when they were at length able to control the secular administration, they rapidly overcame their aversion to bloodshed, and initiated that long series of religious persecutions to which we find no parallel in the pre-Christian civilization of Europe. It was not that Christian writers did not feel the difficulty of attributing criminality to sincere ignorance or error. But the difficulty is not really peculiar to theology; and the theologians usually got over it (as some philosophers had surmounted a similar perplexity in the region of ethics proper) by supposing some latent or antecedent voluntary sin, of which the apparently involuntary heresy was the fearful fruit.

Lastly, we must observe that, in proportion as the legal conception of morality as a code of which the violation deserves supernatural punishment predominated over the philosophic view of ethics as the method for attaining natural felicity, the question of man's freedom of will to obey the law necessarily became prominent. At the same time it cannot be broadly said that Christianity took a decisive side in the metaphysical controversy on free-will and necessity; since, just as in Greek philosophy the need of maintaining freedom as the ground of responsibility clashes with the conviction that no one deliberately chooses his own harm, so in Christian ethics it clashes with the attribution of all true human virtue to supernatural grace, as well as with the belief in divine foreknowledge. All we can say is that in the development of Christian thought the conflict of conceptions was far more profoundly felt, and far more serious efforts were made to evade or transcend it.

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[1] Citra sanguinis effusionem.

Development of opinion in early Christianity.

Augustine.

In the preceding account of Christian morality, it has been already indicated that the characteristics delineated did not all exhibit themselves simultaneously to the same extent, or with perfect uniformity throughout the church. Changes in the external condition of Christianity, the different degrees of civilization in the societies of which it was the dominant religion, and the natural process of internal development, continually brought different features into prominence; while again, the important antagonisms of opinion within Christendom frequently involved ethical issues—even in the Eastern Church—until in the 4th century it began to be absorbed in the labour of a dogmatic construction. Thus, for example, the anti-secular tendencies of the new creed, to which Tertullian (160–220) gave violent and rigid expression, were exaggerated in the Montanist heresy which he ultimately joined; on the other hand, Clement of Alexandria, in opposition to the general tone of his age, maintained the value of pagan philosophy for the development of Christian faith into true knowledge (Gnosis), and the value of the natural development of man through marriage for the normal perfecting of the Christian life. So again, there is a marked difference between the writers before Augustine and those that succeeded him in all that concerns the internal conditions of Christian morality. By Justin and other apologists the need of redemption, faith, grace is indeed recognized, but the theological system depending on these notions is not sufficiently developed[1] to come into even apparent antagonism with the freedom of the will. Christianity is for the most part conceived as essentially a proclamation through the Divine Word, to immortal beings gifted with free choice, of the true code of conduct sanctioned by eternal rewards and punishments. This legalism contrasts strikingly with the efforts of pagan philosophy to exhibit virtue as its own reward; and the contrast is triumphantly pointed out by more than one early Christian writer. Lactantius (*circa* 300 A.D.), for example, roundly declares that Plato and Aristotle, referring everything to this earthly life, "made virtue mere folly"; though himself maintaining, with pardonable inconsistency, that man's highest good did not consist in mere pleasure, but in the consciousness of the filial relation of the soul to God. It is plain, however, that on this external legalistic view of duty it was impossible to maintain a difference in kind between Christian and pagan morality; the philosopher's conformity to the rules of chastity and beneficence, so far as it went, was indistinguishable from the saint's. But when this inference was developed in the teaching of Pelagius, it was repudiated as heretical by the church, under the powerful leadership of Augustine (354–430); and the doctrine of man's incapacity to obey God's law by his unaided moral energy was pressed to a point at which it was difficult to reconcile it with the freedom of the will. Augustine is fully aware of the theoretical indispensability of maintaining Free Will, from its logical connexion with human responsibility and divine justice; but he considers that these latter points are sufficiently secured if actual freedom of choice between good and evil is allowed in the single case of our progenitor Adam.[2] For since the *natura seminalis* from which all men were to arise already existed in Adam, in his voluntary preference of self to God, humanity chose evil once for all; for which ante-natal guilt all men are justly condemned to perpetual absolute sinfulness and consequent punishment, unless they are elected by God's unmerited grace to share the benefits of Christ's redemption. Without this grace it is impossible for man to obey the "first greatest commandment" of love to God; and, this unfulfilled, he is guilty of the whole law, and is only free to choose between degrees of sin; his apparent external virtues have no moral value, since inner rightness of intention is wanting. "All that is not of faith is of sin"; and faith and love are mutually involved and inseparable; faith springs from the divinely imparted germ of love, which in its turn is developed by faith to its full strength, while from both united springs hope, joyful yearning towards ultimate perfect fruition of the object of love. These three Augustine (after St Paul) regards as the three essential elements of Christian virtue; along with these he recognizes the fourfold division of virtue into prudence, temperance, courage and justice according to their traditional interpretation; but he explains these virtues to be in their true natures only the same love to God in different aspects or exercises. The uncompromising mysticism of this view may be at once compared and contrasted with the philosophical severity of Stoicism. Love of God in the former holds the same absolute and unique position as the sole element of moral worth in human action, which, as we have seen, was occupied by knowledge of Good in the latter; and we may carry the parallel further by observing that in neither case is this severity in the abstract estimate of goodness necessarily connected with extreme rigidity in practical precepts. Indeed, an important part of Augustine's work as a moralist lies in the reconciliation which he laboured to effect between the anti-worldly spirit of Christianity and the necessities of secular civilization. For example, we find him arguing for the legitimacy of judicial punishments and military service against an over-literal interpretation of the Sermon on the Mount; and he took an important part in giving currency to the distinction between evangelical "counsels" and "commands," and so defending the life of marriage and temperate enjoyment of natural good against the attacks of the more extravagant advocate of celibacy and self-abnegation; although he fully admitted the superiority of the latter method of avoiding the contamination of sin.

Ambrose.

The attempt to Christianize the old Platonic list of virtues, which we have noticed in Augustine's system, was probably due to the influence of his master Ambrose, in whose treatise *De officiis ministrorum* we find for the first time an exposition of Christian duty systematized on a plan borrowed from a pre-Christian moralist. It is interesting to compare Ambrose's account of what subsequently came to be known as the "four cardinal virtues" with the corresponding delineations in Cicero's[3] *De officiis* which served the bishop as a model. Christian Wisdom, so far as it is speculative, is of course primarily theological; it has God, as the highest truth, for its chief object, and is therefore necessarily grounded on faith. Christian Fortitude is essentially firmness in withstanding the seductions of good and evil fortune, resoluteness in the conflict perpetually waged against wickedness without carnal weapons—though Ambrose, with the Old Testament in his hand, will not quite relinquish the ordinary martial application of the term. "Temperantia" retains the meaning of "observance of due measure" in all conduct, which it had in Cicero's treatise; though its notion is partly modified by being blended with the newer virtue of humility. Finally in the exposition of Christian Justice the Stoic doctrine of the natural union of all human interests is elevated to the full height and intensity of evangelical philanthropy; the brethren are reminded that the earth was made by God a common possession of all, and are bidden to administer their means for the common benefit; Ambrose, we should observe, is thoroughly aware of the fundamental union of these different virtues in Christianity, though he does not, like Augustine, resolve them all into the one central affection of love of God.

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[1] To show the crudity of the notion of redemption in early Christianity, it is sufficient to mention that many fathers represent Christ's ransom as having been paid to the devil; sometimes adding that by the concealment of Christ's divinity under the veil of humanity a certain deceit was (fairly) practised on the great deceiver.

[2] It is to be observed that Augustine prefers to use "freedom" not for the power of willing either good or evil, but the power of willing good. The highest freedom, in his view, excludes the possibility of willing evil.

[3] Cicero's works are unimportant in the history of ancient ethics, as their philosophical matter was entirely borrowed from Greek treatises now lost; but the influence exercised by them (especially by the *De officiis*) over medieval and even modern readers was very considerable.

Ecclesiastical morality in the "Dark Ages."

Under the influence of Ambrose and Augustine, the four cardinal virtues furnished a basis on which the systematic ethical theories of subsequent theologians were built. With them the triad of Christian graces, Faith, Hope and Love, and the seven gifts of the Spirit (Isaiah xi. 2) were often combined. In antithesis to this list, an enumeration of the "deadly sins" obtained currency. These were at first commonly reckoned as eight; but a preference for mystical numbers characteristic of medieval theologians finally reduced them to seven. The statement of them is variously given,—Pride, Avarice, Anger, Gluttony, Unchastity, are found in all the lists; the remaining two (or three) are variously selected from among Envy, Vainglory, and the rather singular sins Gloominess (*tristitia*) and Languid Indifference (*acidia* or *acedia*, from Gr. *ἀκηδία*). These latter notions show plainly, what indeed might be inferred from a study of the list as a whole, that it represents the moral experience of the monastic life, which for some centuries was more and more unquestioningly regarded as in a peculiar sense "religious." It should be observed that the (also Augustinian) distinction between "deadly" and "venial" sins had a technical reference to the quasi-jural administration of ecclesiastical discipline, which grew gradually more organized as the spiritual power of the church established itself amid the ruins of the Western empire, and slowly developed into the theocracy that almost dominated Europe during the latter part of the middle ages. "Deadly" sins were those for which formal ecclesiastical penance was held to be necessary, in order to save the sinner from eternal damnation; for "venial" sins he might obtain forgiveness, through prayer, almsgiving, and the observance of the regular fasts. We find that "penitential books" for the use of the confessional, founded partly on traditional practice and partly on the express decrees of synods, come into general use in the 7th century. At first they are little more than mere inventories of sins, with their appropriate ecclesiastical punishments; gradually cases of conscience come to be discussed and decided, and the basis is laid for that system of casuistry which reached its full development in the 14th and 15th centuries. This ecclesiastical jurisprudence, and indeed the general relation of the church to the ruder races with which it had to deal during this period, necessarily tended to encourage a somewhat external view of morality. But a powerful counterpoise to this tendency was continually maintained by the fervid inwardness of Augustine, transmitted through Gregory the Great, Isidore of Seville, Alcuin, Hrabanus Maurus, and other writers of the philosophically barren period between the destruction of the Western empire and the rise of Scholasticism.

Medieval moral philosophy.

Scholastic ethics, like scholastic philosophy, attained its completest result in the teaching of Thomas Aquinas. But before giving a brief account of the ethical part of his system, it will be well to notice the salient points in the long and active discussion that led up to it. In the pantheistic system of Erigena (*q.v.*) (*circa* 810–877) the chief philosophic element is supplied by the influence of Plato and Plotinus, transmitted through an unknown author of the 5th century, who assumed the name of Dionysius the Areopagite. Accordingly the ethical side of this doctrine has the same negative and ascetic character that we have observed in Neoplatonism. God is the only real Being; evil is essentially unreal and incognizable; the true aim of man's life is to return to perfect union with God out of the degraded material existence into which he has fallen. This doctrine found little acceptance among Erigena's contemporaries, and was certainly unorthodox enough to justify the condemnation which it subsequently received from Honorius III.; but its influence, together with that of the Pseudo-Dionysius, had a considerable share in developing the more emotional orthodox mysticism of the 12th and 13th centuries; and Neoplatonism (or Platonism received through a Neoplatonic tradition) remained a distinct element in medieval thought, though obscured in the period of mature scholasticism by the predominant influence of Aristotle. Passing on to Anselm (1033–1109), we observe that the Augustinian doctrine of original sin and man's absolute need of unmerited grace is retained in his theory of salvation; he also follows Augustine in defining freedom as the "power not to sin"; though in saying that Adam fell "spontaneously" and "by his free choice," though not "through its freedom," he has implicitly made the distinction that Peter the Lombard afterwards expressly draws between the freedom that is opposed to necessity and freedom from the slavery to sin. Anselm further softens the statement of Augustinian predestinationism by explaining that the freedom to will is not strictly lost even by fallen man; it is inherent in a rational nature, though since Adam's sin it only exists potentially in humanity, except where it is made actual by grace.

In a more real sense Abelard (1079–1142) tries to establish the connexion between man's ill desert and his free consent. He asserts that the inherited propensity to evil is not strictly a sin, which is only committed when the conscious self yields to vicious inclination. With a similar stress on the self-conscious side of moral action, he argues that rightness of conduct depends solely on the intention, at one time pushing this doctrine to the paradoxical assertion that all outward acts as such are indifferent.[1] In the same spirit, under the reviving influence of ancient philosophy (with which, however, he was imperfectly acquainted and the relation of which to Christianity he extravagantly misunderstood), he argues that the old Greek moralists, as inculcating a disinterested love of good—and so implicitly love of God as the highest good—were really nearer to Christianity than Judaic legalism was. Nay, further, he required that the Christian "love to God" should be regarded as pure only if purged from the self-regarding desire of the happiness which God gives. The general tendency of Abelard's thought was suspiciously regarded by contemporary orthodoxy;[2] and the over-subtlety of the last-mentioned distinction provoked vehement replies from orthodox mystics of the age. Thus, Hugo of St Victor (1077–1141) argues that all love is necessarily so far "interested" that it involves a desire for union with the beloved; and since eternal happiness consists in this union, it cannot truly be desired apart from God; while Bernard of Clairvaux (1091–1153) more elaborately distinguishes four stages by which the soul is gradually led from (1) merely self-regarding desire for God's aid in distress, to (2) love him for his loving-kindness to it, then also (3) for his absolute goodness, until (4) in rare moments this love for himself alone becomes the sole all-absorbing affection. This controversy Peter the Lombard endeavoured to compose by the scholastic art of taking distinctions, of which he was a master. In his treatise, *Libri sententiarum*, mainly based on Augustinian doctrine, we find a distinct softening of the antithesis between nature and grace and an anticipation of the union of Aristotelian and Christian thought, which was initiated by Albert the Great and completed by Thomas Aquinas.

Thomas Aquinas.

The moral philosophy of Aquinas is Aristotelianism with a Neoplatonic tinge, interpreted and supplemented by a view of Christian dogma derived chiefly from Augustine. All action or movement of all things irrational as well as rational is directed towards some end or good,—that is, really and ultimately towards God himself, the ground and first cause of all being, and unmoved principle of all movement. This universal though unconscious striving after God, since he is essentially intelligible, exhibits itself in its highest form in rational beings as a desire for knowledge of him; such knowledge, however, is beyond all ordinary exercise of reason, and may be only partially revealed to man here below. Thus the *summum bonum* for man is objectively God, subjectively the happiness to be derived from loving vision of his perfections; although there is a lower kind of happiness to be realized here below in a normal human existence of virtue and friendship, with mind and body sound and whole and properly trained for the needs of life. The higher happiness is given to man by free grace of God; but it is given to those only whose heart is right, and as a reward of virtuous actions. Passing to consider what actions are virtuous, we first observe generally that the morality of an act is in part, but only in part, determined by its particular motive; it partly depends on its external object and circumstances, which render it either objectively in harmony with the "order of reason" or the reverse. In the classification of particular virtues and vices we can distinguish very clearly the elements supplied by the different teachings which Aquinas has imbibed. He follows Aristotle closely in dividing the "natural" virtues into intellectual and moral, giving his preference to the former class, and the intellectual again into speculative and practical; in distinguishing within the speculative class the "intellect" that is conversant with principles, the "science" that deduces conclusions, and the "wisdom" to which belongs the whole process of knowing the sublimest objects of knowledge; and in treating practical wisdom as inseparably connected with moral virtues, and therefore in a sense moral. His distinction among moral virtues of the justice that renders others their due from the virtues that control the appetites and passions of the agent himself, represents his interpretation of the *Nicomachean Ethics*, while his account of these latter virtues is a simple transcript of Aristotle's, just as his division of the non-rational element of the soul into "concupiscible" and "irascible" is the old Platonic one. In arranging his list, however, he defers to the established doctrine of the four cardinal virtues (derived from Plato and the Stoics through Cicero), accordingly, the Aristotelian ten have to stand under the higher genera of (1) the prudence which gives reasoned rules of conduct, (2) the temperance which restrains misleading desire, and (3) the fortitude that resists misleading fear of dangers or toils. But before these virtues are ranked the three "theologic" virtues, faith, love and hope, supernaturally "instilled" by God, and directly relating to him as their object. By faith we obtain that part of our knowledge of God which is beyond the range of mere natural wisdom or philosophy; naturally (*e.g.*), we can know God's existence, but not his trinity in unity, though philosophy is useful to defend this and other revealed verities; and it is essential for the soul's welfare that all articles of the Christian creed, however little they can be known by natural reason, should be apprehended through faith; the Christian who rejects a single article loses hold altogether of faith and of God. Faith is the substantial basis of all Christian morality, but without love—the essential form of all the Christian virtues—it is "formless" (*informis*). Christian love is conceived (after Augustine) as primarily love to God (beyond the natural yearning of the creature after its ultimate good), which expands into love towards all God's creatures as created by him, and so ultimately includes even self-love. But creatures are only to be loved in their purity as created by God; all that is bad in them must be an object of hatred till it is destroyed. In the classification of sins the Christian element predominates, still we find the Aristotelian vices of excess and defect, along with the modern divisions into "sins against God, neighbour and self," "mortal and venial sins," and so forth.

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[1] Abelard afterwards retracted this view, at least in its extreme form; and in fact does not seem to have been fully conscious of the difference between (1) unfulfilled intention to do an act objectively right, and (2) intention to do what is merely believed by the agent to be right.

[2] He was condemned by two synods, in 1121 and 1140.

From the notion of sin—treated in its jural aspect—Aquinas passes naturally to the discussion of Law. The exposition of this conception presents to a great extent the same matter that was dealt with by the exposition of moral virtues, but in a different form; the prominence of which may perhaps be attributed to the growing influence of Roman jurisprudence, which attained in the 12th century so rapid and brilliant a revival in Italy. This side of Thomas's system is specially important, since it is just this blending of theological conceptions with the abstract theory of the later Roman law that gave the starting-point for independent ethical thought in the modern world. Under the general idea of law, defined as an "ordinance of reason for the common good, promulgated by him who has charge of the community," Thomas distinguishes (1) the eternal law or regulative reason of God which embraces all his creatures, rational and irrational; (2) "natural law," being that part of the eternal law that relates to rational creatures as such; (3) human law, which properly consists of more particular deductions from natural law particularized and adapted to the varying circumstances of actual communities; (4) divine law specially revealed to man. As regards natural law, he teaches that God has implanted in the human mind a knowledge of its immutable general principles; and not only knowledge, but a disposition, to which he applies the peculiar scholastic name *synderesis*,[1] that unerringly prompts to the realization of these principles in conduct, and protests against their violation. All acts of natural virtue are implicitly included within the scope of this law of nature; but in the application of its principles to particular cases—to which the term "conscience" should be restricted—man's judgment is liable to err, the light of nature being obscured and perverted by bad education and custom. Human law is required, not merely to determine the details for which natural law gives no intuitive guidance, but also to supply the force necessary for practically securing, among imperfect men, the observance of the most necessary rules of mutual behaviour. The rules of this law must be either deductions from principles of natural law, or determinations of particulars which it leaves indeterminate; a rule contrary to nature could not be valid as law at all. Human law, however, can deal with outward conduct alone, and natural law, as we have seen, is liable to be vague and obscure in particular applications. Neither natural nor human law, moreover, takes into account that supernatural happiness which is man's highest end. Hence they need to be supplemented by a special revelation of divine law. This revelation is distinguished into the law of the old covenant and the law of the gospel; the latter of these is productive as well as imperative since it carries with it the divine grace that makes its fulfilment possible. We have, however, to distinguish in the case of the gospel between (1) absolute commands and (2) "counsels," which latter recommend, without positively ordering the monastic life of poverty, celibacy and obedience as the best method of effectively turning the will from earthly to heavenly things.

Duns Scotus.

William of Occam.

But how far is man able to attain either natural or Christian perfection? This is the part of Thomas's system in which the cohesion of the different elements seems weakest. He is scarcely aware that his Aristotelianized Christianity inevitably combines two different difficulties in dealing with this question: first, the old pagan difficulty of reconciling the proposition that will is a rational desire always directed towards apparent good, with the freedom of choice between good and evil that the jural view of morality seems to require; and, secondly, the Christian difficulty of harmonizing this latter notion with the absolute dependence on divine grace which the religious consciousness affirms. The latter difficulty Thomas, like many of his predecessors, avoids by supposing a "co-operation" of free-will and grace, but the former he does not fully meet. It is against this part of his doctrines that the most important criticism, in ethics, of his rival Duns Scotus (*c.* 1266–1308) was directed. He urged that will could not be really free if it were bound to reason, as Thomas (after Aristotle) conceives it; a really free choice must be perfectly indeterminate between reason and unreason. Scotus consistently maintained that the divine will is similarly independent of reason, and that the divine ordering of the world is to be conceived as absolutely arbitrary. On this point he was followed by the acute intellect of William of Occam (d. *c.* 1347). This doctrine is obviously hostile to all reasoned morality; and in fact, notwithstanding the dialectical ability of Scotus and Occam, the work of Thomas remained indubitably the crowning result of the great constructive effort of medieval philosophy. The effort was, indeed, foredoomed to failure, since it attempted the impossible task of framing a coherent system out of the heterogeneous data furnished by Scripture, the fathers, the church and Aristotle—equally unquestioned, if not equally venerated, authorities. Whatever philosophic quality is to be found in the work of Thomas belongs to it in spite of, not in consequence of, its method. Still, its influence has been great and long-enduring,—in the Catholic Church primarily, but indirectly among Protestants, especially in England, since the famous first book of Hooker's *Ecclesiastical Polity* is to a great extent taken from the *Summa theologiae*.

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[1] *Synderesis* (Gr. συντήρησις, from συντηρεῖν, to watch closely, observe) is used in this sense in Jerome (*Com. in Ezek.* i. 4-10).

Medieval mysticism.

Partly in conscious antagonism to the schoolmen, yet with close affinity to the central ethico-theological doctrine which they read out of or into Aristotle, the mystical manner of thought continued to maintain itself in the church. Philosophically it rested upon Neoplatonism, but its development in strict connexion with Christian orthodoxy begins in the 12th century with Bernard of Clairvaux and Hugo of St Victor. It blended the Christian element of love with the ecstatic vision of Plotinus, sometimes giving the former a decided predominance. In its more moderate form, keeping wholly within the limits of ecclesiastical orthodoxy, this mysticism is represented by Bonaventura and Gerson; while it appears more independent and daringly constructive in the German Eckhart, advancing in some of his followers to open breach with the church, and even to practical immorality.

Casuistry.

In the brief account above given of the general ethical view of Thomas Aquinas no mention has been made of the detailed discussion of particular duties included in the *Summa theologiae*; in which, for the most part, an excellent combination of moral elevation with sobriety of judgment is shown, though on certain points the scholastic pedantry of definition and distinction is unfavourable to due delicacy of treatment. As the properly philosophic interest of scholasticism faded in the 14th and 15th centuries, the quasi-legal treatment of morality came again into prominence, borrowing a good deal of matter from Thomas and other schoolmen. One result of this was a marked development and systematization of casuistry. The best known *Summae casuum conscientiae*, compiled for the conduct of auricular confession, belong to the 14th and 15th centuries. The oldest, the *Astesana*, from Asti in Piedmont, is arranged as a kind of text-book of morality on a scholastic basis; later manuals are merely lists of questions and answers. It was inevitable that, in proportion as this casuistry assumed the character of a systematic penal jurisprudence, its precise determination of the limits between the prohibited and the allowable, with all doubtful points closely scrutinized and illustrated by fictitious cases, would have a tendency to weaken the moral sensibilities of ordinary minds; the greater the industry spent in deducing conclusions from the diverse authorities, the greater necessarily became the number of points on which doctors disagreed; and the central authority that might have repressed serious divergences was wanting in the period of moral weakness[1] that the church went through after the death of Boniface VIII. A plain man perplexed by such disagreements might naturally hold that any opinion maintained by a pious and orthodox writer must be a safe one to follow; and thus weak consciences were subtly tempted to seek the support of authority for some desired relaxation of a moral rule. It does not, however, appear that this danger assumed formidable proportions until after the Reformation; when, in the struggle made by the Catholic church to recover its hold on the world, the principle of authority was, as it were, forced into keen, balanced and prolonged conflict with that of reliance on private judgment. To the Jesuits, the foremost champions in this struggle, it seemed indispensable that the confessional should be made attractive; for this purpose ecclesiastico-moral law must be somehow "accommodated" to worldly needs, and the theory of "Probabilism" supplied a plausible method for effecting this accommodation. The theory proceeded thus: A layman could not be expected to examine minutely into a point on which the learned differed; therefore he could not fairly be blamed for following any opinion that rested on the authority of even a single doctor; therefore his confessor must be authorized to hold him guiltless if any such "probable" opinion could be produced in his favour; nay, it was his duty to suggest such an opinion, even though opposed to his own, if it would relieve the conscience under his charge from a depressing burden. The results to which this Probabilism, applied with an earnest desire to avoid dangerous rigour, led in the 17th century were revealed to the world in the immortal *Lettres provinciales* of Pascal.

The Jesuits.

The Reformation. Transition to modern ethical philosophy.

In tracing the development of casuistry we have been carried beyond the great crisis through which Western Christianity passed in the 16th century. The Reformation which Luther initiated may be viewed on several sides, even if we consider only its ethical principles and effects. It maintained the simplicity of Apostolic Christianity against the elaborate system of a corrupt hierarchy, the teaching of Scripture alone against the commentaries of the fathers and the traditions of the church, the right of private judgment against the dictation of ecclesiastical authority, the individual responsibility of every human soul before God in opposition to the papal control over purgatorial punishments, which had led to the revolting degradation of venal indulgences. Reviving the original antithesis between Christianity and Jewish legalism, it maintained the inwardness of faith to be the sole way to eternal life, in contrast to the outwardness of works; returning to Augustine, and expressing his spirit in a new formula, to resist the Neo-Pelagianism that had gradually developed itself within the apparent Augustinianism of the church, it maintained the total corruption of human nature, as contrasted with that "congruity" by which, according to the schoolmen, divine grace was to be earned; renewing the fervent humility of St Paul, it enforced the universal and absolute imperativeness of all Christian duties, and the inevitable unworthiness of all Christian obedience, in opposition to the theory that "condign" merit might be gained by "supererogatory" conformity to evangelical "counsels." It will be seen that these changes, however profoundly important, were, ethically considered, either negative or quite general, relating to the tone and attitude of mind in which all duty should be done. As regards all positive matter of duty and virtue, and most of the prohibitive code for ordinary men, the tradition of Christian teaching was carried on substantially unchanged by the Reformed churches. Even the old method of casuistry was maintained[2] during the 16th and 17th centuries; though Scriptural texts, interpreted and supplemented by the light of natural reason, now furnished the sole principles on which cases of conscience were decided.

Humanism.

In the 17th century, however, the interest of this quasi-legal treatment of morality gradually faded; and the ethical studies of educated minds were occupied with the attempt, renewed after so many centuries, to find an independent philosophical basis for the moral code. The renewal of this attempt was only indirectly due to the Reformation, it is rather to be connected with the more extreme reaction from the medieval religion which was partly caused by, partly expressed in, that enthusiastic study of the remains of old pagan culture that spread from Italy over Europe in the 15th and 16th centuries. To this "humanism" the Reformation seemed at first more hostile than the Roman hierarchy; indeed, the extent to which this latter had allowed itself to become paganized by the Renaissance was one of the points that especially roused the Reformers' indignation. Not the less important is the indirect stimulus given by the Reformation towards the development of a moral philosophy independent alike of Catholic and Protestant assumptions. Scholasticism, while reviving philosophy as a handmaid to theology, had metamorphosed its method into one resembling that of its mistress; thus shackling the renascent intellectual activity which it stimulated by the double bondage to Aristotle and to the church. When the Reformation shook the traditional authority in one department, the blow was necessarily felt in the other. Not twenty years after Luther's defiance of the pope, the startling thesis "that all that Aristotle taught was false" was prosperously maintained by the youthful Ramus before the university of Paris; and almost contemporaneously the group of remarkable thinkers in Italy who heralded the dawn of modern physical science—Cardanus, Telesio, Patrizzi, Campanella, Bruno—began to propound their Aristotelian theories of the constitution of the physical universe. It was to be foreseen that a similar assertion of independence would make itself heard in ethics also; and, indeed, amid the clash of dogmatic convictions, and the variations of private judgment, it was natural to seek for an ethical method that might claim universal acceptance from all sects.

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[1] The refusal of the council of Constance to condemn Jean Petit's advocacy of assassination is a striking example of this weakness. Cf. Milman, *Lat. Christ.* book xiii. c. 9.

[2] As the chief English casuists we may mention Perkins, Hall, Sanderson, as well as the more eminent Jeremy Taylor, whose *Ductor dubitantium* appeared in 1660.

Grotius.

C. *Modern Ethics.*—The need of such independent principles was most strongly felt in the region of man's civil and political relations, especially the mutual relations of communities. Accordingly we find that modern ethical controversy began in a discussion of the law of nature. Albericus Gentilis (1557–1611) and Hugo Grotius (1583–1645) were the first to give a systematic account. Natural law, according to Grotius and other writers of the age, is that part of divine law which follows from the essential nature of man, who is distinguished from animals by his "appetite" for tranquil association with his fellows, and his tendency to act on general principles. It is therefore as unalterable, even by God himself, as the truths of mathematics, although its effect may be overruled in any particular case by an express command of God, hence it is cognizable *a priori*, from the abstract consideration of human nature, though its existence may be known *a posteriori* also from its universal acceptance in human societies. The conception, as we have seen, was taken from the later Roman jurists, by them, however, the law of nature was conceived as something that underlay existing law, and was to be looked for through it, though it might ultimately supersede it, and in the meanwhile represented an ideal standard, by which improvements in legislation were to be guided. Still the language of the jurists in some passages (cf. *Inst. of Justinian*, ii. 1, 2) clearly implied a period of human history in which men were governed by natural law alone, prior to the institution of civil society. Posidonius had identified this period with the mythical "golden age"; and such ideas easily coalesced with the narrative in Genesis. Thus there had become current the conception of a "state of nature" in which individuals or single families lived side by side—under none other than those "natural" laws which prohibited mutual injury and interference in the free use of the goods of the earth common to all, and upheld parental authority, fidelity of wives, and the observance of compacts freely made. This conception Grotius took, and gave it additional force and solidity by using the principles of this natural law for the determination of international rights and duties, it being obvious that independent nations, in their corporate capacities, were still in that "state of nature" in their mutual relations. It was not, of course, assumed that these laws were universally obeyed; indeed, one point with which Grotius is especially concerned is the natural right of private war, arising out of the violation of more primary rights. Still a general observance was involved in the idea of a natural law as a "dictate of right reason indicating the agreement or disagreement of an act with man's rational and social nature"; and we may observe that it was especially necessary to assume such a general observance in the case of contracts, since it was by an "express or tacit pact" that the right of property (as distinct from the mere right to non-interference during use) was held by him to have been instituted. A similar "fundamental pact" had long been generally regarded as the normal origin of legitimate sovereignty.

The ideas above expressed were not peculiar to Grotius; in particular the doctrine of the "fundamental pact" as the jural basis of government had long been maintained, especially in England, where the constitution historically established readily suggested such a compact. At the same time the rapid and remarkable success of Grotius's treatise (*De jure belli et pacis*) brought his view of Natural Right into prominence, and suggested such questions as—"What is man's ultimate reason for obeying these laws? Wherein exactly does this their agreement with his rational and social nature consist? How far, and in what sense, is his nature really social?"

Hobbes.

It was the answer which Hobbes (1588–1679) gave to these fundamental questions that supplied the starting-point for independent ethical philosophy in England. The nature of this answer was determined by the psychological views to which Hobbes had been led, possibly to some extent under the influence of Bacon,[1] partly perhaps through association with his younger contemporary Gassendi, who, in two treatises, published between the appearance of Hobbes's *De cive* (1642) and that of the *Leviathan* (1651), endeavoured to revive interest in Epicurus. Hobbes's psychology is in the first place materialistic; he holds, that is, that in any of the psychophysical phenomena of human nature the reality is a material process of which the mental feeling is a mere "appearance." Accordingly he regards pleasure as essentially motion "helping vital action," and pain as motion "hindering" it. There is no logical connexion between this theory and the doctrine that appetite of desire has always pleasure (or the absence of pain) for its object, but a materialist, framing a system of psychology, will naturally direct his attention to the impulses arising out of bodily wants, whose obvious end is the preservation of the agent's organism; and this, together with a philosophic wish to simplify, may lead him to the conclusion that all human impulses are similarly self-regarding. This, at any rate, is Hobbes's cardinal doctrine in moral psychology, that each man's appetites or desires are naturally directed either to the preservation of his life, or to that heightening of it which he feels as pleasure.[2] Hobbes does not distinguish instinctive from deliberate pleasure-seeking; and he confidently resolves the most apparently unselfish emotions into phases of self-regard. Pity he finds to be grief for the calamity of others, arising from imagination of the like calamity befalling oneself; what we admire with seeming disinterestedness as beautiful (*pulchrum*) is really "pleasure in promise"; when men are not immediately seeking present pleasure, they desire power as a means to future pleasure, and thus have a derivative delight in the exercise of power that prompts to what we call benevolent action. Since, then, all the voluntary actions of men tend to their own preservation or pleasure, it cannot be reasonable to aim at anything else; in fact, nature rather than reason fixes this as the end of human action; it is reason's function to show the means. Hence if we ask why it is reasonable for any individual to observe the rules of social behaviour that are commonly called moral, the answer is obvious that this is only indirectly reasonable, as a means to his own preservation or pleasure. It is not, however, in this, which is only the old Cyrenaic or Epicurean answer, that the distinctive point of Hobbism lies. It is rather in the doctrine that even this indirect reasonableness of the most fundamental moral rules is entirely conditional on their general observance, which cannot be secured apart from government. For example, it is not reasonable for me to perform my share of a contract, unless I have reason for believing that the other party will perform his; and this I cannot have, except in a society in which he will be punished for non-performance. Thus the ordinary rules of social behaviour are only hypothetically obligatory; they are actualized by the establishment of a "common power" that may "use the strength and means of all" to enforce on all the observance of rules tending to the common benefit. On the other hand Hobbes yields to no one in maintaining the paramount importance of moral regulations. The precepts of good faith, equity, requital of benefits, forgiveness of wrong so far as security allows, the prohibition of contumely, pride, arrogance,—which may all be summed up in the formula, "Do not that to another which thou wouldest not have done to thyself" (*i.e.* the negative of the "golden rule")—he still calls "immutable and eternal laws of nature"—meaning that, though a man is not unconditionally bound to realize them, he is, as a reasonable being, bound to desire that they should be realized. The pre-social state of man, in his view, is also pre-moral; but it is therefore utterly miserable. It is a state in which every one has a right to everything that may conduce to his preservation;[1] but it is therefore also a state of war—a state so wretched that it is the first dictate of rational self-love to emerge from it into social peace and order. Hence Hobbes's ideal constitution naturally comes to be an unquestioned and unlimited—though not necessarily monarchical—despotism. Whatever the government declares to be just or unjust must be accepted as such, since to dispute its dictates would be the first step towards anarchy, the one paramount peril outweighing all particular defects in legislation and administration. It is perhaps easy to understand how, in the crisis of 1640, when the ethico-political system of Hobbes first took written shape, a peace-loving philosopher should regard the claims of individual conscience as essentially anarchical, and dangerous to social well-being; but however strong might be men's yearning for order, a view of social duty, in which the only fixed positions were selfishness everywhere and unlimited power somewhere, could not but appear offensively paradoxical.

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[1] This influence was not exercised in the region of ethics. Bacon's brief outline of moral philosophy (in the *Advancement of Learning*, ii. 20-22) is highly pregnant and suggestive. But Bacon's great task of reforming scientific method was one which, as he conceived it, left morals on one side; he never made any serious effort to reduce his ethical views to a coherent system, methodically reasoned on an independent basis. The outline given in the *Advancement* was never filled in, and does not seem to have had any effect on the subsequent course of ethical speculation.

[2] He even identifies the desire with the pleasure, apparently regarding the stir of appetite and that of fruition as two parts of the same "motion."

There was, however, in his theory an originality, a force, an apparent coherence which rendered it undeniably impressive; in fact, we find that for two generations the efforts to construct morality on a philosophical basis take more or less the form of answers to Hobbes. From an ethical point of view Hobbism divides itself naturally into two parts, which by Hobbes's peculiar political doctrines are combined into a coherent whole, but are not otherwise necessarily connected. Its theoretical basis is the principle of egoism; while, for practically determining the particulars of duty it makes morality entirely dependent on positive law and institution. It thus affirmed the relativity of good and evil in a double sense; good and evil, for any individual citizen, may from one point of view be defined as the objects respectively of his desire and his aversion; from another, they may be said to be determined for him by his sovereign. It is this latter aspect of the system which is primarily attacked by the first generation of writers that replied to Hobbes. This attack, or rather the counter-exposition of orthodox doctrine, is conducted on different methods by the Cambridge moralists and by Cumberland respectively. Cumberland is content with the legal view of morality, but endeavours to establish the validity of the laws of nature by taxing them on the single supreme principle of rational regard for the "common good of all," and showing them, as so based, to be adequately supported by the divine sanction. The Cambridge school, regarding morality primarily as a body of truth rather than a code of rules, insist on its absolute character and intuitive certainty.

The Cambridge moralists. Cudworth.

Cudworth was the most distinguished of the little group of thinkers at Cambridge in the 17th century, commonly known as the Cambridge Platonists (*q.v.*). In his treatise on *Eternal and Immutable Morality* his main aim is to maintain the "essential and eternal distinctions of good and evil" as independent of mere will, whether human or divine. These distinctions, he insists, have an objective reality, cognizable by reason no less than the relations of space or number; and he endeavours to refute Hobbism—which he treats as a "novantique philosophy," a mere revival of the relativism of Protagoras—chiefly by the following *argumentum ad hominem.* He argues that Hobbes's atomic materialism involves the conception of an objective physical world, the object not of passive sense that varies from man to man, but of the active intellect that is the same in all; there is therefore, he urges, an inconsistency in refusing to admit a similar exercise of intellect in morals, and an objective world of right and wrong, which the mind by its normal activity clearly apprehends as such.

More.

Cudworth, in the work above mentioned, gives no systematic exposition of the ethical principles which he holds to be thus intuitively apprehended. But we may supply this deficiency from the *Enchiridion Ethicum* of Henry More, another thinker of the same school. More gives a list of 23 *Noemata Moralia*, the truth of which will, he says, be immediately manifest. Some of these admit of a purely egoistic application, and appear to be so understood by the author—as (*e.g.*) that goods differ in quality as well as in duration, and that the superior good or the lesser evil is always to be preferred; that absence of a given amount of good is preferable to the presence of equivalent evil; that future good or evil is to be regarded as much as present, if equally certain, and nearly as much if very probable. Objections, both general and special, might be urged by a Hobbist against these modes of formulating man's natural pursuit of self-interest; but the serious controversy between Hobbism and modern Platonism related not to such principles as these, but to others which demand from the individual a (real or apparent) sacrifice for his fellows. Such are the evangelical principle of "doing as you would be done by"; the principle of justice, or "giving every man his own, and letting him enjoy it without interference"; and especially what More states as the abstract formula of benevolence, that "if it be good that one man should be supplied with the means of living well and happily, it is mathematically certain that it is doubly good that two should be so supplied, and so on." The question, however, still remains, what motive any individual has to conform to these social principles when they conflict with his natural desires. To this Cudworth gives no explicit reply, and the answer of More is hardly clear. On the one hand he maintains that these principles express an absolute good, which is to be called intellectual because its essence and truth are apprehended by the intellect We might infer from this that the intellect, so judging, is itself the proper and complete determinant of the will, and that man, as a rational being, ought to aim at the realization of absolute good for its own sake. In spite, however, of possible inferences from his definition of virtue, this does not seem to be really More's view. He explains that though absolute good is discerned by the intellect, the "sweetness and flavour" of it is apprehended, not by the intellect proper, but by what he calls a "boniform faculty"; and it is in this sweetness and flavour that the motive to virtuous conduct lies; ethics is the "art of living well and happily," and true happiness lies in "the pleasure which the soul derives from the sense of virtue." In short, More's Platonism appears to be really as hedonistic as Hobbism; only the feeling to which it appeals as ultimate motive is of a kind that only a mind of exceptional moral refinement can habitually feel with the decisive intensity required.

It is to be observed that though More lays down the abstract principle of regarding one's neighbour's good as much as one's own with the full breadth with which Christianity inculcates it, yet when he afterwards comes to classify virtues he is too much under the influence of Platonic-Aristotelian thought to give a distinct place to benevolence, except under the old form of liberality. In this respect his system presents a striking contrast to Cumberland's, whose treatise *De Legibus Naturae*

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[1] In spite of Hobbes's uncompromising egoism, there is a noticeable discrepancy between his theory of the ends that men naturally seek and his standard for determining their natural rights. This latter is never Pleasure simply, but always Preservation—though on occasion he enlarges the notion of "preservation" into "preservation of life so as not to be weary of it." His view seems to be that in a state of nature *most* men *will* fight, rob, &c., "for delectation merely" or "for glory," and that hence all men must be allowed an indefinite right to fight, rob, &c., "for preservation."

Cumberland.

(1672), though written like More's in Latin, is yet in its ethical matter thoroughly modern. Cumberland is a thinker both original and comprehensive, and, in spite of defects in style and clearness, he is noteworthy as having been the first to lay down that "regard for the common good of all" is the supreme rule of morality or law of nature. So far he may be fairly called the precursor of later utilitarianism. His fundamental principle and supreme "Law of Nature" is thus stated: "The greatest possible benevolence of every rational agent towards all the rest constitutes the happiest state of each and all, so far as depends on their own power, and is necessarily required for their happiness; accordingly Common Good will be the Supreme Good." It is, however, important to notice that in his "good" is included not merely happiness but "perfection"; and he does not even define perfection so as to exclude from it the notion of absolute moral perfection and save his theory from an obvious logical circle. A notion so vague could not possibly be used with any precision for determining the subordinate rules of morality; but in fact Cumberland does not attempt this; his supreme principle is designed not to rectify, but merely to support and systematize, common morality. This principle, as was said, is conceived as strictly a law, and therefore referred to a lawgiver, God, and provided with a sanction in its effects on the agent's happiness. That the divine will is expressed by it, Cumberland, "not being so fortunate as to possess innate ideas," tries to prove by a long inductive examination of the evidences of man's essential sociality exhibited in his physical and mental constitution. His account of the sanction, again, is sufficiently comprehensive, including both the internal and the external rewards of virtue and punishments of vice; and he, like later utilitarians, explains moral obligation to lie in the force exercised on the will by these sanctions; but as to the precise manner in which individual is implicated with universal good, and the operation of either or both in determining volition, his view is indistinct if not actually inconsistent.

Locke.

The clearness which we seek in vain from Cumberland is found to the fullest extent in Locke, whose *Essay on the Human Understanding* (1690) was already planned when Cumberland's treatise appeared. Yet Locke's ethical opinions have been widely misunderstood; since from a confusion between "innate ideas" and "intuitions," which has been common in recent ethical discussion, it has been supposed that the founder of English empiricism must necessarily have been hostile to "intuitional" ethics. The truth is that, while Locke agrees entirely with Hobbes as to the egoistic basis of rational conduct, and the interpretation of "good" and "evil" as "pleasure" and "pain," or that which is productive of pleasure and pain, he yet agrees entirely with Hobbes's opponents in holding ethical rules to be actually obligatory independently of political society, and capable of being scientifically constructed on principles intuitively known,—though he does not regard these principles as implanted in the mind at birth. The aggregate of such rules he conceives as the law of God, carefully distinguishing it, not only from civil law, but from the law of opinion or reputation, the varying moral standard by which men actually distribute praise and blame; as being divine it is necessarily sanctioned by adequate rewards and punishments. He does not, indeed, speak of the scientific construction of this code as having been actually effected, but he affirms its possibility in language remarkably strong and decisive. "The idea," he says, "of a Supreme Being, infinite in power, goodness, and wisdom, whose workmanship we are, and upon whom we depend, and the idea of ourselves, as understanding rational beings, being such as are clear in us, would, I suppose, if duly considered and pursued, afford such foundations of our duty and rules of action, as might place morality among the sciences capable of demonstration; wherein, I doubt not, but from self-evident propositions, by necessary consequences as incontestable as those in mathematics, the measure of right and wrong might be made out." As Locke cannot consistently mean by God's "goodness" anything but the disposition to give pleasure, it might be inferred that the ultimate standard of right rules of action ought to be the common happiness of the beings affected by the action; but Locke does not explicitly adopt this standard. The only instances which he gives of intuitive moral truths are the purely formal propositions, "No government allows absolute liberty," and "Where there is no property there is no injustice,"—neither of which has any evident connexion with the general happiness. As regards his conception of the Law of Nature, he takes it in the main immediately from Grotius and Pufendorf, more remotely from the Stoics and the Roman jurists.

Clarke.

We might give, as a fair illustration of Locke's general conception of ethics, a system which is frequently represented as diametrically opposed to Lockism; namely, that expounded in Clarke's Boyle lectures on the *Being and Attributes of God* (1704). It is true that Locke is not particularly concerned with the ethico-theological proposition which Clarke is most anxious to maintain,—that the fundamental rules of morality are independent of arbitrary will, whether divine or human. But in his general view of ethical principles as being, like mathematical principles,[1] essentially truths of relation, Clarke is quite in accordance with Locke; while of the four fundamental rules that he expounds, Piety towards God, Equity, Benevolence and Sobriety (which includes self-preservation), the first is obtained, just as Locke suggests, by "comparing the idea" of man with the idea of an infinitely good and wise being on whom he depends; and the second and third are axioms self-evident on the consideration of the equality or similarity of human individuals as such. The principle of equity—that "whatever I judge reasonable or unreasonable for another to do for me, that by the same I declare reasonable or unreasonable that I in the like case should do for him," is merely a formal statement of the golden rule of the gospel. We may observe that, in stating the principle of benevolence, "since the greater good is always most fit and reasonable to be done, every rational creature ought to do all the good it can to its fellow-creatures," Clarke avowedly follows Cumberland, from whom he quotes the further sentence that "universal love and benevolence is as plainly the most direct, certain and effectual means to this good as the flowing of a point is to produce a line." The quotation may remind us that the analogy between ethics and mathematics ought to be traced further back than Locke; in fact, it results from the influence exercised by Cartesianism over English thought generally, in the latter half of the 17th century. It must be allowed that Clarke is misled by the analogy to use general ethical terms ("fitness," "agreement" of things, &c.), which overlook the essential distinction between what is and what ought to be; and even in one or two expressions to overleap this distinction extravagantly, as (*e.g.*) in saying that the man who "wilfully acts contrary to justice wills things to be what they are not and cannot be." What he really means is less paradoxically stated in the general proposition that "originally and in reality it is natural and (morally speaking) necessary that the will should be determined in every action by the reason of the thing and the right of the case, as it is natural and (absolutely speaking) necessary that the understanding should submit to a demonstrated truth." But though it is an essential point in Clarke's view that what is right is to be done as such, apart from any consideration of pleasure or pain, it is to be inferred that he is not prepared to apply this doctrine in its unqualified form to such a creature as man, who is partly under the influence of irrational impulses. At least when he comes to argue the need of future rewards and punishments we find that his claim on behalf of morality is startlingly reduced. He now only contends that "virtue deserves to be chosen for its own sake, and vice to be avoided, though a man was sure for his own particular neither to gain nor lose anything by the practice of either." He fully admits that the question is altered when vice is attended by pleasure and profit to the vicious man, virtue by loss and calamity; and even that it is "not truly reasonable that men by adhering to virtue should part with their lives, if thereby they deprived themselves of all possibility of receiving any advantage from their adherence."

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[1] It should be noticed, however, that it is only in his treatment of Equity and Benevolence that he really follows out the mathematical analogy (cf. Sidgwick's *History of Ethics*, 5th ed., pp. 180-181).

Thus, on the whole, the impressive earnestness with which Clarke enforces the doctrine of rational morality only rendered more manifest the difficulty of establishing ethics on an independent philosophical basis; so long at least as the psychological egoism of Hobbes is not definitely assailed and overthrown. Until this is done, the utmost demonstration of the abstract reasonableness of social duty only leaves us with an irreconcilable antagonism between the view of abstract reason and the self-love which is allowed to be the root of man's appetitive nature. Let us grant that there is as much intellectual absurdity in acting unjustly as in denying that two and two make four; still, if a man has to choose between absurdity and unhappiness, he will naturally prefer the former; and Clarke, as we have already seen, is not really prepared to maintain that such preference is irrational.[1]

Shaftesbury.

It remains to try another psychological basis for ethical construction; instead of presenting the principle of social duty as abstract reason, liable to conflict to any extent with natural self-love, we may try to exhibit the naturalness of man's social affections, and demonstrate a normal harmony between these and his self-regarding impulses. This is the line of thought which Shaftesbury (1671–1713) may be said to have initiated. This theory had already been advanced by Cumberland and others, but Shaftesbury was the first to make it the cardinal point in his system; no one had yet definitely transferred the centre of ethical interest from the Reason, conceived as apprehending either abstract moral distinctions or laws of divine legislation, for the emotional impulses that prompt to social duty; no one had undertaken to distinguish clearly, by analysis of experience, the disinterested and self-regarding elements of our appetitive nature, or to prove inductively their perfect harmony. In his *Inquiry concerning Virtue and Merit* he begins by attacking the egoism of Hobbes, which, as we have seen, was not necessarily excluded by the doctrine of rational intuitions of duty. This interpretation, he says, would be true only if we considered man as a wholly unrelated individual. Such a being we might doubtless call "good," if his impulses were adapted to the attainment of his own felicity. But man we must and do consider in relation to a larger system of which he forms a part, and so we call him "good" only when his impulses and dispositions are so balanced as to tend towards the good of this whole. And again we do not attribute goodness to him merely because his outward acts have beneficial results. When we speak of a man as good, we mean that his dispositions or affections are such as tend of themselves to promote the good or happiness of human society. Hobbes's moral man, who, if let loose from governmental constraint, would straightway spread ruin among his fellows, is not what we commonly agree to call good. Moral goodness, then, in a "sensible creature" implies primarily disinterested affections, whose direct object is the good of others; but Shaftesbury does not mean (as he has been misunderstood to mean) that only such benevolent social impulses are good, and that these are always good. On the contrary, he is careful to point out, first, that immoderate social affections defeat themselves, miss their proper end, and are therefore bad; secondly, that as an individual's good is part of the good of the whole "self-affections" existing in a duly limited degree are morally good. Goodness, in short, consists in due combination, in just proportion, of both sorts of "affections," tendency to promote general good being taken as the criterion of the right degrees and proportions. This being established, the main aim of Shaftesbury's argument is to prove that the same balance of private and social affections, which tends naturally to public good, is also conducive to the happiness of the individual in whom it exists. Taking the different impulses in detail, he first shows how the individual's happiness is promoted by developing his social affections, mental pleasures being superior to bodily, and the pleasures of benevolence the richest of all. In discussing this he distinguishes, with well-applied subtlety, between the pleasurableness of the benevolent emotions themselves, the sympathetic enjoyment of the happiness of others, and the pleasure arising from a consciousness of their love and esteem. He then exhibits the unhappiness that results from any excess of the self-regarding impulses, bodily appetite, desire of wealth, emulation, resentment, even love of life itself; and ends by dwelling on the intrinsic painfulness of all malevolence.[2]

One more special impulse remains to be noticed. We have seen that goodness of character consists in a certain harmony of self-regarding and social affections. But virtue, in Shaftesbury's view, is something more; it implies a recognition of moral goodness and immediate preference of it for its own sake. This immediate pleasure that we take in goodness (and displeasure in its opposite) is due to a susceptibility which he calls the "reflex" or "moral" sense, and compares with our susceptibility to beauty and deformity in external things; it furnishes both an additional direct impulse to good conduct, and an additional gratification to be taken into account in the reckoning which proves the coincidence of virtue and happiness. This doctrine of the moral sense is sometimes represented as Shaftesbury's cardinal tenet; but though characteristic and important, it is not really necessary to his main argument; it is the crown rather than the keystone of his ethical structure.

Mandeville.

The appearance of Shaftesbury's *Characteristics* (1713) marks a turning-point in the history of English ethical thought. With the generation of moralists that followed, the consideration of abstract rational principles falls into the background, and its place is taken by introspective study of the human mind, observation of the actual play of its various impulses and sentiments. This empirical psychology had not indeed been neglected by previous writers. More, among others, had imitated Descartes in a discussion of the passions, and Locke's essay had given a still stronger impulse in the same direction; still, Shaftesbury is the first moralist who distinctly takes psychological experience as the basis of ethics. His suggestions were developed by Hutcheson into one of the most elaborate systems of moral philosophy which we possess; through Hutcheson, if not directly, they influenced Hume's speculations, and are thus connected with later utilitarianism. Moreover, the substance of Shaftesbury's main argument was adopted by Butler, though it could not pass the scrutiny of that powerful and cautious intellect without receiving important modifications and additions. On the other hand, the ethical optimism of Shaftesbury, rather broadly impressive than exactly reasoned, and connected as it was with a natural theology that implied the Christian scheme to be superfluous, challenged attack equally from orthodox divines and from cynical freethinkers. Of these latter Mandeville, the author of *The Fable of the Bees, or Private Vices Public Benefits* (1723), was a conspicuous if not a typical specimen. He can hardly be called a "moralist"; and though it is impossible to deny him a considerable share of philosophic penetration, his anti-moral paradoxes have not even apparent coherence. He is convinced that virtue (where it is more than a mere pretence) is purely artificial; but not quite certain whether it is a useless trammel of appetites and passions that are advantageous to society, or a device creditable to the politicians who introduced it by playing upon the "pride and vanity" of the "silly creature man." The view, however, to which he gave audacious expression, that moral regulation is something alien to the natural man, and imposed on him from without, seems to have been very current in the polite society of his time, as we learn both from Berkeley's *Alciphron* and from Butler's more famous sermons.

The view of "human nature" against which Butler preached was not exactly Mandeville's, nor was it properly to be called

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[1] It should be observed that, while Clarke is sincerely anxious to prove that most principles are binding independently of Divine appointment, he is no less concerned to show that morality requires the practical support of revealed religion.

[2] Three classes of impulses are thus distinguished by Shaftesbury:—(1) "Natural Affections," (2) "Self-affections," and (3) "Unnatural Affections." Their characteristics are further considered in the *History of Ethics*, p. 186 seq.

Butler.

Hobbist, although Butler fairly treats it as having a philosophical basis in Hobbes's psychology. It was, so to say, Hobbism turned inside out,—rendered licentious and anarchical instead of constructive. Hobbes had said "the natural state of man is non-moral, unregulated; moral rules are means to the end of peace, which is a means to the end of self-preservation." On this view morality, though dependent for its actuality on the social compact which establishes government, is actually binding on man as a reasonable being. But the quasi-theistic assumption that what is natural must be reasonable remained in the minds of Hobbes's most docile readers, and in combination with his thesis that egoism is natural, tended to produce results which were dangerous to social well-being. To meet this view Butler does not content himself, as is sometimes carelessly supposed, with insisting on the natural claim to authority of the conscience which his opponent repudiated as artificial; he adds a subtle and effective argument *ad hominem*. He first follows Shaftesbury in exhibiting the social affections as no less natural than the appetites and desires which tend directly to self-preservation; then reviving the Stoic view of the *prima naturae*, the first objects of natural appetites, he argues that pleasure is not the primary aim even of the impulses which Shaftesbury allowed to be "self-affections"; but rather a result which follows upon their attaining their natural ends. We have, in fact, to distinguish self-love, the "general desire that every man hath of his own happiness" or pleasure, from the particular affections, passions, and appetites directed towards objects other than pleasure, in the satisfaction of which pleasure consists. The latter are "necessarily presupposed" as distinct impulses in "the very idea of an interested pursuit"; since, if there were no such pre-existing desires, there would be no pleasure for self-love to aim at. Thus the object of hunger is not the pleasure of eating but food; hunger is therefore, strictly speaking, no more "interested" than benevolence; granting that the pleasures of the table are an important element in the happiness at which self-love aims, the same at least may be said for the pleasures of love and sympathy. Further, so far from bodily appetites (or other particular desires) being forms of self-love, there is no one of them which under certain circumstances may not come into conflict with it. Indeed, it is common for men to sacrifice to passion what they know to be their true interests; at the same time we do not consider such conduct "natural" in man as a rational being; we rather regard it as natural for him to govern his transient impulses. Thus the notion of natural unregulated egoism turns out to be a psychological chimera. Indeed, we may say that an egoist must be doubly self-regulative, since rational self-love ought to restrain not only other impulses, but itself also; for as happiness is made up of feelings that result from the satisfaction of impulses other than self-love, any over-development of the latter, enfeebling these other impulses, must proportionally diminish the happiness at which self-love aims. If, then, it be admitted that human impulses are naturally under government, the natural claim of conscience or the moral faculty to be the supreme governor will hardly be denied.

But has not self-love also, by Butler's own account, a similar authority, which may come into conflict with that of conscience? Butler fully admits this, and, in fact, grounds on it an important criticism of Shaftesbury. We have seen that in the latter's system the "moral sense" is not absolutely required, or at least is necessary only as a substitute for enlightened self-regard; since if the harmony between prudence and virtue, self-regarding and social impulses, is complete, mere self-interest will prompt a duly enlightened mind to maintain precisely that "balance" of affections in which goodness consists. But to Butler's more cautious mind the completeness of this harmony did not seem sufficiently demonstrable to be taken as a basis of moral teaching; he has at least to contemplate the possibility of a man being convinced of the opposite; and he argues that unless we regard conscience as essentially authoritative—which is not implied in the term "moral sense"—such a man is really bound to be vicious; "since interest, one's own happiness, is a manifest obligation." Still on this view, even if the authority of conscience be asserted, we seem reduced to an ultimate dualism of our rational nature. Butler's ordered polity of impulses turns out to be a polity with two independent governments. Butler does not deny this, so far as mere claim to authority is concerned;[1] but he maintains that, the dictates of conscience being clear and certain, while the calculations of self-interest lead to merely probable conclusions, it can never be practically reasonable to disobey the former, even apart from any proof which religion may furnish of the absolute coincidence of the two in a future life.

Wollaston.

This dualism of governing principles, conscience and self-love, in Butler's system, and perhaps, too, his revival of the Platonic conception of human nature as an ordered and governed community of impulses, is perhaps most nearly anticipated in Wollaston's *Religion of Nature Delineated* (1722). Here, for the first time, we find "moral good" and "natural good" or "happiness" treated separately as two essentially distinct objects of rational pursuit and investigation; the harmony between them being regarded as matter of religious faith, not moral knowledge. Wollaston's theory of moral evil as consisting in the practical contradiction of a true proposition, closely resembles the most paradoxical part of Clarke's doctrine, and was not likely to approve itself to the strong common sense of Butler; but his statement of happiness or pleasure as a "justly desirable" end at which every rational being "ought" to aim corresponds exactly to Butler's conception of self-love as a naturally governing impulse; while the "moral arithmetic" with which he compares pleasures and pains, and endeavours to make the notion of happiness quantitatively precise, is an anticipation of Benthamism.

Hutcheson.

There is another side of Shaftesbury's harmony which Butler was ultimately led to oppose in a more decided manner,—the opposition, namely, between conscience or the moral sense and the social affections. In the *Sermons*, indeed (1729), Butler seems to treat conscience and calm benevolence as permanently allied though distinct principles, but in the *Dissertation on Virtue*, appended to the *Analogy* (1739), he maintains that the conduct dictated by conscience will often differ widely from that to which mere regard for the production of happiness would prompt. We may take this latter treatise as representing the first in the development of English ethics, at which what were afterwards called "utilitarian" and "intuitional" morality were first formally opposed; in earlier systems the antithesis is quite latent, as we have incidentally noticed in the case of Cumberland and Clarke. The argument in Butler's dissertation was probably directed chiefly against Hutcheson, who in his *Inquiry into the Original of our Ideas of Beauty and Virtue* had definitely identified virtue with benevolence. The identification is slightly qualified in Hutcheson's posthumously published *System of Moral Philosophy* (1755), in which the general view of Shaftesbury is more fully developed, with several new psychological distinctions, including Butler's separation of "calm" benevolence—as well as, after Butler, "calm self-love"—from the "turbulent" passions, selfish or social. Hutcheson follows Butler again in laying stress on the regulating and controlling function of the moral sense; but he still regards "kind affections" as the principal objects of moral approbation—the "calm" and "extensive" affections being preferred to the turbulent and narrow—together with the desire and love of moral excellence which is ranked with universal benevolence, the two being equally worthy and necessarily harmonious. Only in a secondary sense is approval due to certain "abilities and dispositions immediately connected with virtuous affections," as candour, veracity, fortitude, sense of honour; while in a lower grade still are placed sciences and arts, along with even bodily skills and gifts; indeed, the approbation we give to these is not strictly moral, but is referred to the "sense of decency or dignity," which (as well as the sense of honour) is to be distinguished from the moral sense. Calm self-love Hutcheson regards as morally indifferent; though he enters into a careful analysis of the elements of happiness,[1] in order to show that a true regard for private interest always coincides with the moral sense and with benevolence. While thus maintaining Shaftesbury's "harmony" between public and private good, Hutcheson is still more careful to establish the strict disinterestedness of benevolent affections. Shaftesbury had conclusively shown that these were not in the vulgar sense selfish; but the very stress which he lays on the pleasure inseparable from their exercise suggests a subtle egoistic theory which he does not expressly exclude, since it may be said that this "intrinsic reward" constitutes the real motive of the benevolent man. To this Hutcheson replies that no doubt the exquisite delight of the emotion of love is a motive to sustain and develop it; but this pleasure cannot be directly obtained, any more than other pleasures, by merely desiring it; it can be sought only by the indirect method of cultivating and indulging the disinterested desire for others' good, which is thus obviously distinct from the desire for the pleasure of benevolence. He points to the fact that the imminence of death often intensifies instead of diminishing a man's desire for the welfare of those he loves, as a crucial experiment proving the disinterestedness of love; adding, as confirmatory evidence, that the sympathy and admiration commonly felt for self-sacrifice depends on the belief that it is something different from refined self-seeking.

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[1] In a remarkable passage near the close of his eleventh sermon Butler seems even to allow that conscience would have to give way to self-love, if it were possible (which it is not) that the two should come into ultimate and irreconcilable conflict.

It remains to consider how, from the doctrine that affection is the proper object of approbation, we are to deduce moral rules or "natural laws" prescribing or prohibiting outward acts. It is obvious that all actions conducive to the general good will deserve our highest approbation if done from disinterested benevolence; but how if they are not so done? In answering this question, Hutcheson avails himself of the scholastic distinction between "material" and "formal" goodness. "An action," he says, "is *materially* good when in fact it tends to the interest of the system, so far as we can judge of its tendency, or to the good of some part consistent with that of the system, whatever were the affections of the agent. An action is *formally* good when it flowed from good affection in a just proportion." On the pivot of this distinction Hutcheson turns round from the point of view of Shaftesbury to that of later utilitarianism. As regards "material" goodness of actions, he adopts explicitly and unreservedly the formula afterwards taken as fundamental by Bentham; holding that "that action is best which procures the greatest happiness for the greatest numbers, and the worst which in a like manner occasions misery." Accordingly his treatment of external rights and duties, though decidedly inferior in methodical clearness and precision, does not differ in principle from that of Paley or Bentham, except that he lays greater stress on the immediate conduciveness of actions to the happiness of individuals, and more often refers in a merely supplementary or restrictive way to their tendencies in respect of general happiness. It may be noticed, too, that he still accepts the "social compact" as the natural mode of constituting government, and regards the obligations of subjects to civil obedience as normally dependent on a tacit contract; though he is careful to state that consent is not absolutely necessary to the just establishment of beneficent government, nor the source of irrevocable obligation to a pernicious one.

Hume.

An important step further in political utilitarianism was taken by Hume in his *Treatise on Human Nature* (1739). Hume concedes that a compact is the natural means of peacefully instituting a new government, and may therefore be properly regarded as the ground of allegiance to it at the outset; but he urges that, when once it is firmly established the duty of obeying it rests on precisely the same combination of private and general interests as the duty of keeping promises; it is therefore absurd to base the former on the latter. Justice, veracity, fidelity to compacts and to governments, are all coordinate; they are all "artificial" virtues, due to civilization, and not belonging to man in his "ruder and more natural" condition; our approbation of all alike is founded on our perception of their useful consequences. It is this last position that constitutes the fundamental difference between Hutcheson's ethical doctrine and Hume's.[2] The former, while accepting utility as the criterion of "material goodness," had adhered to Shaftesbury's view that dispositions, not results of action, were the proper object of moral approval; at the same time, while giving to benevolence the first place in his account of personal merit, he had shrunk from the paradox of treating it as the sole virtue, and had added a rather undefined and unexplained train of qualities,—veracity, fortitude, activity, industry, sagacity,—immediately approved in various degrees by the "moral sense" or the "sense of dignity." This naturally suggested to a mind like Hume's, anxious to apply the experimental method to psychology, the problem of reducing these different elements of personal merit—or rather our approval of them—to some common principle. The old theory that referred this approval entirely to self-love, is, he holds, easy to disprove by "crucial experiments" on the play of our moral sentiments; rejecting this, he finds the required explanation in the sympathetic pleasure that attends our perception of the conduciveness of virtue to the interests of human beings other than ourselves. He endeavours to establish this inductively by a survey of the qualities, commonly praised as virtues, which he finds to be always either useful or immediately agreeable, either (1) to the virtuous agent himself or (2) to others. In class (2) he includes, besides the Benevolence of Shaftesbury and Hutcheson, the useful virtues, Justice, Veracity and Fidelity to compacts; as well as such immediately agreeable qualities as politeness, wit, modesty and even cleanliness. The most original part of his discussion, however, is concerned with qualities immediately useful to their possessor. The most cynical man of the world, he says, with whatever "sullen incredulity" he may repudiate virtue as a hollow pretence, cannot really refuse his approbation to "discretion, caution, enterprise, industry, frugality, economy, good sense, prudence, discernment"; nor again, to "temperance, sobriety, patience, perseverance, considerateness, secrecy, order, insinuation, address, presence of mind, quickness of conception, facility of expression." It is evident that the merit of these qualities in our eyes is chiefly due to our perception of their tendency to serve the person possessed of them; so that the cynic in praising them is really exhibiting the unselfish sympathy of which he doubts the existence. Hume admits the difficulty that arises, especially in the case of the "artificial" virtues, such as justice, &c., from the undeniable fact that we praise them and blame their opposites without consciously reflecting on useful or pernicious consequences; but considers that this may be explained as an effect of "education and acquired habits."[3]

So far the moral faculty has been considered as contemplative rather than active; and this, indeed, is the point of view from which Hume mainly regards it. If we ask what actual motive we have for virtuous conduct, Hume's answer is not quite clear. On the one hand, he speaks of moral approbation as derived from "humanity and benevolence," while expressly recognizing, after Butler, that there is a strictly disinterested element in our benevolent impulses (as also in hunger, thirst, love of fame and other passions). On the other hand, he does not seem to think that moral sentiment or "taste" can "become a motive to action," except as it "gives pleasure or pain, and thereby constitutes happiness or misery." It is difficult to make these views quite consistent; but at any rate Hume emphatically maintains that "*reason* is no motive to action," except so far as it "directs the impulse received from appetite or inclination";

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[1] It is worth noticing that Hutcheson's express definition of the object of self-love includes "perfection" as well as "happiness"; but in the working out of his system he considers private good exclusively as happiness or pleasure.

[2] Hume's ethical view was finally stated in his *Inquiry into the Principles of Morals* (1751), which is at once more popular and more purely utilitarian than his earlier work.

[3] Hume remarks that in some cases, by "association of ideas," the rule by which we praise and blame is extended beyond the principle of utility from which it arises; but he allows much less scope to this explanation in his second treatise than in his first.

and recognizes—in his later treatise at least—no "obligation" to virtue, except that of the agent's interest or happiness. He attempts, however, to show, in a summary way, that all the duties which his moral theory recommends are also "the true interest of the individual,"—taking into account the importance to his happiness of "peaceful reflection on one's own conduct."

But even if we consider the moral consciousness merely as a particular kind of pleasurable emotion, there is an obvious question suggested by Hume's theory, to which he gives no adequate answer. If the essence of "moral taste" is sympathy with the pleasure of others, why is not this specific feeling excited by other things beside virtue that tend to cause such pleasure? On this point Hume contents himself with the vague remark that "there are a numerous set of passions and sentiments, of which thinking rational beings are by the original constitution of nature the only proper objects." The truth is, that Hume's notion of moral approbation was very loose, as is sufficiently shown by the list of "useful and agreeable" qualities which he considers worthy of approbation.[1] It is therefore hardly surprising that his theory should leave the specific quality of the moral sentiments a fact still needing to be explained. An original and ingenious solution of this problem was offered by his contemporary Adam Smith, in his *Theory of Moral Sentiments* (1759).

Adam Smith.

Without denying the actuality or importance of that sympathetic pleasure in the perceived or inferred effects of virtues and vices he yet holds that the essential part of common moral sentiment is constituted rather by a more direct sympathy with the impulses that prompt to action or expression. The spontaneous play of this sympathy he treats as an original and inexplicable fact of human nature, but he considers that its action is powerfully sustained by the pleasure that each man finds in the accord of his feelings with another's. By means of this primary element, compounded in various ways, Adam Smith explains all the phenomena of the moral consciousness. He takes first the semi-moral notion of "propriety" or "decorum," and endeavours to show inductively that our application of this notion to the social behaviour of another is determined by our degree of sympathy with the feeling expressed in such behaviour. Thus the prescriptions of good taste in the expression of feeling may be summed up in the principle, "reduce or raise the expression to that with which spectators will sympathize." When the effort to restrain feeling is exhibited in a degree which surprises as well as pleases, it excites admiration as a virtue or excellence; such excellences Adam Smith quaintly calls the "awful and respectable," contrasting them with the "amiable virtues" which consist in the opposite effort to sympathize, when exhibited in a remarkable degree. From the sentiments of propriety and admiration we proceed to the sense of merit and demerit. Here a more complex phenomenon presents itself for analysis; we have to distinguish in the sense of merit—(1) a direct sympathy with the sentiments of the agent, and (2) an indirect sympathy with the gratitude of those who receive the benefit of his actions. In the case of demerit there is a direct antipathy to the feelings of the misdoer, but the chief sentiment excited is sympathy with those injured by the misdeed. The object of this sympathetic resentment, impelling us to punish, is what we call injustice; and thus the remarkable stringency of the obligation to act justly is explained, since the recognition of any action as unjust involves the admission that it may be forcibly obstructed or punished. Moral judgments, then, are expressions of the complex normal sympathy of an impartial spectator with the active impulses that prompt to and result from actions. In the case of our own conduct what we call conscience is really sympathy with the feelings of an imaginary impartial spectator.

Adam Smith gives authority to his moral system by saying that "moral principles are justly to be regarded as the laws of the Deity"; but this he never proves. So Hume insists emphatically on the "reality of moral obligation,"; but is found to mean no more by this than the real existence of the likes and dislikes that human beings feel for each other's qualities. The fact is that amid the analysis of feelings aroused by the sentimentalism of Shaftesbury's school, the fundamental questions "What is right?" and "Why?" had been allowed to drop into the background, and the consequent danger to morality was manifest. The binding force of moral rules becomes evanescent if we admit, with Hutcheson, that the "sense" of them may properly vary from man to man as the palate does; and it seems only another way of putting Hume's doctrine, that reason is not concerned with the ends of action, to say that the mere existence of a moral sentiment is in itself no reason for obeying it. A reaction, in one form or another, against the tendency to dissolve ethics into psychology was inevitable; since mankind generally could not be so far absorbed by the interest of psychological hypothesis as to forget their need of establishing practical principles. It was obvious, too, that this reaction might take place in either of the two lines of thought, which, having been peacefully allied in Clarke and Cumberland, had become distinctly opposed to each other in Butler and Hutcheson. It might either fall back on the moral principles commonly accepted, and, affirming their objective validity, endeavour to exhibit them as a coherent and complete set of ultimate ethical truths; or it might take the utility or conduciveness to pleasure, to which Hume had referred for the origin of most sentiments, as an ultimate end and standard by which these sentiments might be judged and corrected. The former is the line adopted with substantial agreement by Price, Reid, Stewart and other members of the still existing Intuitional school; the latter method, with considerably more divergence of view and treatment, was employed independently and almost simultaneously by Paley and Bentham in both ethics and politics, and is at the present time widely maintained under the name of Utilitarianism.

Price.

Price's *Review of the Chief Questions and Difficulties of Morals* was published in 1757, two years before Adam Smith's treatise. In regarding moral ideas as derived from the "intuition of truth or immediate discernment of the nature of things by the understanding," Price revives the general view of Cudworth and Clarke; but with several specific differences. Firstly, his conception of "right" and "wrong" as "single ideas" incapable of definition or analysis—the notions "right," "fit," "ought," "duty," "obligation," being coincident or identical—at least avoids the confusions into which Clarke and Wollaston had been led by pressing the analogy between ethical and physical truth. Secondly, the emotional element of the moral consciousness, on which attention had been concentrated by Shaftesbury and his followers, though distinctly recognized as accompanying the intellectual intuition, is carefully subordinated to it. While right and wrong, in Price's view, are "real objective qualities" of actions, moral "beauty and deformity" are subjective ideas; representing feelings which are partly the necessary effects of the perceptions of right and wrong in rational beings as such, partly due to an "implanted sense" or varying emotional susceptibility. Thus, both reason and sense of instinct co-operate in the impulse to virtuous conduct, though the rational element is primary and paramount. Price further follows Butler in distinguishing the perception of merit and demerit in agents as another accompaniment of the perception of right and wrong in actions; the former being, however, only a peculiar species of the latter, since, to perceive merit in any one is to perceive that it is right to reward him. It is to be observed that both Price and Reid are careful to state that the merit of the agent depends entirely on the intention or "formal rightness" of his act; a man is not blameworthy for unintended evil, though he may of course be blamed for any wilful neglect (cf. Arist., *Eth. Nic.*, iii. 1), which has caused him to be ignorant of his real duty. When we turn to the subject matter of virtue, we find that Price, in comparison with More or Clarke, is decidedly laxer in accepting and stating his ethical first principles; chiefly owing to the new antithesis to the view of Shaftesbury and Hutcheson by which his controversial position is complicated. What Price is specially concerned to show is the existence of ultimate principles *beside* the principle of universal benevolence. Not that he repudiates the obligation either of rational benevolence or self-love; on the contrary, he takes more pains than Butler to demonstrate the reasonableness of either principle. "There is not anything," he says, "of which we have more undeniably an intuitive perception, than that it is 'right to pursue and promote happiness,' whether for ourselves or for others." Finally, Price, writing after the demonstration by Shaftesbury and Butler of the actuality of disinterested impulses in human nature, is bolder and clearer than Cudworth or Clarke in insisting that right actions are to be chosen because they are right by virtuous agents as such, even going so far as to lay down that an act loses its moral worth in proportion as it is done from natural inclination.

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[1] In earlier editions of the *Inquiry* Hume expressly included all approved qualities under the general notion of "virtue." In later editions he avoided this strain on usage by substituting or adding "merit" in several passages—allowing that some of the laudable qualities which he mentions would be more commonly called "talents," but still maintaining that "there is little distinction made in our internal estimation" of "virtues" and "talents."

Reid.

On this latter point Reid, in his *Essays on the Active Powers of the Human Mind* (1788), states a conclusion more in harmony with common sense, only maintaining that "no act can be morally good in which regard for what is right has not *some* influence." This is partly due to the fact that Reid builds more distinctly than Price on the foundation laid by Butler; especially in his acceptance of that duality of governing principles which we have noticed as a cardinal point in the latter's doctrine. Reid considers "regard for one's good on the whole" (Butler's self-love) and "sense of duty" (Butler's conscience) as two essentially distinct and co-ordinate rational principles, though naturally often comprehended under the one term, Reason. The rationality of the former principle he takes pains to explain and establish; in opposition to Hume's doctrine that it is no part of the function of reason to determine the ends which we ought to pursue, or the preference due to one end over another. He urges that the notion of "good[1] on the whole" is one which only a reasoning being can form, involving as it does abstraction from the objects of all particular desires, and comparison of past and future with present feelings; and maintains that it is a contradiction to suppose a rational being to have the notion of its Good on the Whole without a desire for it, and that such a desire must naturally regulate all particular appetites and passions. It cannot reasonably be subordinated even to the moral faculty; in fact, a man who doubts the coincidence of the two—which on religious grounds we must believe to be complete in a morally governed world—is reduced to the "miserable dilemma whether it is better to be a fool or a knave." As regards the moral faculty itself, Reid's statement coincides in the main with Price's; it is both intellectual and active, not merely perceiving the "rightness" or "moral obligation" of actions (which Reid conceives as a simple unanalysable relation between act and agent), but also impelling the will to the performance of what is seen to be right. Both thinkers hold that this perception of right and wrong in actions is accompanied by a perception of merit and demerit in agents, and also by a specific emotion; but whereas Price conceives this emotion chiefly as pleasure or pain, analogous to that produced in the mind by physical beauty or deformity, Reid regards it chiefly as benevolent affection, esteem and sympathy (or their opposites), for the virtuous (or vicious) agent. This "pleasurable good-will," when the moral judgment relates to a man's own actions, becomes "the testimony of a good conscience—the purest and most valuable of all human enjoyments." Reid is careful to observe that this moral faculty is not "innate" except in germ; it stands in need of "education, training, exercise (for which society is indispensable), and habit," in order to the attainment of moral truth. He does not with Price object to its being called the "moral sense," provided we understand by this a source not merely of feelings or notions, but of "ultimate truths." Here he omits to notice the important question whether the premises of moral reasoning are universal or individual judgments; as to which the use of the term "sense" seems rather to suggest the second alternative. Indeed, he seems himself quite undecided on this question; since, though he generally represents ethical method as deductive, he also speaks of the "original judgment that this action is right and that wrong."

The truth is that the construction of a scientific method of ethics is a matter of little practical moment to Reid. Thus, though he offers a list of first principles, by deduction from which these common opinions may be confirmed, he does not present it with any claim to completeness. Besides maxims relating to virtue in general,—such as (1) that there is a right and wrong in conduct, but (2) only in voluntary conduct, and that we ought (3) to take pains to learn our duty, and (4) fortify ourselves against temptations to deviate from it—Reid states five fundamental axioms. The first of these is merely the principle of rational self-love, "that we ought to prefer a greater to a lesser good, though more distinct, and a less evil to a greater,"—the mention of which seems rather inconsistent with Reid's distinct separation of the "moral faculty" from "self-love." The third is merely the general rule of benevolence stated in the somewhat vague Stoical formula, that "no one is born for himself only." The fourth, again, is the merely formal principle that "right and wrong must be the same to all in all circumstances," which belongs equally to all systems of objective morality; while the fifth prescribes the religious duty of "veneration or submission to God." Thus, the only principle which ever appears to offer definite guidance as to social duty is the second, "that so far as the intention of nature appears in the constitution of man, we ought to act according to that intention," the vagueness[2] of which is obvious. (For Reid's views on moral freedom see A. Bain, *Mental Science*, pp. 422, seq.)

Dugald Stewart.

A similar incompleteness in the statement of moral principles is found if we turn to Reid's disciple, Dugald Stewart, whose *Philosophy of the Active and Moral Powers of Man* (1828) contains the general view of Butler and Reid, and to some extent that of Price,—expounded with more fulness and precision, but without important original additions or modifications. Stewart lays stress on the obligation of justice as distinct from benevolence; but his definition of justice represents it as essentially impartiality,—a virtue which (as was just now said of Reid's fourth principle) must equally find a place in the utilitarian or any other system that lays down universally applicable rules of morality. Afterwards, however, Stewart distinguishes "integrity or honesty" as a branch of justice concerned with the rights of other men, which form the subject of "natural jurisprudence." In this department he lays down the moral axiom "that the labourer is entitled to the fruit of his own labour" as the principle on which complete rights of property are founded; maintaining that occupancy alone would only confer a transient right of possession during use. The only other principles which he discusses are veracity and fidelity to promises, gratitude being treated as a natural instinct prompting to a particular kind of just actions.

Whewell.

It will be seen that neither Reid nor Stewart offers more than a very meagre and tentative contribution to that ethical science by which, as they maintain, the received rules of morality may be rationally deduced from self-evident first principles. A more ambitious attempt in the same direction was made by Whewell in his *Elements of Morality* (1846). Whewell's general moral view differs from that of his Scottish predecessors chiefly in a point where we may trace the influence of Kant—viz. in his rejection of self-love as an independent rational and governing principle, and his consequent refusal to admit happiness, apart from duty, as a reasonable end for the individual. The moral reason, thus left in sole supremacy, is represented as enunciating five ultimate principles,—those of benevolence, justice, truth, purity and order. With a little straining these are made to correspond to five chief divisions of Jus,—personal security (benevolence being opposed to the ill-will that commonly causes personal injuries), property, contract, marriage and government; while the first, second and fourth, again, regulate respectively the three chief classes of human motives,—affections, mental desires and appetites. Thus the list, with the addition of two general principles, "earnestness" and "moral purpose," has a certain air of systematic completeness. When, however, we look closer, we find that the principle of order, or obedience to government, is not seriously intended to imply the political absolutism which it seems to express, and which English common sense emphatically repudiates; while the formula of justice is given in the tautological or perfectly indefinite proposition "that every man ought to have his own." Whewell, indeed, explains that this latter formula must be practically interpreted by positive law, though he inconsistently speaks as if it supplied a standard for judging laws to be right or wrong. The principle of purity, again, "that the lower parts of our nature ought to be subject to the higher," merely particularizes that supremacy of reason over non-rational impulses which is involved in the very notion of reasoned morality. Thus, in short, if we ask for a clear and definite fundamental intuition, distinct from regard for happiness, we find really nothing in Whewell's doctrine except the single rule of veracity (including fidelity to promises); and even of this the axiomatic character becomes evanescent on closer inspection, since it is not maintained that the rule is practically unqualified, but only that it is practically undesirable to formulate its qualifications.

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[1] It is to be observed that whereas Price and Stewart (after Butler) identify the object of self-love with happiness or pleasure, Reid conceives this "good" more vaguely as including perfection *and* happiness; though he sometimes uses "good" and happiness as convertible terms, and seems practically to have the latter in view in all that he says of self-love.

[2] *E.g.* Reid proposes to apply this principle in favour of monogamy, arguing from the proportion of males and females born; without explaining why, if the intention of nature hence inferred excludes occasional polygamy, it does not also exclude occasional celibacy.

Intuitional and utilitarian schools.

On the whole, it must be admitted that the doctrine of the intuitional school of the 18th and 19th centuries has been developed with less care and consistency than might have been expected, in its statement of the fundamental axioms or intuitively known premises of moral reasoning. And if the controversy which this school has conducted with utilitarianism had turned principally on the determination of the matter of duty, there can be little doubt that it would have been forced into more serious and systematic effort to define precisely and completely the principles and method on which we are to reason deductively to particular rules of conduct.[1] But in fact the difference between intuitionists and utilitarians as to the method of determining the particulars of the moral code was complicated with a more fundamental disagreement as to the very meaning of "moral obligation." This Paley and Bentham (after Locke) interpreted as merely the effect on the will of the pleasures or pains attached to the observance or violation of moral rules, combining with this the doctrine of Hutcheson that "general good" or "happiness" is the final end and standard of these rules; while they eliminated all vagueness from the notion of general happiness by defining it to consist in "excess of pleasure over pain"—pleasures and pains being regarded as "differing in nothing but continuance or intensity." The utilitarian system gained an attractive air of simplicity by thus using a single perfectly clear notion—pleasure and its negative quantity pain—to answer both the fundamental questions of mortals, "What is right?" and "Why should I do it?" But since there is no logical connexion between the answers that have thus come to be considered as one doctrine, this apparent unity and simplicity has really hidden fundamental disagreements, and caused no little confusion in ethical debate.

Paley.

In Paley's *Principles of Moral and Political Philosophy*[2] (1785), the link between general pleasure (the standard) and private pleasure or pain (the motive) is supplied by the conception of divine legislation. To be "obliged" is to be "urged by a violent motive resulting from the command of another"; in the case of moral obligation, the command proceeds from God, and the motive lies in the expectation of being rewarded and punished after this life. The commands of God are to be ascertained "from scripture and the light of nature combined." Paley, however, holds that scripture is given less to teach morality than to illustrate it by example and enforce it by new sanctions and greater certainty, and that the light of nature makes it clear that God wills the happiness of his creatures. Hence, his method in deciding moral questions is chiefly that of estimating the tendency of actions to promote or diminish the general happiness. To meet the obvious objections to this method, based on the immediate happiness caused by admitted crimes (such as "knocking a rich villain on the head"), he lays stress on the necessity of general rules in any kind of legislation;[3] while, by urging the importance of forming and maintaining good habits, he partly evades the difficulty of calculating the consequences of particular actions. In this way the utilitarian method is freed from the subversive tendencies which Butler and others had discerned in it; as used by Paley, it merely explains the current moral and jural distinctions, exhibits the obvious basis of expediency which supports most of the received rules of law and morality and furnishes a simple solution, in harmony with common sense, of some perplexing casuistical questions. Thus (*e.g.*) "natural rights" become rights of which the general observance would be useful apart from the institution of civil government; as distinguished from the no less binding "adventitious rights," the utility of which depends upon this institution. Private property is in this sense "natural" from its obvious advantages in encouraging labour, skill, preservative care; though actual rights of property depend on the general utility of conforming to the law of the land by which they are determined. We observe, however, that Paley's method is often mixed with reasonings that belong to an alien and older manner of thought; as when he supports the claim of the poor to charity by referring to the intention of mankind "when they agreed to a separation of the common fund," or when he infers that monogamy is a part of the divine design from the equal numbers of males and females born. In other cases his statement of utilitarian considerations is fragmentary and unmethodical, and tends to degenerate into loose exhortation on rather trite topics.

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[1] We may observe that some recent writers, who would generally be included in this school, avoid in various ways the difficulty of constructing a code of external conduct. Sometimes they consider moral intuition as determining the comparative excellence of conflicting motives (James Martineau), or the comparative quality of pleasures chosen (Laurie), which seems to be the same view in a hedonistic garb; others hold that what is intuitively perceived is the rightness or wrongness of individual acts—a view which obviously renders ethical reasoning practically superfluous.

[2] The originality—such as it is—of Paley's system (as of Bentham's) lies in its method of working out details rather than in its principles of construction. Paley expressly acknowledges his obligations to the original and suggestive, though diffuse and whimsical, work of Abraham Tucker (*Light of Nature Pursued*, 1768–1774). In this treatise, as in Paley's, we find "every man's own satisfaction, the spring that actuates all his motives," connected with "general good, the root whereout all our rules of conduct and sentiments of honour are to branch," by means of natural theology demonstrating the "unniggardly goodness of the author of nature." Tucker is also careful to explain that satisfaction or pleasure is "one and the same in kind, however much it may vary in degree, . . . whether a man is pleased with hearing music, seeing prospects, tasting dainties, performing laudable actions, or making agreeable reflections," and again that by "general good" he means "quantity of happiness," to which "every pleasure that we do to our neighbour is an addition." There is, however, in Tucker's theological link between private and general happiness a peculiar ingenuity which Paley's common sense has avoided. He argues that men having no free will have really no desert; therefore the divine equity must ultimately distribute happiness in equal shares to all; therefore I must ultimately increase my own happiness most by conduct that adds most to the general fund which Providence administers.

But in fact the outline of Paley's utilitarianism is to be found a generation earlier—in Gay's dissertation prefixed to Law's edition of King's *Origin of Evil*—as the following extracts will show:—"The idea of virtue is the conformity to a rule of life, directing the actions of all rational creatures with respect to each other's happiness; to which every one is always obliged. . . . Obligation is the necessity of doing or omitting something in order to be happy. . . . Full and complete obligation which will extend to all cases can only be that arising from the authority of God. . . . The will of God [so far as it directs behaviour to others] is the immediate rule or criterion of virtue . . . but it is evident from the nature of God that he could have no other design in creating mankind than their happiness; and therefore he wills their happiness; therefore that my behaviour so far as it may be a means to the happiness of mankind should be such; so this happiness of mankind may be said to be the criterion of virtue once removed."

The same dissertation also contains the germ of Hartley's system, as we shall presently notice.

[3] It must be allowed that Paley's application of this argument is somewhat loosely reasoned, and does not sufficiently distinguish the consequence of a single act of beneficent manslaughter from the consequences of a general permission to commit such acts.

Bentham and his school.

In unity, consistency and thoroughness of method, Bentham's utilitarianism has a decided superiority over Paley's. He considers actions solely in respect of their pleasurable and painful consequences, expected or actual; and he recognizes the need of making a systematic register of these consequences, free from the influences of common moral opinion, as expressed in the "eulogistic" and "dyslogistic" terms in ordinary use. Further, the effects that he estimates are all of a definite, palpable, empirically ascertainable quality; they are such pleasures and pains as most men feel and all can observe, so that all his political or moral inferences lie open at every point to the test of practical experience. Every one, it would seem, can tell what value he sets on the pleasures of alimentation, sex, the senses generally, wealth, power, curiosity, sympathy, antipathy (malevolence), the goodwill of individuals or of society at large, and on the corresponding pains, as well as the pains of labour and organic disorders;[1] and can guess the rate at which they are valued by others; therefore if it be once granted that all actions are determined by pleasures and pains, and are to be tried by the same standard, the art of legislation and private conduct is apparently placed on an empirical basis. Bentham, no doubt, seems to go beyond the limits of experience proper in recognizing "religious" pains and pleasures in his fourfold division of sanctions, side by side with the "physical," "political," and "moral" or "social"; but the truth is that he does not seriously take account of them, except in so far as religious hopes and fears are motives actually operating, which therefore admit of being observed and measured as much as any other motives. He does not himself use the will of an omnipotent and benevolent being as a means of logically connecting individual and general happiness. He thus undoubtedly simplifies his system, and avoids the doubtful inferences from nature and Scripture in which Paley's position is involved; but this gain is dearly purchased. For in answer to the question that immediately arises, How then are the sanctions of the moral rules which it will most conduce to the general happiness for men to observe, shown to be always adequate in the case of all the individuals whose observance is required? he is obliged to admit that "the only interests which a man is at all times sure to find adequate motives for consulting are his own." Indeed, in many parts of his work, in the department of legislative and constitutional theory, it is rather assumed that the interests of some men will continually conflict with those of their fellows, unless we alter the balance of prudential calculation by a readjustment of penalties. But on this assumption a system of private conduct on utilitarian principles cannot be constructed until legislative and constitutional reform has been perfected. And, in fact, "private ethics," as conceived by Bentham, does not exactly expound such a system; but rather exhibits the coincidence, *so far as it extends*, between private and general happiness, in that part of each man's conduct that lies beyond the range of useful legislation. It was not his place, as a practical philanthropist, to dwell on the defects in this coincidence;[2] and since what men generally expect from a moralist is a completely reasoned account of what they ought to do, it is not surprising that some of Bentham's disciples should have either ignored or endeavoured to supply the gap in his system. One section of the school even maintained it to be a cardinal doctrine of utilitarianism that a man always gains his own greatest happiness by promoting that of others; another section, represented by John Austin, apparently returned to Paley's position, and treated utilitarian morality[3] as a code of divine legislation; others, with Grote, are content to abate the severity of the claims made by "general happiness" on the individual, and to consider utilitarian duty as practically limited by reciprocity; while on the opposite side an unqualified subordination of private to general happiness was advocated by J. S. Mill, who did more than any other member of the school to spread and popularize utilitarianism in ethics and politics.

Varieties of utilitarian doctrine.

The fact is that there are several different ways in which a utilitarian system of morality may be used, without deciding whether the sanctions attached to it are always adequate. (1) It may be presented as practical guidance to all who choose "general good" as their ultimate end, whether they do so on religious grounds, or through the predominance in their minds of impartial sympathy, or because their conscience acts in harmony with utilitarian principles, or for any combination of these or any other reasons; or (2) it may be offered as a code to be obeyed not absolutely, but only so far as the coincidence of private and general interest may in any case be judged to extend; or again (3) it may be proposed as a standard by which men may reasonably agree to praise and blame the conduct of others, even though they may not always think fit to act on it. We may regard morality as a kind of supplementary legislation, supported by public opinion, which we may expect the public, when duly enlightened, to frame in accordance with the public interest. Still, even from this point of view, which is that of the legislator or social reformer rather than the moral philosopher, our code of duty must be greatly influenced by our estimate of the degrees in which men are normally influenced by self-regard (in its ordinary sense of regard for interests not sympathetic) and by sympathy or benevolence, and of the range within which sympathy may be expected to be generally effective. Thus, for example, the moral standard for which a utilitarian will reasonably endeavour to gain the support of public opinion must be essentially different in quality, according as he holds with Bentham that nothing but self-regard will "serve for diet," though "for a dessert benevolence is a very valuable addition"; or with J. S. Mill that disinterested public spirit should be the prominent motive in the performance of all socially useful work, and that even hygienic precepts should be inculcated, not chiefly on grounds of prudence, but because "by squandering our health we disable ourselves from rendering services to our fellow-creatures."

J. S. Mill.

Not less important is the interval that separates Bentham's polemical attitude towards the moral sense from Mill's conciliatory position, that "the mind is not in a state conformable to utility unless it loves virtue as a thing desirable in itself." Such love of virtue Mill holds to be in a sense natural, though not an ultimate and inexplicable fact of human nature; it is to be explained by the "Law of Association" of feelings and ideas, through which objects originally desired as a means to some further end come to be directly pleasant or desirable. Thus, the miser first sought money as a means to comfort, but ends by sacrificing comfort to money; and similarly though the first promptings to justice (or any other virtue) spring from the non-moral pleasures gained or pains avoided by it, through the link formed by repeated virtuous acts the performance of them ultimately comes to have that immediate satisfaction attached to it which we distinguished as moral. Indeed, the acquired tendency to virtuous conduct may become so strong that the habit of willing it may continue, "even when the reward which the virtuous man receives from the consciousness of well-doing is anything but an equivalent for the sufferings he undergoes or the wishes he may have to renounce." It is thus that the before-mentioned self-sacrifice of the moral hero is conceived by Mill to be possible and actual. The moral sentiments, on this view, are not phases of self-love as Hobbes held; nor can they be directly identified with sympathy, either in Hume's way or in Adam Smith's; in fact, though apparently simple they are really derived in a complex manner from self-love and sympathy combined with more primitive impulses. Justice (*e.g.*) is regarded by Mill as essentially resentment moralized by enlarged sympathy and intelligent self-interest; what we mean by injustice is harm done to an assignable individual by a breach of some rule for which we desire the violator to be punished, for the sake both of the person injured and of society at large, including ourselves. As regards moral sentiments generally, the view suggested by Mill is more definitely given by the chief living representative of the associationist school, Alexander Bain; by whom the distinctive characteristics of conscience are traced to "education under government or authority," though prudence, disinterested sympathy and other emotions combine to swell the mass of feeling vaguely denoted by the term moral. The combination of antecedents is somewhat differently given by different writers; but all agree in representing the conscience of any individual as naturally correlated to the interests of the community of which he is a member, and thus a natural ally in enforcing utilitarian rules, or even a valuable guide when utilitarian calculations are difficult and uncertain.

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[1] This list gives twelve out of the fourteen classes in which Bentham arranges the springs of action, omitting the religious sanction (mentioned afterwards), and the pleasures and pains of self-interest, which include all the other classes except sympathy and antipathy.

[2] In the *Deontology* published by Bowring from MSS. left after Bentham's death, the coincidence is asserted to be complete.

[3] It should be observed that Austin, after Bentham, more frequently uses the term "moral" to connote what he more distinctly calls "positive morality," the code of rules supported by common opinion in any society.

Association and evolution.

This substitution of hypothetical history for direct analysis of the moral sense is really older than the utilitarianism of Paley and Bentham, which it has so profoundly modified. The effects of association in modifying mental phenomena were noticed by Locke, and made a cardinal point in the metaphysic of Hume; who also referred to the principle slightly in his account of justice and other "artificial" virtues. Some years earlier, Gay,[1] admitting Hutcheson's proof of the actual disinterestedness of moral and benevolent impulses, had maintained that these (like the desires of knowledge or fame, the delight of reading, hunting and planting, &c.) were derived from self-love by "the power of association." But a thorough and systematic application of the principle to ethical psychology is first found in Hartley's *Observations on Man* (1748). Hartley, too, was the first to conceive association as producing, instead of mere cohesion of mental phenomena, a quasi-chemical combination of these into a compound apparently different from its elements. He shows elaborately how the pleasures and pains of "imagination, ambition, self-interest, sympathy, theopathy, and the moral sense" are developed out of the elementary pleasures and pains of sensation; by the coalescence into really complex but apparently single ideas of the "miniatures" or faint feelings which the repetition of sensations contemporaneously or in immediate succession tends to produce in cohering groups. His theory assumes the correspondence of mind and body, and is applied *pari passu* to the formation of ideas from sensations, and of "compound vibratiuncules in the medullary substance" from the original vibrations that arise in the organ of sense.[2] The same general view was afterwards developed with much vigour and clearness on the psychical side alone by James Mill in his *Analysis of the Human Mind*. The whole theory has been persistently controverted by writers of the intuitional school, who (unlike Hartley) have usually thought that this derivation of moral sentiments from more primitive feelings would be detrimental to the authority of the former. The chief argument against this theory has been based on the early period at which these sentiments are manifested by children, which hardly allows time for association to produce the effects ascribed to it. This argument has been met in recent times by the application to mind of the physiological theory of heredity, according to which changes produced in the mind (brain) of a parent, by association of ideas or otherwise, tend to be inherited by his offspring; so that the development of the moral sense or any other faculty or susceptibility of existing man may be hypothetically carried back into the prehistoric life of the human race, without any change in the manner of derivation supposed. At present, however, the theory of heredity is usually held in conjunction with Darwin's theory of natural selection; according to which different kinds of living things in the course of a series of generations come gradually to be endowed with organs, faculties and habits tending to the preservation of the individual or species under the conditions of life in which it is placed. Thus we have a new zoological factor in the history of the moral sentiments; which, though in no way opposed to the older psychological theory of their formation through coalescence of more primitive feelings, must yet be conceived as controlling and modifying the effects of the law of association by preventing the formation of sentiments other than those tending to the preservation of human life. The influence of the Darwinian theory, moreover, has extended from historical psychology to ethics, tending to substitute "preservation of the race under its conditions of existence" for "happiness" as the ultimate end and standard of virtue.

Free-will.

Before concluding this sketch of the development of English ethical thought from Hobbes to the thinkers of the 19th century, it will be well to notice briefly the views held by different moralists on the question of free-will,—so far, that is, as they have been put forward as ethically important. We must first distinguish three meanings in which "freedom" is attributed to the will or "inner self" of a human being, viz. (1) the general power of choosing among different alternatives of action without a motive, or against the resultant force of conflicting motives; (2) the power of choice between the promptings of reason and those of appetites (or other non-rational impulses) when the latter conflict with reason; (3) merely the quality of acting rationally in spite of conflicting impulses, however strong, the *non posse peccare* of the medieval theologians.[3] It is obvious that "freedom" in this third sense is in no way incompatible with complete determination; and, indeed, is rather an ideal state after which the moral agent ought to aspire than a property which the human will can be said to possess. In the first sense, again, as distinct from the second, the assertion of "freedom" has no ethical significance, except in so far as it introduces a general uncertainty into all our inferences respecting human conduct. Even in the second sense it hardly seems that the freedom of a man's will can be an element to be considered in examining what it is right or best for him to do (though of course the clearest convictions of duty will be fruitless if a man has not sufficient self-control to enable him to act on them); it is rather when we ask whether it is just to punish him for wrong-doing that it seems important to know whether he could have done otherwise. But in spite of the strong interest taken in the theological aspect of this question by the Protestant divines of the 17th century, it does not appear that English moralists from Hobbes to Hume laid any stress on the relation of free-will either to duty generally or to justice in particular. Neither the doctrine of Hobbes, that deliberation is a mere alternation of competing desires, voluntary action immediately following the "last appetite," nor the hardly less decided Determinism of Locke, who held that the will is always moved by the greatest present uneasiness, appeared to either author to require any reconciliation with the belief in human responsibility. Even in Clarke's system, where Indeterminism is no doubt a cardinal notion, its importance is metaphysical rather than ethical; Clarke's view being that the apparently arbitrary particularity in the constitution of the cosmos is really only explicable by reference to creative free-will. In the ethical discussion of Shaftesbury and sentimental moralists generally this question drops naturally out of sight; and the cautious Butler tries to exclude its perplexities as far as possible from the philosophy of practice. But since the reaction, led by Price and Reid, against the manner of philosophizing that had culminated in Hume, free-will has been generally maintained by the intuitional school to be an essential point of ethics; and, in fact, it is naturally connected with the judgment of good and ill desert which these writers give as an essential element in their analysis of the moral consciousness. An irresistible motive, it is forcibly said, palliates or takes away guilt; no one can blame himself for yielding to necessity, and no one can properly be punished for what he could not have prevented. In answer to this argument some necessarians have admitted that punishment can be legitimate only if it be beneficial to the person punished; others, again, have held that the lawful use of force is to restrain lawless force; but most of those who reject free-will defend punishment on the ground of its utility in deterring others from crime, as well as in correcting or restraining the criminal on whom it falls.

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[1] In the before-mentioned dissertation. Cf. note 2 to p. 835. Hartley refers to this treatise as having supplied the starting-point for his own system.

[2] It should be noticed that Hartley's sensationalism is far from leading him to exalt the corporeal pleasures. On the contrary, he tries to prove elaborately that they (as well as the pleasures of imagination, ambition, self-interest) cannot be made an object of primary pursuit without a loss of happiness on the whole—one of his arguments being that these pleasures occur earlier in time, and "that which is prior in the order of nature is always less perfect than that which is posterior."

[3] It may be observed that in the view of Kant and others (2) and (3) are somewhat confusingly blended.

French influence on English ethics.

Helvetius.

In the preceding sketch we have traced the course of English ethical speculation without bringing it into relation with contemporary European thought on the same subject. And in fact almost all the systems described, from Hobbes downward, have been of essentially native growth, showing hardly any traces of foreign influence. We may observe that ethics is the only department in which this result appears. The physics and psychology of Descartes were much studied in England, and his metaphysical system was certainly the most important antecedent of Locke's; but Descartes hardly touched ethics proper. So again the controversy that Clarke conducted with Spinoza, and afterwards with Leibnitz, was entirely confined to the metaphysical region. Catholic France was a school for Englishmen in many subjects, but not in morality; the great struggle between Jansenists and Jesuits had a very remote interest for them. It was not till near the close of the 18th century that the impress of the French revolutionary philosophy began to manifest itself in England; and even then its influence was mostly political rather than ethical. It is striking to observe how even in the case of writers such as Godwin, who were most powerfully affected by the French political movement, the moral basis, on which the new social order of rational and equal freedom is constructed, is almost entirely of native origin; even when the tone and spirit are French, the forms of thought and manner of reasoning are still purely English. In the derivation of Benthamism alone—which, it may be observed, first becomes widely known in the French paraphrase of Dumont—an important element is supplied by the works of a French writer, Helvetius; as Bentham himself was fully conscious. It was from Helvetius that he learnt that, men being universally and solely governed by self-love, the so-called moral judgments are really the common judgments of any society as to its common interests; that it is therefore futile on the one hand to propose any standard of virtue, except that of conduciveness to general happiness, and on the other hand useless merely to lecture men on duty and scold them for vice; that the moralist's proper function is rather to exhibit the coincidence of virtue with private happiness; that, accordingly, though nature has bound men's interests together in many ways, and education by developing sympathy and the habit of mutual help may much extend the connexion, still the most effective moralist is the legislator, who by acting on self-love through legal sanctions may mould human conduct as he chooses. These few simple doctrines give the ground plan of Bentham's indefatigable and lifelong labours.

Comte.

So again, in the modified Benthamism which the persuasive exposition of J. S. Mill afterwards made popular in England, the influence of Auguste Comte (*Philosophie positive*, 1829–1842, and *Système de politique positive*, 1851–1854) appears as the chief modifying element. This influence, so far as it has affected moral as distinct from political speculation, has been exercised primarily through the general conception of human progress; which, in Comte's view, consists in the ever-growing preponderance of the distinctively human attributes over the purely animal, social feelings being ranked highest among human attributes, and highest of all the most universalized phase of human affection, the devotion to humanity as a whole. Accordingly, it is the development of benevolence in man, and of the habit of "living for others," which Comte takes as the ultimate aim and standard of practice, rather than the mere increase of happiness. He holds, indeed, that the two are inseparable, and that the more *altruistic* any man's sentiments and habits of action can be made, the greater will be the happiness enjoyed by himself as well as by others. But he does not seriously trouble himself to argue with egoism, or to weigh carefully the amount of happiness that might be generally attained by the satisfaction of egoistic propensities duly regulated; a supreme unquestioning self-devotion, in which all personal calculations are suppressed, is an essential feature of his moral ideal. Such a view is almost diametrically opposed to Bentham's conception of normal human existence; the newer utilitarianism of Mill represents an endeavour to find the right middle path between the two extremes.

It is to be observed that, in Comte's view, devotion to humanity is the principle not merely of morality, but of religion; *i.e.* it should not merely be practically predominant, but should be manifested and sustained by regular and partly symbolical forms of expression, private and public. This side of Comte's system, however, and the details of his ideal reconstruction of society, in which this religion plays an important part, have had but little influence either in England or elsewhere. It is more important to notice the general effect of his philosophy on the method of determining the particulars of morality as well as of law (as it ought to be). In the utilitarianism of Paley and Bentham the proper rules of conduct, moral and legal, are determined by comparing the imaginary consequences of different modes of regulation on men and women, conceived as specimens of a substantially uniform and unchanging type. It is true that Bentham expressly recognizes the varying influences of climate, race, religion, government, as considerations which it is important for the legislator to take into account; but his own work of social construction was almost entirely independent of such considerations, and his school generally appear to have been convinced of their competence to solve all important ethical and political questions for human beings of all ages and countries, without regard to their specific differences. But in the Comtian conception of social science, of which ethics and politics are the practical application, the knowledge of the laws of the evolution of society is of fundamental and continually increasing importance; humanity is regarded as having passed through a series of stages, in each of which a somewhat different set of laws and institutions, customs and habits, is normal and appropriate. Thus present man is a being that can only be understood through a knowledge of his past history; and any effort to construct for him a moral and political ideal, by a purely abstract and unhistorical method, must necessarily be futile; whatever modifications may at any time be desirable in positive law and morality can only be determined by the aid of "social dynamics." This view extends far beyond the limits of Comte's special school or sect, and has been widely accepted.

German influence on English ethics.

When we turn from French philosophy to German, we find the influence of the latter on English ethical thought almost insignificant until a very recent period. In the 17th century, indeed, the treatise of Pufendorf on the *Law of Nature*, in which the general view of Grotius was re-stated with modifications, partly designed to effect a compromise with the doctrine of Hobbes, seems to have been a good deal read at Oxford and elsewhere. Locke includes it among the books necessary to the complete education of a gentleman. But the subsequent development of the theory of conduct in Germany dropped almost entirely out of the cognizance of

Englishmen; even the long dominant system of Wolff (d. 1754) was hardly known. Nor had Kant any serious influence in England until the second quarter of the 19th century. We find, however, distinct traces of Kantian influence in Whewell and other writers of the intuitional school, and at a later date it became so strong that its importance on subsequent ethical thought can scarcely be over-estimated.

Kant.

Categorical Imperative.

The English moralist with whom Kant has most affinity is Price; in fact, Kantism, in the ethical thought of modern Europe, holds a place somewhat analogous to that formerly occupied by the teaching of Price and Reid among English moralists. Kant, like Price and Reid, holds that man as a rational being is unconditionally bound to conform to a certain rule of right, or "categorical imperative" of reason. Like Price he holds that an action is not good unless done from a good motive, and that this motive must be essentially different from natural inclination of any kind; duty, to be duty, must be done for duty's sake; and he argues, with more subtlety than Price or Reid, that though a virtuous act is no doubt pleasant to the virtuous agent, and any violation of duty painful, this moral pleasure (or pain) cannot strictly be the motive to the act, because it follows instead of preceding the recognition of our obligation to do it.[1] With Price, again, he holds that rightness of intention and motive is not only an indispensable condition or element of the rightness of an action, but actually the sole determinant of its moral worth; but with more philosophical consistency he draws the inference—of which the English moralist does not seem to have dreamt—that there can be no separate rational principles for determining the "material" rightness of conduct, as distinct from its "formal" rightness; and therefore that all rules of duty, so far as universally binding, must admit of being exhibited as applications of the one general principle that duty ought to be done for duty's sake. This deduction is the most original part of Kant's doctrine. The dictates of reason, he points out, must necessarily be addressed to all rational beings as such; hence, my intention cannot be right unless I am prepared to will the principle on which I act to be a universal law. He considers that this fundamental rule or imperative "act on a maxim which thou canst will to be law universal" supplies a sufficient criterion for determining particular duties in all cases. The rule excludes wrong conduct with two degrees of stringency. Some offences, such as making promises with the intention of breaking them, we cannot even conceive universalized; as soon as every one broke promises no one would care to have promises made to him. Other maxims, such as that of leaving persons in distress to shift for themselves, we can easily conceive to be universal laws, but we cannot without contradiction will them to be such: for when we are ourselves in distress we cannot help desiring that others should help us.

Another important peculiarity of Kant's doctrine is his development of the connexion between duty and free-will. He holds that it is through our moral consciousness that we know that we are free; in the cognition that I ought to do what is right because it is right and not because I like it, it is implied that this purely rational volition is possible; that my action can be determined, not "mechanically," through the necessary operation of the natural stimuli of pleasurable and painful feelings, but in accordance with the laws of my true, reasonable self. The realization of reason, or of human wills so far as rational, thus presents itself as the absolute end of duty; and we get, as a new form of the fundamental practical rule, "act so as to treat humanity, in thyself or any other, as an end always, and never as a means only." We may observe, too, that the notion of freedom connects ethics with jurisprudence in a simple and striking manner. The fundamental aim of jurisprudence is to realize external freedom by removing the hindrances imposed on each one's free action through the interferences of other wills. Ethics shows how to realize internal freedom by resolutely pursuing rational ends in opposition to those of natural inclination. If we ask what precisely are the ends of reason, Kant's proposition that "all rational beings as such are ends in themselves for every rational being" hardly gives a clear answer. It might be interpreted to mean that the result to be practically sought is simply the development of the rationality of all rational beings—such as men—whom we find to be as yet imperfectly rational. But this is not Kant's view. He holds, indeed, that each man should aim at making himself the most perfect possible instrument of reason; but he expressly denies that the perfection of others can be similarly prescribed as an end to each. It is, he says, "a contradiction to regard myself as in duty bound to promote the perfection of another, . . . a contradiction to make it a duty for me to do something for another which no other but himself can do." In what practical sense, then, am I to make other rational beings my ends? Kant's answer is that what each is to aim at in the case of others is not Perfection, but Happiness, *i.e.* to help them to attain those purely subjective ends that are determined for each not by reason, but by natural inclination. He explains also that to seek one's own happiness cannot be prescribed as a duty, because it is an end to which every man is inevitably impelled by natural inclination: but that just because each inevitably desires his own happiness, and therefore desires that others should assist him in time of need, he is bound to make the happiness of others his ethical end, since he cannot *morally* demand aid from others, without accepting the obligation of aiding them in like case. The exclusion of private happiness from the ends at which it is a duty to aim contrasts strikingly with the view of Butler and Reid, that man, as a rational being, is under a "manifest obligation" to seek his own interest. The difference, however, is not really so great as it seems; since in another part of his system Kant fully recognizes the reasonableness of the individual's regard for his own happiness. Though duty, in his view, excludes regard for private happiness, the *summum bonum* is not duty alone, but happiness combined with moral worth; the demand for happiness as the reward of duty is so essentially reasonable that we must postulate a universal connexion between the two as the order of the universe; indeed, the practical necessity of this postulate is the only adequate rational ground that we have for believing in the existence of God.

Hegel.

Before the ethics of Kant had begun to be seriously studied in England, the rapid and remarkable development of metaphysical view and method of which the three chief stages are represented by Fichte, Schelling and Hegel respectively had already taken place; and the system of the latter was occupying the most prominent position in the philosophical thought of Germany.[2] Hegel's ethical doctrine (expounded chiefly in his *Philosophie des Rechts*, 1821) shows a close affinity, and also a striking contrast, to Kant's. He holds, with Kant, that duty or good conduct consists in the conscious realization of the free reasonable will, which is essentially the same in all rational beings. But in Kant's view the universal content of this will is only given in the formal condition of "only acting as one can desire all to act," to be subjectively applied by each rational agent to his own volition; whereas Hegel conceives the universal will as objectively presented to each man in the laws, institutions and customary morality of the community of which he is a member. Thus, in his view, not merely natural inclinations towards pleasures, or the desires for selfish happiness, require to be morally resisted; but even the prompting of the individual's conscience, the impulse to do what seems to him right, if it comes into conflict with the common sense of his community. It is true that Hegel regards the conscious effort to realize one's own conception of good as a higher stage of moral development than the mere conformity to the jural rules establishing property, maintaining contract and allotting punishment to crime, in which the universal will is first expressed; since in such conformity this will is only accomplished accidentally by the outward concurrence of individual wills, and is not essentially realized in any of them. He holds, however, that this conscientious effort is self-deceived and futile, is even the very root of moral evil, except it attains its realization in harmony with the objective social relations in which the individual finds himself placed. Of these relations the first grade is constituted by the family, the second by civil society, and the third by the state, the organization of which is the highest manifestation of universal reason in the sphere of practice.

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[1] Singularly enough, the English writer who approaches most nearly to Kant on this point is the utilitarian Godwin, in his *Political Justice*. In Godwin's view, reason is the proper motive to acts conducive to general happiness; reason shows me that the happiness of a number of other men is of more value than my own; and the perception of this truth affords me at least *some* inducement to prefer the former to the latter. And supposing it to be replied that the motive is really the moral uneasiness involved in choosing the selfish alternative, Godwin answers that this uneasiness, though a "constant step" in the process of volition, is a merely "accidental" step—"I feel pain in the neglect of an act of benevolence, because benevolence is judged by me to be conduct which it becomes me to adopt."

[2] In Kantism, as we have partly seen, the most important ontological beliefs—in God, freedom and immortality of the soul—are based on necessities of ethical thought. In Fichte's system the connexion of ethics and metaphysics is still more intimate; indeed, we may compare it in this respect to Platonism; as Plato blends the most fundamental notions of each of these studies in the one idea of good, so Fichte blends them in the one idea free-will. "Freedom," in his view, is at once the foundation of all being and the end of all moral action. In the systems of Schelling and Hegel ethics falls again into a subordinate place; indeed, the ethical view of the former is rather suggested than completely developed. Neither Fichte nor Schelling has exercised more than the faintest and most indirect influence on ethical philosophy in England; it therefore seems best to leave the ethical doctrines of each to be explained in connexion with the rest of his system.

Hegelianism appears as a distinct element in modern English ethical thought; but the direct influence of Hegel's system is perhaps less important than that indirectly exercised through the powerful stimulus which it has given to the study of the historical development of human thought and human society. According to Hegel, the essence of the universe is a process of thought from the abstract to the concrete; and a right understanding of this process gives the key for interpreting the evolution in time of European philosophy. So again, in his view, the history of mankind is a history of the necessary development of the free spirit through the different forms of political organization: the first being that of the Oriental monarchy, in which freedom belongs to the monarch only; the second, that of the Graeco-Roman republics, in which a select body of free citizens is sustained on a basis of slavery; while finally in the modern societies, sprung from the Teutonic invasion of the decaying Roman empire, freedom is recognized as the natural right of all members of the community. The effect of the lectures (posthumously edited) in which Hegel's "Philosophy of History" and "History of Philosophy" were expounded, has extended far beyond the limits of his special school; indeed, the predominance of the historical method in all departments of the theory of practice is not a little due to their influence. (H. S.; X.)

D. *Ethics since 1879.*—Ethical controversies, like most other speculative disputes, have, during the latter part of the 19th and the beginning of the 20th century, centred round Darwinian theories. The chief characteristic of English moral philosophy in its previous history has been its comparative isolation from great movements, sometimes contemporary movements, of philosophical or scientific thought. Ethics in England no less than on the continent of Europe suffered until the time of Bacon from the excessive domination of theological dogma and the traditional scholastic and Aristotelian philosophy. But the moral philosophy of the 18th century, freed from scholastic trammels, was a genuine native product, arising out of the real problem of conduct and reaching its conclusions, at least ostensibly, by an analysis of, and an appeal to, the facts of conduct and the nature of morality. Even at the beginning of the 19th century, when the main interest of writers who belonged to the Utilitarian school was mainly political, the influence of political theories upon contemporary moral philosophy was upon the whole an influence of which the moral philosophers themselves were unconscious; and from the nature of things moral and political philosophy have a tendency to become one and the same inquiry. Mill, it is true, and Comte both encouraged the idea that society and conduct alike were susceptible of strictly scientific investigation. But the attempt not only to treat ethics scientifically, but actually to subordinate the principles of conduct to the principles of existing biological science or group of sciences biological in character, was reserved for post-Darwinian moral philosophers. That attempt has not, in the opinion of the majority of critics, been successful, and perhaps what is most permanent in the contribution of modern times to ethical theory will ultimately be attributed to philosophers antagonistic to evolutionary ethics. Nevertheless the application of the historical method to inquiries concerning the facts of morality and the moral life—itself part of the great movement of thought to which Darwin gave the chief impetus—has caused moral problems to be presented in a novel aspect; while the influence of Darwinism upon studies which have considerable bearing upon ethics, *e.g.* anthropology or the study of comparative religion, has been incalculable.

The other great movement in modern moral philosophy due to the influence of German, and especially Hegelian, idealism followed naturally for the most part from the revival of interest in metaphysics noticeable in the latter half of the 19th century.

But metaphysical systems of ethics are no novelty even in England, and, while the increased interest in ultimate issues of philosophy has enormously deepened and widened men's appreciation of moral problems and the issues involved in conduct, the actual advance in ethical theory produced by such speculations has been comparatively slight. What is of lasting importance is the re-affirmation upon metaphysical grounds of the right of the moral consciousness to state and solve its own difficulties, and the successful repulsion of the claims of particular sciences such as biology to include the sphere of conduct within their scope and methods. And both evolutionary and idealistic ethics agree in repudiating the standpoint of narrow individualism, alike insist upon the necessity of regarding the self as social in character, and regard the end of moral progress as only realizable in a perfect society.

It is perhaps too much to hope that the long-continued controversy between hedonists and anti-hedonists has been finally settled. But certainly few modern moral philosophers would be found in the present day ready to defend the crudities of hedonistic psychology as they appear in Bentham and Mill. A certain common agreement has been reached concerning the impossibility of regarding pleasure as the sole motive criterion and end of moral action, though different opinions still prevail as to the place occupied by pleasure in the summum bonum, and the possibility of a hedonistic calculus.

The failure of "laissez-faire" individualism in politics to produce that common prosperity and happiness which its advocates hoped for caused men to question the egoistic basis upon which its ethical counterpart was constructed. Similarly the comparative failure of science to satisfy men's aspirations alike in knowledge and, so far as the happiness of the masses is concerned, in practice has been largely instrumental in producing that revolt against material prosperity as the end of conduct which is characteristic of idealist moral philosophy. To this revolt, and to the general tendency to find the principle of morality in an ideal good present to the consciousness of all persons capable of acting morally, the widespread recognition of reason as the ultimate court of appeal alike in religion or politics, and latterly in economics also, has no doubt contributed largely. In the main the appeal to reason has followed the traditional course of such movements in ethics, and has re-affirmed in the light of fuller reflection the moral principles implicit in the ordinary moral consciousness. It is only in the present day that there are noticeable signs of dissatisfaction with current morality itself, and a tendency to substitute or advocate a new morality based ostensibly upon conclusions derived from the facts of scientific observation.

Darwin himself seems never to have questioned, in the sceptical direction in which his followers have applied his principles, the absolute character of moral obligation. What interested him chiefly, in so far as he made a study of morality, was the development of moral conduct in its preliminary stages.

Darwin.

He was principally concerned to show that in morality, as in other departments of human life, it was not necessary to postulate a complete and abrupt gap between human and merely animal existence, but that the instincts and habits which contribute to survival in the struggle for existence among animals develop into moral qualities which have a similar value for the preservation of human and social life. Regarding the social tendency as originally itself an instinct developed out of parental or filial affection, he seems to suggest that natural selection, which was the chief cause of its development in the earlier stages, may very probably influence the transition from purely tribal and social morality into morality in its later and more complex forms. But he admits that natural selection is not necessarily the only cause, and he refrains from identifying the fully developed morality of civilized nations with the "social instinct." Moreover, he recognizes that qualities, *e.g.* loyalty and sympathy, which may have been of great service to the tribe in its primitive struggle for existence, may become a positive hindrance to physical efficiency (leading as they do to the preservation of the unfit) at a later stage. Nevertheless to check our sympathy would lead to the "deterioration of the noblest part of our nature," and the question, which is obviously of vital importance, whether we should obey the dictates of reason, which would urge us only to such conduct as is conducive to natural selection, or remain faithful to the noblest part of our nature at the expense of reason, he leaves unsolved.

Spencer.

It was in Herbert Spencer, the triumphant "buccinator novi temporis," that the advocates of evolutionary ethics found their protagonist. Spencer looked to ideas derived from the biological sciences to provide a solution of all the enigmas of morality, as of most other departments of life; and he conceived it "to be the business of moral science to deduce from the laws of life and the conditions of existence what kinds of action necessarily tend to produce happiness and what kinds to produce unhappiness." It is clear, therefore, that any moral science which is to be of value must wait until the "laws of life" and "conditions of existence" have been satisfactorily determined, presumably by biology and the allied sciences; and there are few more melancholy instances of failure in philosophy than the paucity of the actual results attained by Spencer in his lifetime in his application of the so-called laws of evolution to human conduct—a failure recognized by Spencer himself. His own contribution to ethics was vitiated at the outset by the fact that he never shook himself free from the trammels of the philosophy which his own system was intended to supersede. He began by disclaiming any affinity to Utilitarianism on the part of his own philosophy. He pointed out that the principle of the greatest happiness of the greatest number is a principle without any definite meaning, since men are nowhere unanimous in their standard of happiness, but regard the conception of happiness rather as a problem to be solved than a test to be applied. Universal happiness would require omniscience to legislate for it and the "normal" or, as some would say, "perfect" man to desire it; neither of these conditions of its realization is at present in existence. Further, the principle that "everybody is to count for one, nobody for more than one," is equally unsatisfactory. It may be taken to imply that the useless and the criminal should be entitled to as much happiness as the useful and the virtuous. While it gives no rule for private as distinct from public conduct, it provides no real guidance for the legislator. For neither happiness, nor the concrete means to happiness, nor finally the conditions of its realization can be distributed; and in the end "not general happiness becomes the ethical standard by which legislative action is to be guided, but universal justice." Yet the implications of this latter conclusion Spencer never fully thought out. He accepted bodily without farther questioning the hedonistic psychology by which the Utilitarians sought to justify their theory while he rejected the theory itself. Good, *e.g.* defined by him "as conduct conducive to life," is also further defined as that which is "conducive to a surplus of pleasures over pains." Happiness, again, is always regarded as consisting in feeling, ultimately in pleasant feeling, and there is no attempt to apply the same principles of criticism which he had successfully applied to the Utilitarians' "happiness" to the conception of "pleasure." And, though he maintains as against the Utilitarians the existence of certain fundamental moral intuitions which have come to be quite independent of any present conscious experience of their utility, he yet holds that they are the results of accumulated racial experiences gradually organized and inherited. Finally, side by side with a theory of the nature of moral obligation thus fundamentally empirical and a posteriori in its outlook, he maintains in his account of justice the existence of the idea of justice as distinct from a mere sentiment, carrying with it an a priori belief in its existence and identical in its a priori and intuitive character with the ultimate criterion of Utilitarianism itself. The fact is that any close philosophical analysis of Spencer's system of ethics can only result in the discovery of a multitude of mutually conflicting and for the most part logically untenable theories. It is frequently impossible to discover whether he wishes by an appeal to evolutionary principles to reinforce the sanctions and emphasize the absolute character of the traditional morality which in the main he accepts without question from the current opinions about conduct of his age, or whether he wishes to discredit and disprove the validity of that morality in order to substitute by the aid of the biological sciences a new ethical code. The argument, for instance, that intuitive and a priori beliefs gain their absolute character from the fact that they are the result of continued transmission and accumulation of past nervous modifications in the history of the race would, if taken seriously, lead us to the belief that ultimate ethical sanctions are to be sought, not by an appeal to the moral consciousness, but by the investigation of brain tissue and the relation of man's bodily organism to its environment. Yet such a view would be totally at variance with much that Spencer says (especially in his treatment of justice) concerning the trustworthiness and inevitable character of men's constant appeal to the intuitions of their moral consciousness. Moreover, the very fact itself of the possibility of inheriting acquired moral characteristics is still hotly debated by those biologists with whom should rest the ultimate verdict. Again, the argument that "conduct is good or bad according as its total effects are pleasurable or painful," and that ultimately "pleasure-giving acts are life-sustaining acts," seems to involve Spencer in a multitude of unverified assumptions and contradictory theories. In the first place it is never clear whether Spencer regards the fact that a particular course of conduct is accompanied by a feeling of pleasure as a test of its life-preserving and life-sustaining character, or whether he wishes us to use as our criterion of what is pleasant in conduct the fact that the conduct in question seems conducive to the continued existence of man's organic life. He apparently passes from one criterion to the other as best suits the purpose of the moment. He does not prove the coincidence of life-sustaining and pleasant activities. He assumes throughout that the pleasant is the opposite of what is painful, and seems unaware of the difficulty of determining by means of terms so highly abstract the specific character of moral action. We find in his theory no satisfactory attempt to discriminate between the pleasure aimed at by the altruist and the immediate pleasure of egoistic action. Similarly he disregards the distinction between pleasant feeling as an immediate motive of conduct and the idea of the attainment of future pleasure whether by the race or by the individual. Spencer is involved in effect in most of the confusions and contradictions of hedonistic psychology.

Nor is his attempt to construct a scientific criterion out of data derived from the biological sciences productive of satisfactory results. He is hampered by a distinction between "absolute" and "relative" ethics definitely formulated in the last two chapters of *The Data of Ethics*. Absolute ethics would deal with such laws as would regulate the conduct of ideal man in an ideal society, *i.e.* a society where conduct has reached the stage of complete adjustment to the needs of social life. Relative ethics, on the other hand, is concerned only with such conduct as is advantageous for that society which has not yet reached the end of complete adaptation to its environment, *i.e.* which is at present imperfect. It is hardly necessary to say that Spencer does not tell us how to bring the two ethical systems into correlation. And the actual criteria of conduct derived from biological considerations are almost ludicrously inadequate. Conduct, *e.g.*, is said to be more moral in proportion as it exhibits a tendency on the part of the individual or society to become more "definite," "coherent" and "heterogeneous." Or, again, we should recognize as a test of the "authoritative" character of moral ideas or feelings the fact that they are complex and representative, referring to a remote rather than to a proximate good, remembering the while that "the sense of duty is transitory, and will diminish as fast as moralization increases." In fact, no acceptable scientific criterion emerges, and the outcome of Spencer's attempt to ascertain the laws of life and the conditions of existence is either a restatement of the dictates of the moral consciousness in vague and cumbrous quasi-scientific phraseology, or the substitution of the meaningless test of "survivability" as a standard of perfection for the usual and intelligible standards of "good" and "right."

Leslie Stephen.

A similar criticism might fairly be passed upon the majority of philosophers who approach ethics from the standpoint of evolution. Sir Leslie Stephen, for instance, wishes to substitute the conception of "social health" for that of universal happiness, and considers that the conditions of social health are to be discovered by an examination of the "social organism" or of "social tissue," the laws of which can be studied apart from those laws by which the individuals composing society regulate their conduct. "The social evolution means the evolution of a strong social tissue; the best type is the type implied by the strongest tissue." But on the important question as to what constitutes the strongest social tissue, or to what extent the analogy between society as at present constituted and organic life is really applicable, we are left without certain guidance. The fact is that with few exceptions evolutionary moral philosophers evade the choice between alternatives which is always presented to them. They begin, for the most part, with a belief that in ethics as in other departments of human knowledge "the more developed must be interpreted by the less developed"—though frequently in the sequel complexity or posteriority of development is erected as a standard by means of which to judge the process of development itself. They are not content to write a *history* of moral development, applying to it the principles by which Darwinians seek to explain the development of animal life. But the search of origins frequently leads them into theories of the nature of that moral conduct whose origin they are anxious to find quite at variance with current and accepted beliefs concerning its nature. The discovery of the so-called evolution of morality out of non-moral conditions is very frequently an unconscious subterfuge by which the evolutionist hides the fact that he is making a priori judgments upon the value of the moral concepts held to be evolved. To accept such theories of the origin of morality would carry with it the conviction that what we took for "moral" conduct was in reality something very different, and has been so throughout its history. The legitimate inference which should follow would be the denial of the validity of those moral laws which have hitherto been regarded as absolute in character, and the substitution for all customary moral terms of an entirely new set based upon biological considerations. But it is precisely this, the only logical inference, which most evolutionary philosophers are unwilling to draw. They cannot give up their belief in customary morality. Professor Huxley maintained, for example, in a famous lecture that "the ethical progress of society depends not on imitating the cosmic process, still less in running away from it, but in combating it" (*Romanes Lecture, ad fin.*). And very frequently arguments are adduced by evolutionists to prove that men's belief in the absolute character of moral precepts is one of the necessary means adopted by nature to carry out her designs for the social welfare of mankind. Yet the other alternative, to which such reasoning points, they are reluctant to accept. For the belief that moral obligation is absolute in character, that it is alike impossible to explain its origin and transcend its laws, would make the search for a scientific criterion of conduct to be deduced from the laws of life and conditions of existence meaningless, if not absurd.

Nietzsche.

Perhaps the one European thinker who has carried evolutionary principles in ethics to their logical conclusion is Friedrich Nietzsche. Almost any system of morality or immorality might find some justification in Nietzsche's writings, which are extraordinarily chaotic and full of the wildest exaggerations. Yet it has been a true instinct which has led popular opinion as testified to by current literature to find in Nietzsche the most orthodox exponent of Darwinian ideas in their application to ethics. For he saw clearly that to be successful evolutionary ethics must involve the "transvaluation of all values," the "demoralization" of all ordinary current morality. He accepted frankly the glorification of brute strength, superior cunning and all the qualities necessary for success in the struggle for existence, to which the ethics of evolution necessarily tend. He proclaimed himself, before everything else, a physiologist, and looked to physiology to provide the ultimate standard for everything that has value; and though his own ethical code necessarily involves the disappearance of sympathy, love, toleration and all existing altruistic emotions, he yet in a sense finds room for them in such altruistic self-sacrifice as prepares the way for the higher man of the future. Thus, after a fashion, he is able to reconcile the conflicting claims of egoism and altruism and succeed where most apostles of evolution fail. The Christian virtues, sympathy for the weak, the suffering, &c., represent a necessary stage to be passed through in the evolution of the *Übermensch*, *i.e.* the stage when the weak and suffering combine in revolt against the strong. They are to be superseded, not so much because all social virtues are to be scorned and rejected, as because in their effects, *i.e.* in their tendency to perpetuate and prolong the existence of the weak and those who are least well equipped and endowed by nature, they are anti-social in character and inimical to the survival of the strongest and most vigorous type of humanity. Consequently Nietzsche in effect maintains the following paradoxical position: he explains the existence of altruism upon egoistical principles; he advocates the total abolition of all altruism by carrying these same egoistical principles to their logical conclusion; he nevertheless appeals to that moral instinct which makes men ready to sacrifice their own narrow personal interests to the higher good of society—an instinct profoundly altruistic in character—as the ultimate justification of the ethics he enunciates. Such a position is a *reductio ad absurdum* of the attempt to transcend the ultimate character of those intuitions and feelings which prompt men to benevolence. Thus, though incidentally there is much to be learned from Nietzsche, especially from his criticism of the ethics of pessimism, or from the strictures he passes upon the negative morality of extreme asceticism or quietism, his system inevitably provides its own refutation. For no philosophy which travesties the real course of history and distorts the moral facts is likely to commend itself to the sober judgment of mankind however brilliant be its exposition or ingenious its arguments. Finally, the conceptions of strength, power and masterfulness by which Nietzsche attempts to determine his own moral ideal, become, when examined, as relative and unsatisfactory as other criteria of moral action said to be deduced from evolutionary principles. Men desire strength or power not as ends but as means to ends beyond them; Nietzsche is most convincing when the *Übermensch* is left undefined. Imagined as ideal man, *i.e.* as morality depicts him, he becomes intelligible; imagined as Nietzsche describes him he reels back into the beast, and that distinction which chiefly separates man from the animal world out of which he has emerged, viz. his unique power of self-consciousness and self-criticism, is obliterated.

It was upon this crucial difficulty, *i.e.* the transition in the

T. H. Green.

evolution of morality from the stage of purely animal and unconscious action to specifically human action,—*i.e.* action directed by self-conscious and purposive intelligence to an end conceived as good,—that the polemic of T. H. Green and his idealistic followers fastened. And it is perhaps unfortunate that metaphysical doctrines enunciated chiefly for the purposes of criticism not in themselves vitally necessary to the theory of morality propounded should have been regarded as the main contribution to ethical theory of idealist writers, and as such treated severely by hostile critics. Green's principal objection to evolutionary moral philosophy is contained in the argument that no merely "natural" explanation of the facts of morality is conceivable. The knowing consciousness,—*i.e.* so far as conduct is concerned the moral consciousness,—can never become an object of knowledge in the sense in which natural phenomena are objects of scientific knowledge. For such knowledge implies the existence of a knowing consciousness as a relating and uniting intelligence capable of distinguishing itself from the objects to which it relates. And more particularly the existence of the moral consciousness implies "the transition from mere want to consciousness of wanted object, from impulse to satisfy the want to effort for the realization of the wanted objects, implies the presence of the want to a subject which distinguishes itself from it." Consequently the facts of moral development imply with the emergence of human consciousness the appearance of something qualitatively different from the facts with which physiology for instance deals, imply a stratum as it were in development which no examination of animal tissues, no calculation of consequences with regard to the preservation of the species can ever satisfactorily explain. However far back we go in the history of humanity, if the presence of consciousness be admitted at all, it will be necessary to admit also the presence to consciousness of an ideal which can be accepted or rejected, of a power of looking before and after, and aiming at a future which is not yet fully realized. But unfortunately the temporary exigencies of criticism made it necessary for Green to emphasize the metaphysic of the self, *i.e.* to insist upon the necessity of a critical examination of the pre-requisites of any form of self-consciousness and especially of the knowing consciousness, to such an extent that critics have lost sight of the real dependence of his metaphysic upon the direct evidence of the moral consciousness. The philosophic value, the sincerity, the breadth and depth of his treatment of moral facts and institutions have been fully recognized. What has not been adequately realized is that the metaphysical basis of his system of ethics—the argument, for example, contained in the introduction to the *Prolegomena*—is unfairly treated if divorced from his treatment of morals as a whole, and that it can be justly estimated only if interpreted as much as the conclusion as the starting-point of moral theory. The doctrine of the eternity of the self, for instance, against which much criticism (*e.g.* Taylor, *The Problem of Conduct*, chap. ii.) has been directed, though it is chiefly expressed in the language of epistemology, has its roots nevertheless in the direct testimony of moral experience. For morality implies a power in the individual of rising above the interests of his own narrower self and identifying himself in the pursuit of a universal good with the true interests of all other selves. Similarly the conception of the self as a moral unity arises naturally out of the impossibility of finding the summum bonum in a succession of transient states of consciousness such as hedonism for example postulates. Good as a true universal can only be realized by a true self, and both imply a principle of unity not wholly expressible in terms of the particulars which it unifies. But whether the idealistic interpretation of the nature of universal good be the true one, *i.e.* whether we are justified in identifying that self-consciousness which is capable of grasping the principle of unity with the principle of unity which it grasps is a metaphysical and theistic problem comparatively irrelevant to Green's moral theory. It would be quite possible to accept his criticisms of naturalism and hedonism while rejecting many of the metaphysical inferences which he draws. A somewhat similar answer might be returned to those critics who find Green's use of the term "self-realization" or "self-development" as characteristic of the moral ideal unsatisfactory. It is quite easy to exhibit the futility of such a conception if understood formally for the practical purposes of moral philosophy. If the phrase be understood to mean the realization of some capacities of the self it does not appear to discriminate sufficiently between the good and bad capacities; while the realization under present conditions of all the capacities of a self is impossible. And to aim so far as is possible at all-round development would again ignore the distinction between vice and virtue. But used in the sense in which Green habitually uses it self-realization implies, as he puts it, the fulfilment by the good man of his rational capacity or the idea of a best that is in time, *i.e.* the distinction between the good and the bad self is never ignored, but is the fundamental assumption of his theory. And if it be urged that the expression is in any case tautological, *i.e.* that the good is defined in terms of self-realization and self-realization in terms of the good, it may be doubted whether any rational system of ethics can avoid a similar imputation. Green would admit that in a certain sense the conception of "good" is indefinable, *i.e.* that it can only be recognized in the particulars of conduct of which it is the universal form. Only, therefore, to those philosophers who believe in the existence of a criterion of morality, *i.e.* a universal test such as that of pleasure, happiness and the like, by which we can judge of the worth of actions, will Green's position seem absurd; since, on the contrary, such conceptions as those of "self-development" or "self-realization" seem to have a definite and positive value if they call attention to the metaphysical implications of morality and accurately characterize the moral facts. What ambiguity they possess arises from the ambiguity of morality itself. For moral progress consists in the actualization of what is already potentially in existence. The striking merit of Green's moral philosophy is that the idealism which he advocates is rooted and grounded in moral habits and institutions: and the metaphysic in which it culminates is based upon principles already implicitly recognized by the moral consciousness of the ordinary man. Nothing could be farther from Green's teaching than the belief that constructive metaphysics could, unaided by the intuitions of the moral consciousness, discover laws for the regulation of conduct.

Taylor.

But although Green's loyalty to the primary facts of the moral consciousness prevented him from constructing a rationalistic system of morals based solely upon the conclusions of metaphysics, it was perhaps inevitable that the revival of interest in metaphysics so prominent in his own speculations should lead to a more daring criticism of ethical first principles in other writers. Bradley's *Ethical Studies* had presented with great brilliancy an idealist theory of morality not very far removed from that of Green's *Prolegomena*. But the publication of *Appearance and Reality* by the same author marked a great advance in philosophical criticism of ethical postulates, and a growing dissatisfaction with current reconciliations between moral first principles and the conclusions of metaphysics. *Appearance and Reality* was not primarily concerned with morals, yet it inevitably led to certain conclusions affecting conduct, and it was no very long time before these conclusions were elaborated in detail. Professor A. E. Taylor's *Problem of Conduct* (1901) is one of the most noteworthy and independent contributions to Moral Philosophy published in recent years. But it nevertheless follows in the main Bradley's line of criticism and may therefore be regarded as representative of his school. There are two principal positions in Professor Taylor's work:—(1) a refusal to base ethics upon metaphysics, and (2) the discovery of an irreconcilable dualism in the nature of morality which takes many shapes, but may be summarized roughly as consisting in an ultimate opposition between egoism and altruism. With regard to the first of these Taylor says (*op. cit.* p. 4) that his object is to show that "ethics is as independent of metaphysical speculation for its principles and methods as any of the so-called 'natural sciences'; that its real basis must be sought not in philosophical theories about the nature of the Absolute or the ultimate constitution of the Universe, but in the empirical facts of human life as they are revealed to us in our concrete everyday experience of the world and mankind, and sifted and systematized by the sciences of psychology and sociology. . . . Ethics should be regarded as a purely 'positive' or 'experimental' and not as a 'speculative' science." With regard to the second position one quotation will suffice (*op. cit.* p. 183). "Altruism and egoism are divergent developments from the common psychological root of primitive ethical sentiment. Both developments are alike unavoidable, and each is ultimately irreconcilable with the other. Neither egoism nor altruism can be made the sole basis of moral theory without mutilation of the facts, nor can any higher category be discovered by the aid of which their rival claims may be finally adjusted."

Professor Taylor expounds these two theories with great brilliance of argument and much ingenuity, yet neither of them will perhaps carry complete conviction to the minds of the majority of his critics. It is curious, in the first place, to find the independence of moral philosophy upon metaphysics supported by metaphysical arguments. For whatever may be the real character of the interrelation of moral and metaphysical first principles it is obvious that Taylor's own dissatisfaction with current moral principles arises from an inability to believe in their ultimate rationality, *i.e.* a belief that they are untenable from the standpoint of ultimate metaphysics; and perhaps the most interesting portion of his book is the chapter entitled "Beyond Good and Bad," in which the highest and final form of the ethical consciousness of mankind is subjected to searching criticism. But further, it is becoming increasingly apparent that psychology (upon which Taylor would base morality) itself involves metaphysical assumptions; its position in fact cannot be stated except as a metaphysical position, whether that of subjective idealism or any other. And the need which most philosophers have felt for some philosophical foundation for morality arises, not from any desire to subordinate moral insight to speculative theory, but because the moral facts themselves are inexplicable except in the light of first principles which metaphysics alone can criticize.

Taylor himself attempts to find the roots of ethics in the moral sentiments of mankind, the moral sentiments being primarily feelings or emotions, though they imply and result in judgments of approval and disapproval upon conduct. But it may be doubted whether he succeeds in clearly distinguishing ethical feelings from ethical judgments, and if they are to be treated as synonymous it seems difficult to avoid the conclusion that the implications of moral "judgment" must involve a reference to metaphysics.

Moreover, it is obvious that a great part of Taylor's quarrel with current moral ideals arises from the fact that they do not commend themselves to the moral judgment, *i.e.* from the standpoint of real goodness they are unsatisfactory, being tainted with evil. Hence it appears difficult to reconcile what is in effect a belief in the validity of the judgments of the moral consciousness with a belief that the real source and justification of that consciousness are to be found in the very sentiments and vague mass of floating feelings upon which it pronounces. Scepticism seems to be the only possible result of such a position. Taylor's polemic against metaphysical systems of ethics is based throughout upon an alleged discrepancy and separation between the facts of moral "experience," the judgments of the moral consciousness, and theories as to the nature of these which the philosophers whom he attacks would by no means accept. There is no doubt a distinction between morality as a form of consciousness and reflection upon that morality. But such a distinction neither corresponds to, nor testifies to, the existence of a distinction between morality as "experience" and morality as "theory" or "idea."

Taylor is more persuasive when he is developing his second main thesis—that of the alleged existence of an ultimate dualism in the nature of morality. His accounts of the genesis of the conceptions of obligation and responsibility as of most of the ultimate conceptions with which moral philosophy deals will be accepted or rejected to the extent to which the main contention concerning the psychological basis of ethics commends itself to the reader. But in his exposition of the fundamental contradiction involved in morality elaborated with much care and illustrative argument he appeals for the most part to facts familiar to the unphilosophical moral consciousness. He begins by finding an ultimate opposition between the instincts of self-assertion and instincts which secure the production and protection of the coming generation even in the infra-ethical world with which biology deals. He traces this opposition into the forms in which it appears in the social life of mankind (as, *e.g.*, in the difficulty of reconciling the conflicting claims of individual self-development and self-culture and social service), and finds "a hidden root of insincerity and hypocrisy beneath all morality" (p. 243), inasmuch as it is not possible to pursue any one type of ideal without some departure from singleness of purpose. And he finds all the conceptions by which men have hoped to reconcile admitted antagonisms and divergencies between moral ideals claiming to be ultimate and authoritative alike unsatisfactory (p. 285). Progress is illusory; there is no satisfactory goal to which moral development inevitably tends; religion in which some take refuge when distressed by the inexplicable contradictions of moral conduct itself "contains and rests upon an element of make believe" (p. 489).

With Taylor's presentation of the difficulties with which morality is expected to grapple probably few would be found seriously to disagree, though they might consider it unduly pessimistic. But when he turns what is in effect a statement of certain forms of moral difficulty into an attack upon the logical and coherent character of morality itself, he is not so likely to command assent. For the difficulty all men meet with in realizing goodness, or in being moral, is not in itself evidence of an inherent contradiction in the nature of goodness as such. And what perhaps would first strike an unprejudiced critic in Taylor's examples of conflicting ideals or antagonistic yet ultimate moral judgments would be the perception that they are not necessarily moral ideas or judgments at all, and hence necessarily not ultimate.

The claims of self-culture and of social service may when considered in the abstract or in some hypothetical case appear antagonistic and irreconcilable. But when they present themselves to the individual moral consciousness it may be safely asserted (1) that there can be only one moral choice possible, *i.e.* that their opposition (where they are opposed) involves no conflict of duties; and (2) that whichever ideal is in the end preferred, opportunities will nevertheless be provided within its realization for the concurrent realization of activities and capacities ordinarily associated with the ideal alleged to be contradictoty. For just as there is no self-realization which does not involve self-sacrifice, so there is no room for that species of egoism within the confines of morality which is incompatible with social service.

It will be clear from the foregoing account of Taylor's work that the tendency of his thought, as of that of Bradley, is by no means directed to the confirmation or re-establishment of those principles of conduct recognized by the ordinary moral consciousness. Psychology or metaphysics tend in their systems to usurp the place of authority formerly assigned to ethics proper.

Martineau.

It would be true on the whole to assert that evolutionary systems of ethics such as those of Herbert Spencer, Sir Leslie Stephen or Professor S. Alexander (*Moral Order and Progress*, 1899), together with the metaphysical theories of morals of which T. H. Green and Bradley and Taylor are the chief representatives, have dominated the field of ethical speculation since 1870. Nevertheless it is only necessary to mention such a work as Martineau's *Types of Ethical Theory* to dispel the notion that the type of moral philosophy most characteristically English, *i.e.* consisting in the patient analysis of the form and nature of the moral consciousness itself, has given way or is likely to give way to more ambitious and constructive efforts. Martineau's chief endeavour was, as he himself says, to interpret, to vindicate, and to systematize the moral sentiments, and if the actual exhibition of what is involved, *e.g.*, in moral choice is the vindication of morality Martineau may be said to have been successful. It is with his interpretation and systematization of the moral sentiments that most of Martineau's critics have found fault. It is impossible, *e.g.*, to accept his ordered hierarchy of "springs of action" without perceiving that the real principle upon which they can be arranged in order at all must depend upon considerations of circumstances and consequences, of stations and duties, with which a strict intuitionalism such as that of Martineau would have no dealing.[1] Similarly the notion of Conscience as a special faculty giving its pronouncements immediately and without reflection cannot be maintained in the face of modern psychological analysis and is untrue to the nature of moral judgment itself. And Martineau is curiously unsympathetic to the universal and social aspect of morality with which evolutionary and idealist moral philosophers are so largely occupied. Nevertheless there have been few moral philosophers who have, apart from the idiosyncrasies of their special prepossessions, set forth with clearer insight or with greater nobility of language the essential nature of the moral consciousness.

Sidgwick.

Equal in importance to Martineau's work is Professor Sidgwick's *Methods of Ethics*, which appeared in 1874. The two works are alike in loftiness of outlook and in the fact that they are devoted to the re-examination of the nature of the moral consciousness to the exclusion of alien branches of inquiry. In most other respects they differ. Martineau is much more in sympathy with idealism than Sidgwick, whose work consists in a restatement from a novel and independent standpoint of the Utilitarian position. And Sidgwick has been far more successful than any other moral philosopher with the exception of T. H. Green and Bradley in founding a school of thought. Many of his most acute critics would be the first to admit how much they owe to his teaching. Chief among the more recent of these is G. E. Moore, whose book *Principia Ethica* is an important original contribution to ethical thought. And although Dr Hastings Rashdall (*The Theory of Good and Evil*, Oxford, 1907) is not in agreement with Sidgwick's own particular type of hedonistic theory in his own philosophical position, he occupies a point of view somewhat similar to that of Sidgwick's main attitude of Rational Utilitarianism. Rashdall's two volumes exhibit also a welcome return on the part of English thought to the proper business of the moral philosopher—the examination of the nature of moral conduct. Other works, such as Professor L. T. Hobhouse's *Morals in Evolution* or Professor E. A. Westermarck's *Origin and Development of the Moral Ideas*, testify to a continued interest in the history of morality and in the anthropological inquiries with which moral philosophy is closely connected.

Much that is of importance for moral philosophy has recently been written upon problems that more properly belong to the philosophy of religion and the theory of knowledge. J. F. M'Taggart's *Studies in Hegelian Cosmology*, and his later work, *Some Dogmas of Religion*, contain interesting contributions to the theory of pleasure and of the problem of free will and determinism. A notable instance of this tendency is seen in the developments of the theory of pragmatism (*q.v.*), for which F. C. S. Schiller has proposed the general term "humanism." Such aspects as concern ethics include, for example, the limited indeterminism involved in the theory, the attitude of the religious consciousness expressed by William James (*Will to Believe* and *Pragmatism*), and the pragmatic conception of the good. And the widespread interest in social problems has produced a revival of speculation concerning questions partly political and party ethical in character, *e.g.* the nature of justice. Finally it has become apparent that many problems hitherto left for political economy to solve belong more properly to the moralist, if not to the moral philosopher, and it may be confidently expected that with the increased complexity of social life and the disappearance of many sanctions of morality hitherto regarded as inviolable, the future will bring a renewed and practical interest in the theory of conduct likely to lead to fresh developments in ethical speculation.

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ETHIOPIA, or AETHIOPIA (Gr. *Αἰθιοπία*), the ancient classical name of a district of north-eastern Africa, bounded on the N. by Egypt and on the E. by the Red Sea.[1] The application of the name has varied considerably at different times. In the Homeric poems the *Aethiopes* are the furthest of mankind both eastward and westward; the gods go to their banquets and probably the Sun sets in their country. With the growth of scientific geography they came to be located somewhat less vaguely, and indeed their name was employed as the equivalent of the Assyrian and Hebrew Cush (*q.v.*), the Kesh or Ekōsh of the Hieroglyphics (first found in Stele of Senwosri I.), *i.e.* a country extending from about the 24th to the 10th degree of N. lat., while its limits to the E. and W. were doubtful. The etymology of the name, which to a Greek ear meant "swarthy-faced," is unknown, nor can we say why in official inscriptions of the Axumite dynasty the word is used as the equivalent of Habashat (whence the modern Abyssinia), which, from the context would appear to denote a tribe located in S. Arabia, whose name was rendered by the Greek geographers as *Abaseni* and *Abissa*.

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[1] Cf. A. Seth Pringle-Pattison, *The Philosophical Radicals. Martineau's Philosophy*, p. 92.

[1] For the topography and later history see SUDAN and ABYSSINIA.

The inhabitants of Ethiopia, partly perhaps owing to their honourable mention in the Homeric poems, attracted the attention of many Greek researchers, from Democritus onwards. Herodotus divides them into two main groups, a straight-haired race and a woolly-haired race, dwelling respectively to the East and West, and this distinction is confirmed by the Egyptian monuments. From his time onwards various names of tribes are enumerated, and to some extent geographically located, most of these appellations being Greek words, applied to the tribes by strangers in virtue of what seemed to be their leading characteristics, *e.g.* "Long-lived," "Fish-eaters," "Troglodytes," &c. The bulk of our information is derived from Egyptian monuments, whence it appears that, originally occupied by independent tribes, who were raided (first by Seneferu or Snefru, first king of the IVth or last of the IIIrd Dynasty) and gradually subjected by Egyptian kings (the steps in this process are traced by E. W. Budge, *The Egyptian Sudan*, 1907, i. 505 sqq.), under the XVIIIth Dynasty it became an Egyptian province, administered by a viceroy (at first the Egyptian king's son), called prince of Kesh, and paying tributes in negroes, oxen, gold, ivory, rare beads, hides and household utensils. The inhabitants frequently rebelled and were as often subdued; records of these repeated conquests were set up by the Egyptian kings in the shape of steles and temples; of the latter the temple of Amenhotep (Amenophis) III. at Soleb or Sulb seems to have been the most magnificent. Ethiopia became independent towards the 11th century B.C., when the XXIst Dynasty was reigning in Egypt. A state was founded, having for its capital Napata (mod. *Merawi*) at the foot of Jebel Barkal, "the sacred mountain," which in time became formidable, and in the middle of the 8th century conquered Egypt; an Egyptian campaign is recorded in the famous stele of King Pankhi. The fortunes of the Ethiopian (XXVth) Dynasty belong to the history of Egypt (*q.v.*). After the Ethiopian yoke had been shaken off by Egypt, about 660 B.C., Ethiopia continued independent, under kings of whom not a few are known from inscriptions. Besides a number whose names have been discovered in cartouches at Jebel Barkal, the following, of whom all but the third have left important steles, can be roughly dated: Tandamane, son of Tirhaka (667–650), Asperta (630–600), Pankharer (600–560), Harsiōtf (560–525), Nastasen (525–500). From the evidence of the stele of the second (the Coronation Stele) and that of the fifth it has been inferred that the sovereignty early in this period became elective, a deputation of the various orders in the realm being (as Diodorus states), when a vacancy occurred, sent to Napata, where the chief god Amen selected out of the members of the royal family the person who was to succeed, and who became officially the god's son; and it seems certain that the priestly caste was more influential in Ethiopia than in Egypt both before and after this period. Another stele (called the Stele of Excommunication) records the expulsion of a priestly family guilty of murder (H. Schäfer, *Klio*, vi. 287): the name of the sovereign who expelled them has been obliterated. The stele of Harsiōtf contains the record of nine expeditions, in the course of which the king subdued various tribes south of Meroë and built a number of temples. The stele of the last of these sovereigns, now in the Berlin Museum, and edited by H. Schäfer (Leipzig, 1901), contains valuable information concerning the state of the Ethiopian kingdom in its author's time. Shortly after his accession he was threatened with invasion by Cambyses, the Persian conqueror of Egypt, but (according to his own account) destroyed the fleet sent by the invader up the Nile, while (as we learn from Herodotus) the land-force succumbed to famine (see CAMBYSES). It further appears that in his time and that of his immediate predecessors the capital of the kingdom had been removed from Napata, where in the time of Harsiōtf the temples and palaces were already in ruins, to Meroë at a distance of 60 camel-hours to the south-east. But Napata retained its importance as the religious metropolis; it was thither that the king went to be crowned, and there too the chief god delivered his oracles, which were (it is said) implicitly obeyed. The local names in Nastasen's inscription, describing his royal circuit, are in many cases obscure. A city named Pnups (Hierogl Pa-Nebes) appears to have constituted the most northerly point in the empire. These Ethiopian kings seem to have made no attempt to reconquer Egypt, though they were often engaged in wars with the wild tribes of the Sudan. For the 5th and 4th centuries B.C. the history of the country is a blank. A fresh epoch was, however, inaugurated by Ergamenes, a contemporary of Ptolemy Philadelphus, who is said to have massacred the priests at Napata, and destroyed sacerdotal influence, till then so great that the king might at the priests' order be compelled to destroy himself; Diodorus attributes this measure to Ergamenes' acquaintance with Greek culture, which he introduced into his country. A temple was built by this king at Pselcis (Dakka) to Thoth. Probably the sovereignty again became hereditary. Occasional notices of Ethiopia occur from this time onwards in Greek and Latin authors, though the special treatises by Agatharchides and others are lost. According to these the country came to be ruled by queens named Candace. One of them was involved in war with the Romans in 24 and 23 B.C.; the land was invaded by C. Petronius, who took the fortress Premis or Ibrim, and sacked the capital (then Napata); the emperor Augustus, however, ordered the evacuation of the country without even demanding tribute. The stretch of land between Assuan (Syene) and Maharraka (Hiera Sycaminus) was, however, regarded as belonging to the Roman empire, and Roman cohorts were stationed at the latter place. To judge by the monuments it is possible that there were queens who reigned alone. Pyramids were erected for queens as well as for kings, and the position of the queens was little inferior to that of their consorts, though, so far as monumental representations go, they always yielded precedence to the latter. Candace appears to be found as the name of a queen for whom a pyramid was built at Meroë. A great builder was Netekamane, who is represented with his queen Amanetari on temples of Egyptian style at many points up the Nile—at Amara just above the second cataract, and at Napata, as well as at Meroë, Benaga and Naga in the distant Isle of Meroë. He belongs, probably, to the Ptolemaic age. Later, in the Roman period, the type in sculpture changed from the Egyptian. The figures are obese, especially the women, and have pronounced negro features, and the royal person is loaded with bulging gold ornaments. Of this period also there is a royal pair, Netekamane and Amanetari, imitating the names of their conspicuous predecessors. In the 4th century A.D. the state of Meroë was ravaged by the Nubas (?) and the Abyssinians, and in the 6th century its place was taken by the Christian state of Nubia (see DONGOLA).

Contrary to the opinion of the Greeks, the Ethiopians appear to have derived their religion and civilization from the Egyptians. The royal inscriptions are written in the hieroglyphic character and the Egyptian language, which, however, in the opinion of experts, steadily deteriorate after the separation of Ethiopia from Egypt. About the time of Ergamenes, or (according to some authorities) before, a vernacular came to be employed in inscriptions, written in a special alphabet of 23 signs in parallel hieroglyphic and cursive forms. The cursive is to be read from right to left, the hieroglyphic, contrary to the Egyptian method, in the direction in which the figures face. The Egyptian equivalents of six characters have been made out by the aid of bilingual cartouches. Words are divided from each other by pairs of dots, and it is clear that the forms and values of the signs are largely based on Egyptian writing; but as yet decipherment has not been attained, nor can it yet be stated to what group the language should be assigned (F. Ll. Griffith in D. R. MacIver's *Areika*, Oxford, 1909, and later researches).

Notices in Greek authors are collected by P. Paulitschke, *Die geographische Erforschung des afrikanischen Continents* (Vienna, 1880); the inscriptions were edited and interpreted by G. Maspero, *Revue archéol.* xxii., xxv.; *Mélanges d'Assyriologie et d'Égyptologie*, ii., iii.; *Records of the Past*, vi.; *T.S.B.A.* iv.; Schäfer, *l.c.*, and *Zeitschrift für ägyptische Sprache*, xxxiii. See also J. H. Breasted, "The Monuments of Sudanese Nubia," in *American Journal of Semitic*

Languages (October 1908), and the work of E. W. Budge cited above. A description of the chief ruins and the results of Dr D. R. MacIver's researches in northern Nubia, begun in 1907, will be found under SUDAN: *Anglo-Egyptian*.

The Axumite Kingdom.—About the 1st century of the Christian era a new kingdom grew up at Axum (*q.v.*), of which a king Zoscales is mentioned in the *Periplus Maris Erythraei*. Fragments of the history of this kingdom, of which there is no authentic chronicle, have been made out chiefly by the aid of inscriptions, of which the following is a list:—(1) Greek inscription of Adulis, copied by Cosmas Indicopleustes in 545, the beginning, with the king's name, lost. (2) Sabaean inscription of Ela Amida in two halves, discovered by J. Theodore Bent at Axum in 1893, and completed by E. Littmann in 1906. (3) Ethiopic inscription probably of the same king, imperfect (Littmann). (4) Trilingual inscription of Aeizanes, the Greek version discovered by Henry Salt in 1805, the Sabaean by Bent, and the Ethiopic (Geez) by Littmann. (5) Ethiopic inscription of Aeizanes (so Littmann), son of Ela Amida, discovered by Eduard Rüppell in 1833. (6) Ethiopic inscriptions of Hetana-Dan'el, son of Dabra Efrem. These are all long inscriptions giving details of wars, &c. The sixth is later than the rest, which are to be attributed to the most flourishing period of the kingdom, the 4th and 5th centuries A.D. The fourth is pagan, the fifth Christian, Aeizanes having in the interval embraced Christianity. It was to this king that the emperor Constantius addressed a letter in 356 A.D.

Aeizanes and his successors style themselves kings of the Axumites, Homerites (Himyar), Raidan, the Ethiopians (Habašat), the Sabaeans, Silee, Tiamo, the Bugaites (Bega) and Kasu. This style implies considerable conquests in South Arabia, which, however, must have been lost to the Axumites by A.D. 378. They claim to rule the Kasu or Meroitic Ethiopians; and the fifth inscription records an expedition along the Atbara and the Nile to punish the Nuba and Kasu, and a fragment of a Greek inscription from Meroë was recognized by Sayce as commemorating a king of Axum. Except for these inscriptions Axumite history is a blank until in the 6th century we find the Axumite king sending an expedition to wreck the Jewish state then existing in S. Arabia, and reducing that country to a state of vassalage: the king is styled in Ethiopian chronicles Caleb (Kaleb), in Greek and Arabic documents El-Esbaha. In the 7th century a successor to this king, named Abraha or Abraham, gave refuge to the persecuted followers of Mahomet at the beginning of his career (see ARABIA: *History, ad init.*). A few more names of kings occur on coins, which were struck in Greek characters till about A.D. 700, after which time that language seems definitely to have been displaced in favour of Ethiopic or Geez: the condition of the script and the coins renders them all difficult to identify with the names preserved in the native lists, which are too fanciful and mutually contradictory to furnish of themselves even a vestige of history. For the period between the rise of Islam and the beginning of the modern history of Abyssinia there are a few notices in Arabic writers; so we have a notice of a war between Ethiopia and Nubia about 687 (C. C. Rossini in *Giorn. Soc. Asiat. Ital.* x. 141), and of a letter to George king of Nubia from the king of Abyssinia some time between 978 and 1003, when a Jewish queen Judith was oppressing the Christian population (I. Guidi, *ibid.* iii. 176, 7).

The Abyssinian chronicles, it may be noted, attribute the foundation of the kingdom to Menelek (or Ibn el-Hakim), son of Solomon and the queen of Sheba. The Axumite or Menelek dynasty was driven from northern Abyssinia by Judith, but soon after another Christian dynasty, that of the Zagués, obtained power. In 1268 the reigning prince abdicated in favour of Yekūnō Amlāk, king of Shoa, a descendant of the monarch overthrown by Judith (see ABYSSINIA).

See A. Dillman, *Die Anfänge des axumitischen Reiches* (Berlin, 1879); E. Drouin, *Revue archéol.* xliv. (1882); T. Mommsen, *Geschichte der römischen Provinzen*, chap. xiii.; W. Dittenberger, *Orientis Graeci Inscriptiones selectae*, Nos. 199, 200; Littmann u. Kroncker, *Vorbericht der deutschen Aksum-Expedition* (Berlin, 1906), and Littman's subsequent researches.

ETHIOPIC LITERATURE

The employment of the Geez or Ethiopic language for literary purposes appears to have begun no long time before the introduction of Christianity into Abyssinia, and its pagan period is represented by two Axumite inscriptions (published by D. H. Müller in J. T. Bent's *Sacred City of the Ethiopians*, 1893), and an inscription at Matara (published by C. C. Rossini, *Rendiconti Accad. Lincei*, 1896). As a literary language it survived its use as a vernacular, but it is unknown at what time it ceased to be the latter. In Sir W. Cornwallis Harris's *Highlands of Aethiopia* (1844) there is a list of rather more than 100 works extant in Ethiopic; subsequent research has chiefly brought to light fresh copies of the same works, but it has contributed some fresh titles. A conspectus of all the MSS. known to exist in Europe (over 1200 in number) was published by C. C. Rossini in 1899 (*Rendiconti Accad. Lincei*, ser. v. vol. viii.); of these the largest collection is that in the British Museum, but others of various sizes are to be found in the chief libraries of Europe. R. E. Littmann (in the *Zeitschrift für Assyriologie*, xv. and xvi.) describes two collections at Jerusalem, one of which contains 283 MSS.; and Rossini (*Rendiconti*, 1904) a collection of 35 MSS. belonging to the Catholic mission at Cheren. Other collections exist in Abyssinia, and many MSS. are in private hands. In 1893 besides portions of the Bible some 40 Ethiopic books had been printed in Europe (enumerated in L. Goldschmidt's *Bibliotheca Aethiopica*), but many more have since been published.

Geez literature is ordinarily divided into two periods, of which the first dates from the establishment of Christianity in the 5th century, and ends somewhere in the 7th; the second from the re-establishment of the Salomonic dynasty in 1268, continuing to the present time. It consists chiefly of translations, made in the first period from Greek, in the second from Arabic. It has no authors of the first or even of the second rank. Its character as a sacred and literary language is due to its translation of the Bible, which in the ordinary enumeration is made to contain 81 books, 46 of the Old Testament, and 35 of the New. These figures are most probably obtained by adding to the ordinary canonical books *Maccabees*, *Tobit*, *Judith*, *Wisdom*, *Ecclesiasticus*, *Baruch*, *Jubilees*, *Enoch*, the *Ascension of Isaiah*, *Ezra IV.*, *Shepherd of Hermas*, the *Synodos* (Canons of the Apostles), the *Book of Adam*, and *Joseph Ben Gorion*. For the distinction between canonical and apocryphal appears to be unknown to the Ethiopic Church, whose chief service to Biblical literature consists in its preservation of various apocryphal works which other parts of Christendom have lost or possess only in an imperfect form (see ENOCH; JUBILEES, BOOK OF, &c.). It should be observed that the *Maccabees* of the Ethiopic Bible is an entirely different work from the books of that name included in the Septuagint, of which, however, the Abyssinians have a recent version made from the Vulgate; specimens of their own *Maccabees* have been published by J. Horovitz in the *Zeitschrift für Assyriologie*, vol. xx. The MSS. of the Biblical books vary very much, and none of them can claim any great antiquity; the oldest extant MS. of the four Books of Kings appears to be one in the Museo Borgiano, presented by King Amda Sion (1314) to the Virgin Mary in Jerusalem (described by N. Roupp, *ibid.* xvi. 296-342). Hence P. de Lagarde supposed the Ethiopic version to have been made from the Arabic, which indeed is in accordance with a native tradition. This opinion is held by few; C. F. A. Dillman distinguished in the case of the Old Testament three classes of MSS., a *versio antiqua*, made from the Septuagint (probably in the Hesychian text), a class revised from Greek MSS., and a class revised from the Hebrew (probably through the medium of an Arabic version). An examination of ten chapters of St Matthew by L. Hackspill (*ibid.* vol. xi.) led to the result that the Ethiopic version of the Gospels was made about A.D. 500, from a Syro-occidental text, and that this original translation is represented by Cod. Paris. Aeth. 32; whereas most MSS. and all printed editions contain a text influenced by the Alexandrian Vulgate, and show traces of Arabic. Rossini (*ibid.* x. 232) has made it probable that the

Abba Salāmā, whom the native tradition identifies with Frumentius, evangelist of Abyssinia, to whom the translation of the Bible was ascribed, was in reality a Metropolitan of the early 14th century, who revised the corrupt text then current. Of the ancient translation the latest book is said to be Ecclesiasticus, translated in the year 678. The New Testament has been published repeatedly (first in Rome, 1548–1549; some letters about its publication were edited by I. Guidi in the *Archivio della Soc. Rom. di Storia Patria*, 1886), and C. F. A. Dillmann edited a critical text of most of the Old Testament and Apocrypha, but did not live to complete it; portions have been edited by J. Bachmann and others.

Other translations thought to belong to the first period are the *Sher'ata Makhbār*, ascribed to S. Pachomius; the *Kerilos*, a collection of homilies and tracts, beginning with Cyril of Alexandria *De recta fide*; and the *Physiologus*, a fanciful work on Natural History (edited by F. Hommel, Leipzig, 1877).

Of the works belonging to the second period much the most important are those which deal with Abyssinian history A court official, called *sahāfē te'ezāzenet* (secretary), having under him a staff of scribes, was employed to draw up the public annals year by year; and on these official compositions the Abyssinian histories are based. The earliest part of the Axum chronicle preserved is that recording the wars of Amda Sion (1314–1344) against the Moslems; it is doubtful, however, whether even this exists in its original form, as some scholars think; according to its editor (J. Perruchon in the *Journ. Asiat.* for 1889) it is preserved in a recension of the time of King Zar'a Ya'kūb. Under King Lebna Dengel (1508–1540) the annals of his four predecessors, Zar'a Ya'kūb, Baeda Maryam, Eskender and Na'od (1434–1508) were drawn up; those of the first two were published by J. Perruchon (Paris, 1893); in the *Journ. Asiat.* for 1894 the same scholar published a further fragment of the history of Baeda Maryam, written by the tutor to the king's children, and the history of Eskender, Amda Sion II. and Na'od as compiled in Lebna Dengel's time. The history of Lebna Dengel was published by the same scholar (*Journ. Semit.* i. 274) and Rossini (*Rendiconti*, 1894, v. p. 617); that of his successor Claudius (1540–1559) by Conzelmann (Paris, 1895); that of his successor Minas (1559–1563) by F. M. E. Pereira (Lisbon, 1888); those of the three following kings, Sharsa Dengel, Zā Dengel, and Ya'kūb, by Rossini (*Rendiconti*, 1893). The history of the next king Sysenius (1606–1632) by Abba Meherka Dengel and Tekla Shelase was edited by Pereira (Lisbon, 1892); the chronicles of Joannes I., Iyasu I. and Bakaffa (1682–1730) by I. Guidi, with a French translation (Paris, 1903–1905), all are contemporary, and the names of the chroniclers of the last two kings are recorded. Besides these we have the partly fabulous chronicle of Lalibela (of uncertain date, but before the Salomonian dynasty was restored), edited by Perruchon (Paris, 1892); and a brief chronicle of Abyssinia, drawn up in the reign of Iyasu II. (1729–1753), embodying materials abridged, but often unaltered, was published by R. Basset, in the *Journ. Asiat.* for 1882 (cf. Rossini in the *Rendiconti*, 1893–1894, p. 668), and has since formed the basis for Abyssinian history. Many compilations of the sort exist in MS. in libraries, and great praise is bestowed on the one which E. Rüppell, when travelling in Abyssinia, ordered to be drawn up for his use. It is now in the collection of his MSS. at Frankfurt. Ethiopic scholars speak of a special "historical style" which comes from the mixture of the styles of different periods, and the admixture of Amharic phrases and idioms. The historian of the wars of Amda Sion is credited with some literary merit; most of the chroniclers have little.

The remaining literature of the second period is thought to begin somewhat earlier than these chronicles. To the time of King Yekūnō Amlāk (1268–1283) the historical romance called *Kebra Nagaset* (Glory of Kings) is assigned by its editor, C. Bezold (Bavarian Academy, 1904), other scholars gave it a somewhat later date. Its purpose is to glorify the Salomonian dynasty, whence, in spite of a colophon which declares it to be a translation, it was regarded as an original work; since, however, it shows evident signs of having been translated from Arabic, Bezold supposes that its author, Ishāk, was an immigrant whose native language was Arabic, in which therefore he would naturally write the first draft of his book. To the time of Yagbea Sion (*ob.* 1294) belongs the *Vision of the Prophet Habakkuk in Kartasā*, as also the works of Abba Salāmā, regarded as the founder of the Ethiopic renaissance, one of whose sermons is preserved in a Cheren MS. With his name are connected the *Acts of the Passion*, the *Service for the Dead* and the translation of Philexius, *i.e.* Philoxenus. King Zar'a Ya'kūb composed or had composed for him as many as seven books; the most important of these is the *Book of Light* (Mashafa Berhān), paraphrased as *Kirchenordnung*, by Dillmann, who gave an analysis of its contents (*Über die Regierung des Königs Zar'a Ya'kob*, Berl. Acad., 1884). He also organized the compilation of the Miracles of the Virgin Mary, one of the most popular of Ethiopic books; a magnificent edition was printed by E. W. Budge in the Meux collection (London, 1900). In the same reign the Arabic chronicle of al-Makin was translated into Geez. Under Lebna Dengel (*ob.* 1540), besides the above-mentioned collection of chronicles, we hear of the translation from the Arabic of the history and martyrdom of St George, the Commentary of J. Chrysostom on the Epistle to the Hebrews, and the ascetic works of J. Saba called *Aragāwi manfasāwi*. Under Claudius (1540–1559) Maba Sion is said to have translated from the Arabic *The Faith of the Fathers*, a vast compilation, including the *Didascalia Apostolorum* (edited by Platt, London, 1834), and the *Creed of Jacob Baradaeus* (published by Cornill, *ZDMG.* xxx. 417-466), and to the same reign belong the *Book of Extreme Unction* (*Mashafa Kandīl*), and the religious romance *Barlaam et Joasaph* also paraphrased from the Arabic (partly edited by A. Zotenberg in *Notices et Extraits*, vol. xxviii.). The *Confession of Faith* of King Claudius has been repeatedly printed. The reign of Sharsa Dengel (*ob.* 1595) was marked by many literary monuments, such as the religious and controversial compilation called *Masmura Chrestos*, and the translation, by a certain Salik, of the religious encyclopaedia (Mashafa Hāiā) of the monk Nikon; an Arab merchant from Yemen, who took on conversion the name Anbākōm (Habakkuk), translated a number of books from the Arabic. Under Ya'kūb (*ob.* 1605) the valuable chronicle of John of Nikiou was translated from Arabic (edited by A. Zotenberg with French translation in *Notices et extraits*, vol. xxiv.). Under John, about 1687, the *Spiritual Medicine* of Michael, bishop of Adtrib and Malig, was translated. The literature that is not accurately dated consists largely of liturgies, prayers and hymns; Ethiopic poetry is chiefly, if not entirely, represented by the last of these, the most popular work of the kind being an ode in praise of the Virgin, called *Weddase Maryam* (edited by K. Fries, Leipzig, 1892). Various hymn-books bear the names *Degua*, *Zemmare* and *Mawas'et* (Antiphones); there is also a biblical history in verse called *Mashafa Madbal* or *Mestira Zamān*. Homilies also exist in large numbers, both original and translated, sometimes after the Arabic fashion in rhymed prose. Hagiology is naturally an important department in Ethiopic literature. In the great collection called *Synaxar* (translated originally from Arabic, but with large additions) for each day of the year there is the history of one or more saints; an attempt has been made by H. Dünsing (1900) to derive some actual history from it Many texts containing lives of individual saints have been issued. Such are those of Maba Sion and Gabra Chrestos, edited by Budge in the Meux collection (London, 1899); the Acts of S. Mercurius, of which a fragment was edited by Rossini (Rome, 1904); the unique MS. of the original, one of the most extensive works in the Geez language, was burned by thieves who set fire to the editor's house. The same scholar began a series of *Vitae Sanctorum antiquiorum*, while *Monumenta Aethiopiae hagiologica* and *Vitae Sanctorum indigenarum* have been edited by B. Turaiev (Leipzig and St Petersburg, 1902, and Rome, 1905). Other lives have been edited by Pereira, Guidi, &c. Similar in historical value to these works is the *History of the Exploits of Alexander*, of which various recensions have been edited by Budge (London, 1895). See further ALEXANDER THE GREAT, section on the legends, *ad fin.*

Of Law the most important monument is the *Fatha Nagast*

(Judgment of Kings), of which an official edition was issued by I. Guidi (Rome, 1899), with an Italian translation; it is a version probably made in the early 16th century of the Arabic code of Ibn 'Assal, of the 12th century, whose work, being meant for Christians living under Moslem rule, was not altogether suitable for an independent Christian kingdom; yet the need for such a code made it popular and authoritative in Abyssinia. The translator was not quite equal to his task, and the Brit. Mus. MS. 800 exhibits an attempt to correct it from the original.

Science can scarcely be said to exist in Geez literature, unless a medical treatise, of which the British Museum possesses a copy, comes under this head. Philosophy is mainly represented by mystical commentaries on Scripture, such as the *Book of the Mystery of Heaven and Earth*, by Ba-Hailu Michael, probably of the 15th century, edited by Perruchon and Guidi (Paris, 1903). There is, however, a translation of the Book of the Wise Philosophers, made by Michael, son of Abba Michael, consisting of various aphorisms; specimens have been edited by Dillmann in his Chrestomathy, and J. Cornill (Leipzig, 1876). There is also a translation of *Secundus the Silent*, edited by Bachmann (Berlin, 1888). Far more interesting than these is the treatise of Zar'a Ya'kūb of Axum, composed in the year 1660 (edited by Littmann, 1904), which contains an endeavour to evolve rules of life according to nature. The author reviews the codes of Moses, the Gospel and the Koran, and decides that all contravene the obvious intentions of the Creator. He also gives some details of his own life and his occupation of scribe. A less original treatise by Walda Haywat accompanies it. Epistolography is represented by the diplomatic correspondence of some of the kings with the Portuguese and Spanish courts; some documents of this sort have been edited by C. Beccari, *Documenti inediti per la storia d' Etiopia* (Rome, 1903); lexicography, by the vocabulary called *Sawāsew*. The first Ethiopic book printed was the Psalter (Rome, 1513), by John Potken of Cologne, the first European who studied the language.

See C. C. Rossini, "Note per la storia letteraria Abissina," in *Rendiconti della R. Accad. dei Lincei* (1899); Fumagalli, *Bibliografia Etiopica* (1893); Basset, *Études sur l'histoire de l'Éthiopie* (1882); Catalogues of various libraries, especially British Museum (Wright), Paris (Zotenberg), Oxford and Berlin (Dillmann), Frankfurt (Goldschmidt). Plates illustrating Ethiopic palaeography are to be found in Wright's Catalogue; an account of the illustrations in Ethiopic MSS. is given by Budge in his *Life of Maba Sion*; and a collection of inscriptions in the church of St Stefano dei Mori, in Rome, by Gallina in the *Archivio della Soc. Rom. di Storia Patria* (1888).

(D. S. M.*)

ETHNOLOGY and **ETHNOGRAPHY** (from the Gr. ἔθνος, race, and λογος, science, or γράφειν, to write), sciences which in their narrowest sense deal respectively with man as a racial unit (*mankind*), *i.e.* his development through the family and tribal stages into national life, and with the distribution over the earth of the races and nations thus formed. Though the etymology of the words permits in theory of this line of division between ethnology and ethnography, in practice they form an indivisible study of man's progress from the point at which anthropology (*q.v.*) leaves him.

Ethnology is thus the general name for investigations of the widest character, including subjects which in this encyclopaedia are dealt with in detail under separate headings, such as ARCHAEOLOGY, ART (and allied articles), COMMERCE, GEOGRAPHY (and the headings for countries and tribes), FAMILY, NAME, ETHICS, LAW, MYTHOLOGY, FOLK-LORE (and allied articles), PHILOLOGY (and allied articles), AGRICULTURE, ARCHITECTURE, RELIGION, SOCIOLOGY, &c., &c. It covers generally the whole history of the material and intellectual development of man, as it has passed through the stages of (*a*) hunting and fishing, (*b*) sheep and cattle tending, (*c*) agriculture, (*d*) industry. It investigates his food, his weapons, tools and implements, his housing, his social, economic and commercial organization, forms of government, language, art, literature, morals, superstitions and religious systems. In this sense ethnology is the older term for what now is called sociology. At the present day the progress of research has in practice, however, restricted the "ethnologist" as a rule to the study of one or more branches only of so wide a subject, and the word "ethnology" is used with a somewhat vague meaning for any ethnological study; each country or nation has thus its own separate ethnology. It becomes more convenient, therefore, to deal with the ethnology as a special subject in each case. "Ethnography," in so far as it has a distinctive province, is then conveniently restricted to the scientific mapping out of different racial regions, nations and tribes; and it is only necessary here to refer the reader to the separate articles on continents, &c., where this is done. The only fundamental problem which need here be referred to is that of the whole question of the division of mankind into separate races at all, which is consequential on the earlier problem (dealt with in the article ANTHROPOLOGY) as to man's origin and antiquity.

If we assume that man existed on the earth in remote geological time, the question arises, was this pleistocene man specifically one? What evidence is there that he represented, in his different habitats a series of varieties of one species rather than a series of species? The evidence is of three kinds, (1) anatomical, (2) physiological, (3) cultural and psychical.

1. Dr Robert Munro, in his address to the Anthropological section of the British Association in 1893, said: "All the osseous remains of man which have hitherto been collected and examined point to the fact that, during the larger portion of the quarternary period, if not, indeed, from its very commencement, he had already acquired his human characteristics." By "characteristics" is here meant those anatomical ones which distinguish man from other animals, not the physical criteria of the various races. Do, then, these anatomical characteristics of pleistocene man show such differences among themselves and between them and the types of man existing to-day as to justify the assumption that there has ever been more than one species of man?

The undoubted "osseous remains" of pleistocene man are few. Burial was not practised, and the few bones found are for the most part those which have by mere chance been preserved in caves or rock-shelters. Of these the three chief "finds," in order of probable age, are the Trinil (Java) brain-cap, the lowest human skull yet described, characterized by depressed cranial arch, with a cephalic index of 70; the Neanderthal (Germany) skull, remarkable for its flat retreating curve with an index of 73-76; and the two nearly perfect skeletons found at Spy (Belgium), the skulls of which exhibit enormous brow ridges with cranial indices of 70 and 75. All these skulls, taken in conjunction with other well-authenticated human remains such as those found at La Naulette (Belgium), Shipka (Balkan Peninsula), Olmo (Italy), Predmert (Bohemia) and in Argentina and Brazil, make it possible to reconstruct anatomically the varying types of pleistocene man, and to establish the fact that in essential features the same primitive type has persisted through all time. The skeleton bones show differences so slight as to admit of pathological or other explanation. What Professor Kollmann says of man to-day was true in the remotest ages. Referring to Cuvier's statement that from a single bone it is possible to determine the very species to which an animal belongs, he says, "Precisely on this ground I have mainly concluded that the existence of several human species cannot be recognized, for we are unacquainted with a single tribe from a single bone of which we might with certainty determine to what species it belonged." Such differences as the bones exhibit are progressive modifications towards the higher neolithic and modern types, and are in themselves entirely incapable of supporting the theory that the owner of the Trinil skull, say, and the "man of Spy" belonged to separate species. All these "osseous remains" belong to the palaeolithic period, and from the cranial indices it is thus clear that palaeolithic man was long-headed. Neolithic man is, speaking generally, round-headed, and it has been urged that round-headedness is entirely synchronous with the neolithic age, and that the long-headed palaeolithic species of mankind gave place all at once to the round-headed neolithic species. The point thus raised involves the physiological as well as, indeed more than, the anatomical proofs of man's specific unity.

2. All physiologists agree that species cannot breed with species. Darwin himself laid it down as a fundamental principle. If then the palaeolithic and neolithic types represented separate species, they would be found to remain distinct through all time. This is not the case. There is evidence that extreme dolichocephaly continued into neolithic times, and was only slowly modified into brachycephaly. In the neolithic caves of Italy, Austria, Belgium, and the barrows of Great Britain, skulls of all types are found. The later cave-dwellers and early dolmen builders of Europe were at first long-headed, then of medium type, and finally in some places exclusively round-headed. In England the round-heads appear to be synchronous with the metal age, as shown by the contents of the barrows, and, as on the continental mainland, the two types gradually blended. Permanent fertility between them in prehistoric Europe is thus proved. And this is the case throughout the habitable globe. An examination of the osseous remains of American man supports the view that the human species has not varied since quaternary times. The palaeolithic type is to be found among modern European populations. Certain skulls from South Australia seem cast in almost the same mould as the Neanderthal. After thousands of years nearly pure descendants of quaternary man are found among living races. And man's mutual fertility in prehistoric is repeated throughout historic times: strict racial purity is almost unknown. Thus the unity of the species man is proved by the test of fertility.

3. The works of early man everywhere present the most startling resemblance. The palaeolithic implements all over the globe are all of one pattern. "The implements in distant lands," writes Sir J. Evans, "are so identical in form and character with the British specimens that they might have been manufactured by the same hands. . . . On the banks of the Nile, many hundreds of feet above its present level, implements of the European types have been discovered; while in Somaliland, in an ancient river-valley at a great elevation above the sea, Sir H.W. Seton-Karr has collected a large number of implements formed of flint and quartzite, which, judging from their form and character, might have been dug out of the drift-deposits of the Somme and the Seine, the Thames or the ancient Solent." This identity in the earliest arts is repeated in the later stages of man's culture; his arts and crafts, his manners and customs, exhibit a similarity so close as to compel the presumption that all the races are but divisions of one family. But perhaps the greatest psychical proof of man's specific unity is his common possession of language. Theodore Waitz writes: "Inasmuch as the possession of a language of regular grammatical structure forms a fixed barrier between man and brute, it establishes at the same time a near relationship between all people in psychical respects. . . . In the presence of this common feature of the human mind, all other differences lose their import" (*Anthropology*, p. 273). As Dr J. C. Prichard urged, "the same inward and mental nature is to be recognized in all races of men. When we compare this fact with the observations, fully established, as to the specific instincts and separate psychical endowments of all the distinct tribes of sentient beings in the Universe we are entitled to draw confidently the conclusion that all human races are of one species and one family." It has been argued that stock languages imply stock races, but this assumption is untenable. There are some fifty irreducible stock languages in the United States and Canada, yet, taking into consideration the physical and moral homogeneity of the American Indian races, he would be a reckless theorist who held that there were therefore fifty separate human species. If it were so, how have they descended? There are no anthropoid apes in America, none of the ape family higher than the Cebidae, from which it is impossible to trace men. Again, in Australia there is certainly one stock language, yet there are not even Cebidae. In Caucasia, there are many distinct forms of speech, yet all the peoples belong to the Caucasic division of mankind.

Man, then, may be regarded as specifically one, and thus he must have had an original cradle-land, whence the peopling of the earth was brought about by migration. The evidence tends to prove that the world was peopled by a generalized proto-human form. Each division of mankind would thus have had its pleistocene ancestors, and would have become differentiated into races by the influence of climatic and other surroundings. As to the man's cradle-land there have been many theories, but the weight of evidence is in favour of Indo-Malaysia.

Of all animals man's range alone coincides with that of the habitable globe, and the real difficulty of the "cradle-land" theory lay in explaining how the human race spread to every land. This problem has been met by geology, which proves that the earth's surface has undergone great changes since man's appearance, and that continents, long since submerged, once existed, making a complete land communication from Indo-Malaysia. The evidence for the Indo-African continent has been summed up by R. D. Oldham,[1] and proofs no less cogent are available of the former existence of an Eurafrican continent, while the extension of Australia in the direction of New Guinea is more than probable. Thus the ancestor of man was free to move in all directions over the eastern hemisphere. The western hemisphere was more than probably connected with Europe and Asia, in Tertiary times, by a continent, the existence of which is evidenced by a submarine bank stretching from Scotland through the Faeroes and Iceland to Greenland, and on the other side by continuous land at what is now the Behring Straits.

Acclimatization has been urged as an argument against the cradle-land theory, but the peopling of the globe took place in inter-Glacial if not pre-Glacial ages, when the climate was much milder everywhere, and thus pleistocene man met no climatic difficulties in his migrations.

Probably before the close of Palaeolithic times all the primary divisions of man were specialized in their several habitats by the influence of their surroundings. The profound effect of climate is seen in the relative culture of races. Thus, tropical countries are inhabited by savage or semi-savage peoples, while the higher races are confined to temperate zones. The primary divisions of mankind, Ethiopic, Mongolic, Caucasic, were certainly differentiated in neolithic times, and these criteria had almost certainly occurred not consecutively in one area but simultaneously in several areas. A Negro was not metamorphosed into a Mongol, nor the latter into a White, but the several semi-simian precursors under varying environments developed into generalized Negro, generalized Mongol, generalized Caucasian

Taking, then, these three primary divisions as those into which it is most reasonable broadly to divide mankind they may be analysed as to their racial constituents and their habitats as follows:—

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[1] Writing in the *Geographical Journal*, March 1894, on "Evolution of Indian Geography," he says: "The plants of Indian and African coal measures are without exception identical, and among the few animals which have been found in India one is indistinguishable from an African species, another is closely allied, and both faunas are characterized by the very remarkable genus group of reptiles comprising the Dicynodon and other allied forms (see *Manual of Geology of India*, 2nd ed. p. 203). These, however, are not the only analogies, for near the coast of South Africa there are developed a series of beds containing the plant fossils in the lower part and marine shells in the upper, known as the Uitenhage series, which corresponds exactly to the small patches of the Rajmahál series along the east coast of India. The few plant forms found in the lower beds of Africa are mostly identical with or closely allied to the Rajmahál species, while of the very few marine shells in the Indian outcrops, which are sufficiently well preserved for identification, at least one species is identical with an African form. These very close relationships between the plants and animals of India and Africa at this remote period appear inexplicable unless there were direct land communications between them over what is now the Indian Ocean. On the east coast of India in the Khasi Hills, and on the coast of South Africa, the marine fossils of late jurassic and early cretaceous age are largely identical with, or very closely allied to each other, showing that they must have been inhabitants of one and the same great sea. In western India the fossils of the same age belong to a fauna which is found in the north of Madagascar, in northern and eastern Africa, in western Asia, and ranges into Europe—a fauna differing so radically from that of the eastern exposures that only a few specimens of world-wide range are found in both. Seeing that the distances between the separate outcrops containing representatives of the two faunas are much less than those separating the outcrops from the nearest ones of the same fauna, the only possible explanation of the facts is that there was a continuous stretch of dry land connecting South Africa and India and separating two distinct marine zoological provinces."

1. Caucasic or White Man is best divided, following Huxley, into (*a*) Xanthochroi or "fair whites" and (*b*) Melanochroi or "dark whites." (*a*) The first—tall, with almost colourless skin, blue or grey eyes, hair from straw colour to chestnut, and skulls varying as to proportionate width—are the prevalent inhabitants of Northern Europe, and the type may be traced into North Africa and eastward as far as India. On the south and west it mixes with that of the Melanochroi and on the north and east with that of the Mongoloids. (*b*) The "dark whites" differ from the fair whites in the darkening of the complexion to brownish and olive, and of the eyes and hair to black, while the stature is somewhat lower and the frame lighter. To this division belong a large part of those classed as Celts, and of the populations of Southern Europe, such as Spaniards, Greeks and Arabs, extending as far as India, while endless intermediate grades between the two white types testify to ages of intermingling. Besides these two main types, the Caucasic division of mankind has been held with much reason to include such aberrant types as the brown Polynesian races of the Eastern Pacific, Samoans, Hawaiians, Maoris, &c., the proto-Malay peoples of the Eastern archipelago, sometimes termed Indonesians, represented by the Dyaks of Borneo and the Battaks of Sumatra, the Todas of India and the Ainus of Japan.

2. Mongolic or Yellow Man prevails over the vast area lying east of a line drawn from Lapland to Siam. His physical characteristics are a short squat body, a yellowish-brown or coppery complexion, hair lank, straight and black, flat small nose, broad skull, usually without prominent brow-ridges, and black oblique eyes. Of the typical Mongolic races the chief are the Chinese, Tibetans, Burmese, Siamese; the Finnic group of races occupying Northern Europe, such as Finns, Lapps, Samoyedes and Ostyaks, and the Arctic Asiatic group represented by the Chukchis and Kamchadales; the Tunguses, Gilyaks and Golds north of, and the Mongols proper west of, Manchuria; the pure Turkic peoples and the Japanese and Koreans. Less typical, but with the Mongolic elements so predominant as to warrant inclusion, are the Malay peoples of the Eastern archipelago. Lastly, though differentiated in many ways from the true Mongol, the American races from the Eskimo to the Fuegians must be reckoned in the Yellow division of mankind.

3. Negroid or Black Man is primarily represented by the Negro of Africa between the Sahara and the Cape district, including Madagascar. The skin varies from dark brown to brown-black, with eyes of the same colour, and hair usually black and always crisp or woolly. The skull is narrow, with orbital ridges not prominent, the jaws protrude, the nose is flat and broad, and the lips thick and everted. Two important families are classed in this division; some authorities hold, as special modifications of the typical Negro to-day, others as actually nearer the true generalized Negroid type of neolithic times. First are the Bushman of South Africa, diminutive in stature and of a yellowish-brown colour: the neighbouring Hottentot is believed to be the result of crossing between the Bushman and the true Negro. Second are the large Negrito family, represented in Africa by the dwarf-races of the equatorial forests, the Akkas, Batwas, Wochuas and others, and beyond Africa by the Andaman Islanders, the Aetas of the Philippines, and probably the Senangs and other aboriginal tribes of the Malay Peninsula. The Negroid type seems to have been the earliest predominant in the South Sea islands, but it is impossible to say certainly whether it is itself derived from the Negrito, or the latter is a modification of it, as has been suggested above. In Melanesia, the Papuans of New Guinea, of New Caledonia, and other islands, represent a more or less Negroid type, as did the now extinct Tasmanians.

Excluded from this survey of the grouping of Man are the aborigines of Australia, whose ethnical affinities are much disputed. Probably they are to be reckoned as Dravidians, a very remote blend of Caucasic and Negro man. For a detailed discussion of the branches of these three main divisions of Man the reader must refer to articles under race headings, and to NEGRO; NEGRITOS; MONGOLS; MALAYS; INDIANS, NORTH AMERICAN; AUSTRALIA; AFRICA; &c., &c.

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ETHYL, in chemistry, the name given to the alkyl radical C_2H_5. The compounds containing this radical are treated under other headings; the hydride is better known as ethane, the alcohol, C_2H_5OH, is the ordinary alcohol of commerce, and the oxide $(C_2H_5)_2O$ is ordinary ether.

ETHYL CHLORIDE, or HYDROCHLORIC ETHER, C_2H_5Cl, a chemical compound prepared by passing dry hydrochloric acid gas into absolute alcohol. It is a colourless liquid with a sweetish burning taste and an agreeable odour. It is extremely volatile, boiling at 12·5° C. (54·5° F.), and is therefore a gas at ordinary room temperatures; it is stored in glass tubes fitted with screw-capped nozzles. The vapour burns with a smoky green-edged flame. It is largely used in dentistry and slight surgical operations to produce local anaesthesia (*q.v.*), and is known by the trade-name kelene. More volatile anaesthetics such as anestile or anaesthyl and coryl are produced by mixing with methyl chloride; a mixture of ethyl and methyl chlorides with ethyl bromide is known as somnoform.

ETHYLENE, or ETHENE, C_2H_4, or $H_2C{:}CH_2$, the first representative of the series of olefine hydrocarbons, is found in coal gas. It is usually prepared by heating a mixture of ethyl alcohol and sulphuric acid. G. S. Newth (*Jour. Chem. Soc.*, 1901, 79, p. 915) obtains a purer product by dropping ethyl alcohol into syrupy phosphoric acid (sp. gr. 1·75) warmed to 200° C., subsequently raising the temperature to 220° C. It can also be obtained by the action of sodium on ethylidene chloride (B. Tollens, *Ann.*, 1866, 137, p. 311); by the reduction of copper acetylide with zinc dust and ammonia; by heating ethyl bromide with an alcoholic solution of caustic potash; by passing a mixture of carbon bisulphide and sulphuretted hydrogen over red-hot copper; and by the electrolysis of a concentrated solution of potassium succinate,

$$(CH_2{\cdot}CO_2K)_2+2H_2O=C_2H_4+2CO_2+2KOH+H_2.$$

It is a colourless gas of somewhat sweetish taste; it is slightly soluble in water, but more so in alcohol and ether. It can be liquefied at −1·1° C., under a pressure of 42½ atmos. It solidifies at −181° C. and melts at −169° C. (K. Olszewski); it boils at −105° C. (L. P. Cailletet), or −102° to −103° C. (K. Olszewski). Its critical temperature is 13° C., and its specific gravity is 0·9784 (air = 1). The specific gravity of liquid ethylene is 0·386 (3° C.). Ethylene burns with a bright luminous flame, and forms a very explosive mixture with oxygen. For the combustion of ethylene see FLAME. On strong heating it decomposes, giving, among other products, carbon, methane and acetylene (M. Berthelot, *Ann.*, 1866, 139, p. 277). Being an unsaturated hydrocarbon, it is capable of forming addition products, *e.g.* it combines with hydrogen in the presence of platinum black, to form ethane, C_2H_6, with sulphur trioxide to form carbyl sulphate, $C_2H_4(SO_3)_2$, with hydrobromic and hydriodic acids at 100° C. to form ethyl bromide, C_2H_5Br, and ethyl iodide, C_2H_5I, with sulphuric acid at 160–170° C. to form ethyl sulphuric acid, $C_2H_5{\cdot}HSO_4$, and with hypochlorous acid to form glycol chlorhydrin, $Cl{\cdot}CH_2{\cdot}CH_2{\cdot}OH$. Dilute potassium permanganate solution oxidizes it to ethylene glycol, $HO{\cdot}CH_2{\cdot}CH_2{\cdot}OH$, whilst fuming nitric acid converts it into oxalic acid. Several compounds of ethylene and metallic chlorides are known; *e.g.* ferric chloride in the presence of ether at 150° C. gives $C_2H_4\cdot FeCl_3\cdot 2H_2O$ (J. Kachtler, *Ber.*, 1869, 2, p. 510), while platinum bichloride in concentrated hydrochloric acid solution absorbs ethylene, forming the compound $C_2H_4\cdot PtCl_2$ (K. Birnbaum, *Ann.*, 1868, 145, p. 69).

ÉTIENNE, CHARLES GUILLAUME (1778–1845), French dramatist and miscellaneous writer, was born near Saint Dizier, Haute Marne, on the 5th of January 1778. He held various municipal offices under the Revolution and came in 1796 to Paris, where he produced his first opera, *Le Rêve*, in 1799, in collaboration with Antoine Frédéric Gresnick. Although Étienne continued to write for the Paris theatres for twenty years from that date, he is remembered chiefly as the author of one comedy, which excited considerable controversy. *Les Deux Gendres* was represented at the Théâtre Français on the 11th of August 1810, and procured for its author a seat in the Academy. A rumour was put in circulation that Étienne had drawn largely on a manuscript play in the imperial library, entitled *Conaxa, ou les gendres dupés.* His rivals were not slow to take up the charge of plagiarism, to which Étienne replied that the story was an old one (it existed in an old French *fabliau*) and had already been treated by Alexis Piron in *Les Fils ingrats.* He was, however, driven later to make admissions which at least showed a certain lack of candour. The bitterness of the attacks made on him was no doubt in part due to his position as editor-in-chief of the official *Journal de l'Empire.* His next play, *L'Intrigante* (1812), hardly maintained the high level of *Les Deux Gendres*; the patriotic opera *L'Oriflamme* and his lyric masterpiece *Joconde* date from 1814. Étienne had been secretary to Hugues Bernard Maret, duc de Bassano, and in this capacity had accompanied Napoleon throughout his campaigns in Italy, Germany, Austria and Poland. During these journeys he produced one of his best pieces, *Brueys et Palaprat* (1807). During the Restoration Étienne was an active member of the opposition. He was seven times returned as deputy for the department of Meuse, and was in full sympathy with the revolution of 1830, but the reforms actually carried out did not fulfil his expectations, and he gradually retired from public life. Among his other plays may be noted: *Les Deux Mères*, *Le Pacha de Suresnes*, and *La Petite École des pères*, all produced in 1802, in collaboration with his friend Gaugiran de Nanteuil (1778–1830). With Alphonse Dieudonné Martainville (1779–1830) he wrote an *Histoire du Théâtre Français* (4 vols., 1802) during the revolutionary period. Étienne was a bitter opponent of the romanticists, one of whom, Alfred de Vigny, was his successor and panegyrist in the Academy. He died on the 13th of March 1845.

His *Œuvres* (6 vols., 1846–1853) contain a notice of the author by L. Thiessé.

ETIQUETTE, a term for ceremonial usage, the rules of behaviour observed in society, more particularly the formal rules of ceremony to be observed at court functions, &c., the procedure, especially with regard to precedence and promotions in an organized body or society. Professions, such as the law or medicine, observe a code of etiquette, which the members must observe as protecting the dignity of the profession and preventing injury to its members. The word is French. The O. Fr. *estiquette* or *estiquet* meant a label, or "ticket," the true English derivative. The ultimate origin is Teutonic, from *sticken*, to post up, stick, affix. Cotgrave explains the word in French as a billet for the benefit or advantage of him that receives it, a form of introduction and also a notice affixed at the gate of a court of law. The development of meaning in French from a label to ceremonial rules is not difficult in itself, but, as the *New English Dictionary* points out, the history has not been clearly established.

ETNA (Gr. *Αἴτνη*, from *αἴθω*, burn; Lat. *Aetna*), a volcano on the east coast of Sicily, the summit of which is 18 m. N. by W. of Catania. Its height was ascertained to be 10,758 ft. in 1900, having decreased from 10,870 ft. in 1861. It covers about 460 sq. m., and by rail the distance round the base of the mountain is 86 m., though, as the railway in some places travels high, the correct measurement is about 91 m. The height cannot have been very different in ancient times, for the so-called Torre del Filosofo, which is only 1188 ft. below the present summit, is a building of Roman date. The shape is that of a truncated cone, interrupted on the west by the Valle del Bove, a huge sterile abyss, 3 m. wide, bounded on three sides by perpendicular cliffs (2000 to 4000 ft.). Its south-west portion, which is the deepest, was perhaps the original crater. There are also some 200 subsidiary cones, some of them over 3000 ft. high, which have risen over lateral fissures. On the slopes of the mountain there are three distinct zones of vegetation, distinguished by Strabo (vi. p. 273 ff.). The lowest, up to about 3000 ft., is the zone of cultivation, where vegetables, and above them where water is more scanty, vines and olives flourish. Owing to its extraordinary fertility it is densely populated, having 930 inhabitants per sq. m. below 2600 ft., and 3056 inhabitants per sq. m. in the triangle between Catania, Nicolosi and Acireale. The next zone is the wooded zone, and is hardly inhabited, only a few isolated houses occurring. The lower part of it (up to about 6000 ft.) consists chiefly of forests of evergreen pines (*Pinus nigricans*), the upper (up to about 6800 ft.) of birchwoods (*Betula alba*). A few oaks and red beeches occur, while chestnut trees grow anywhere between 1000 and 5300 ft. In the third and highest zone the vegetation is stunted, and there is a narrow zone of sub-Alpine shrubs, but no Alpine flora. In the last 2000 ft. five phanerogamous species only are to be found, the first three of which are peculiar to the mountain: *Senecio Etnensis* (which is found quite close to the crater), *Anthemis Etnensis*, *Robertsia taraxacoides*, *Tanacetum vulgare* and *Astragalus siculus.* No trace of animal life is to be found in this zone; for the greater part of the year it is covered with snow, but by the end of summer this has almost all melted, except for that preserved in the covered pits in which it is stored for use for cooling liquids, &c., in Catania and elsewhere. The ascent is best undertaken in summer or autumn. From the village of Nicolosi, 9 m. to the N.W. of Catania, about 7 or 8 hours are required to reach the summit. Thucydides mentions eruptions in the 8th and 5th centuries B.C., and others are mentioned by Livy in 125, 121 and 43 B.C. Catania was overwhelmed in 1169, and many other serious eruptions are recorded, notably in 1669, 1830, 1852, 1865, 1879, 1886, 1892, 1899 and March 1910.

According to Lyell, Etna is rather older than Vesuvius—perhaps of the same geological age as the Norwich Crag. At Trezza, on the eastern base of the mountain, basaltic rocks occur associated with fossiliferous Pliocene clays. The earliest eruptions of Etna are older than the Glacial period in Central and Northern Europe. If all the minor cones and monticules could be stripped from the mountain, the diminution of bulk would be extremely slight. Lyell concluded that, although no approximation can be given of the age of Etna, "its foundations were laid in the sea in the newer Pliocene period." From the slope of the strata from one central point in the Val del Bue he further concluded that there once existed a second great crater of permanent eruption. The rocks erupted by Etna have always been very constant in composition, viz. varieties of basaltic lava and tuff containing little or no olivine—the rock type known as labradorite. At Acireale the lava has assumed the prismatic or columnar form in a striking manner; at the rock of Aci it is in parts spheroidal. The Grotte des Chèvres has been regarded as an enormous gas-bubble in the lava. The remarkable stability of the mountain appears to be due to the innumerable dikes which penetrate the lava flows and tuff beds in all directions and thus bind the whole mass together.

From the earliest times the mountain has naturally been the subject of legends. The Greeks believed it to be either the mountain with which Zeus had crushed the giant Typhon (so Pindar, *Pyth.* i. 34 seq.; Aeschylus, *Prometheus Vinctus*, 351 seq.; Strabo xiii. p. 626), or Enceladus (Virgil, *Georg.* i. 471; Oppian, *Cyn.* i. 273), or the workshop of Hephaestus and the Cyclopes (Cic. *De divin.* ii. 19; cf. Lucil., *Aetna*, 41 seq., Solin. 11). Several Roman writers, on the other hand, attempted to explain the phenomena which it presented by natural causes (*e.g.* Lucretius vi. 639 seq.; Lucilius, *Aetna*, 511 seq.). Ascents of the mountain were not infrequent in those days—one was made by Hadrian.

See Sartorius von Waltershausen, *Atlas des Ätna* (Leipzig, 1880); E. Chaix, *Carta Volcanologica e topografica dell'Etna* (showing lava streams up to 1892); G. de Lorenzo, *L'Etna* (Bergamo, 1907).

ETNA, a borough of Allegheny county, Pennsylvania, U.S.A., in the western part of the state, on the W. bank of the Allegheny river (about 5 m. from its junction with the Monongahela), and about 2 m. N. of the city of Pittsburg, of which it is a suburb. Pop. (1880) 2334; (1890) 3767; (1900) 5384 (1702 foreign-born); (1910) 5830. It is served by the Pennsylvania railway and by electric lines. Among its industrial establishments are rolling mills, tube and pipe works, furnaces, steel mills, a brass foundry, and manufactories of electrical railway supplies, boxes, asbestos coverings, enamel work and ice. The city's industrial history dates from 1820, when a small factory for the manufacture of scythes and sickles was set up. Natural gas, piped from Butler county, was early used here as a fuel in the iron mills. Etna, formerly called Steuart's Town, was incorporated as a borough in 1869.

ETON, a town of Buckinghamshire, England, on the north (left) bank of the river Thames, opposite Windsor, within which parliamentary borough it is situated. Pop. of urban district (1901) 3301. It is famous for its college, the largest of the ancient English public schools. The "King's College of Our Lady of Eton beside Windsor" was founded by Henry VI. in 1440–1441, and endowed mainly from the revenues of the alien priories suppressed by Henry V. The founder followed the model established by William of Wykeham in his foundations of Winchester and New College, Oxford. The original foundation at Eton consisted of a provost, 10 priests, 4 clerks, 6 choristers, a schoolmaster, 25 poor and indigent scholars, and the same number of poor men or bedesmen. In 1443, however, Henry considerably altered his original plans; the number of scholars was increased to 70, and the number of bedesmen reduced to 13. A connexion was then established, and has been maintained ever since, though in a modified form, between Eton and Henry's foundation of King's College, Cambridge. One of the king's chief advisers was William of Waynflete, who had been master of Winchester College, and was appointed provost of Eton in 1443. Among further alterations to the foundation in this year was the establishment of *commensales* or commoners, distinct from the scholars; and these under the name of "oppidans" now form the principal body of the boys. The college survived with difficulty the unsettled period at the close of Henry's reign; while Edward IV. curtailed its possessions, and was at first desirous of amalgamating it with the ecclesiastical foundation of St George, Windsor Castle. In 1506 the annual revenue amounted to £652; and through benefactions and the rise in the value of property the college has grown to be very richly endowed. In 1870 commissioners under an act of 1868 appointed the governing body of the college to consist of the provost of Eton, the provost of King's College, Cambridge, five representatives nominated respectively by the university of Oxford, the university of Cambridge, the Royal Society, the lord chief justice and the masters, and four representatives chosen by the rest of the governing body. By this body the foundation was in 1872 made to consist of a provost and ten fellows (not priests, but merely the members of the governing body other than the provost), a headmaster of the school, and a lower master, at least seventy scholars (known as "collegers"), and not more than two chaplains or conducts. Originally it was necessary that the scholars should be born in England, of lawfully married parents, and be between eight and sixteen years of age; but according to the statutes of 1872 the scholarships are open to all boys who are British subjects, and (with certain limitations as to the exact date of birth) between twelve and fifteen years of age. A number of foundation scholarships for King's College, Cambridge, are open for competition amongst the boys; and there are besides several other valuable scholarships and exhibitions, most of which are tenable only at Cambridge, some at Oxford, and some at either university. The teaching embraces the customary range of classical and modern subjects; but until the first half of the 19th century the normal course of instruction remained almost wholly classical; and although there were masters for other subjects, they were unconnected with the general business of the school, and were attended at extra hours.

The school buildings were founded in 1441 and occupied in part by 1443, but the whole original structure was not completed till fifty years later. The older buildings consist of two quadrangles, built partly of freestone but chiefly of brick. The outer quadrangle, or school-yard, is enclosed by the chapel, upper and lower schools, the original scholars' dormitory ("long chamber"), now transformed, and masters' chambers. It has in its centre a bronze statue of the royal founder. The buildings enclosing the inner or lesser quadrangle contain the residence of the fellows, the library, hall and various offices. The chapel, on the south side of the school-yard, represents only the choir of the church which the founder originally intended to build; but as this was not completed Waynflete added an ante-chapel. The chapel was built upon a raised platform of stone, as was the hall, in order to lift it above the flood-level of the Thames. It contains some interesting monuments of provosts of the college and others, and at the west end of the ante-chapel is a fine marble statue of the founder in his royal robes, by John Bacon. A chantry contains the tomb of Roger Lupton (provost 1503–1535), whose most notable monument is the fine tower between the school-yard and the cloisters to the east; though other parts of his building also remain. The space enclosed by two buttresses on the north side of the chapel, at the point where steps ascend to the north door, is the model of the peculiar form of court for the game of fives which takes name from Eton, with its "buttress" (represented by the projecting balustrade), the ledges round the walls, and the step dividing the floor into two levels. From the foundation of the college the chapel was used as the parish church until 1854, and not until 1875, after the alteration of the ancient constitution had secularized the foundation, was the parish of Eton created into a separate vicarage. The chapel does not accommodate the whole school; and a new chapel, from the designs of Sir Arthur Blomfield, is used by the lower school. The library contains many manuscripts (notably an Oriental and Egyptian collection) and rare books; and there is also a library for the use of the boys. The college in modern times has far outgrown its ancient buildings, and new buildings, besides the lower chapel, include the new schools, with an observatory, a chemical laboratory, science schools and boarding-houses. In 1908 King Edward VII. opened a fine range of buildings erected in honour of the Old Etonians who served in the South African War, and in memory of those who fell there. The architect was Mr L. K. Ball, an old Etonian. The buildings include a school hall, a domed octagonal library, and a classical museum.

The principal annual celebration is held on the 4th of June, the birthday of King George III., who had a great kindness for the school. This is the speech-day; and after the ceremonies in the school a procession of boats takes place on the Thames. In the sport of rowing Eton occupies a unique position among the public schools, and a large proportion of the oarsmen in the annual Oxford and Cambridge boat-race are *alumni* of the school. Another annual celebration is the occasion of the contest between collegers and oppidans at a peculiar form of football known as the wall game, from the fact that it is played against a wall bordering the college playing-field. This game takes place on St Andrew's Day, the 30th of November. The field game of football commonly played at Eton has also peculiar rules. The annual cricket match between Eton and Harrow schools, at Lord's ground, London, is always attended by a large and fashionable gathering. A singular custom termed the *Montem*, of unknown origin, but first mentioned in 1561, was observed here triennially on Whit-Tuesday. The last celebration took place in 1844, the ceremony being abolished just before it fell due in 1847. It consisted of a procession of the boys in a kind of military order, with flags and music, headed by their "captain," to a small mound called Salt Hill, near the Bath road, where they levied contributions, or "salt," from the passers-by and spectators. The sum collected sometimes exceeded £1000—the surplus, after deducting certain expenses, becoming the property of the captain of the school. The average number of pupils at Eton exceeds 1000.

See E. S. Creasy, *Memoirs of Eminent Etonians, with Notices of the Early History of the College* (1850); *Sketches of Eton* (1873); Sir H. C. Maxwell Lyte, *History of Eton College from 1440 to 1875* (1875); J. Heneage Jesse, *Memoirs of Celebrated Etonians* (1875); *The Eton Portrait Gallery*, by a Barrister of the Inner Temple (1875); A. C. Benson, *Fasti Etonienses* (1899); L. Cust, *History of Eton College* (1899).

ÉTRETAT, a watering-place of France, in the department of Seine-Inférieure, on the coast of the English Channel, 16½ m. N. by E. of Havre by road. Pop. (1906) 1982. It is situated between fine cliffs in which, here and there, the sea has worn archways, pinnacles and other curious forms. The small stream traversing the valley, at the extremity of which Étretat lies, flows underground for some distance but rises to the surface on the beach. A Roman road and aqueduct and other Roman and Gallic remains have been discovered. The church of Notre-Dame, a Romanesque building, with a nave of the 11th century and a central tower and choir of the 13th century, is a fine example of the Norman architecture of those periods. Fishing is carried on, though there is no port and the fishermen haul their boats up the beach; the old hulks (*caloges*) serve as sheds and even as dwellings. Étretat sprang into popularity during the latter half of the 19th century, largely owing to the frequent references to it in the novels of Alphonse Karr.

ETRURIA, an ancient district of Italy, the extent of which varied considerably, and, especially in the earliest periods, is very difficult to define (see section *Language*). The name is the Latin equivalent of the Greek *Τυρρηνία* or *Τυρσηνία*, which is used by Latin writers also in the forms *Tyrrhenia*, *Tyrrhenii*; the Romans also spoke of Tusci, whence the modern Tuscany (*q.v.*). In early times the district appears to have included the whole of N. Italy from the Tiber to the Alps, but by the end of the 5th century B.C. it was considerably diminished, and about the year 100 B.C. its boundaries were the Arnus (Arno), the Apennines and the Tiber. In the division of Italy by Augustus it formed the seventh *regio* and extended as far north as the river Macra, which separated it from Liguria.

History.—The authentic history of Etruria is very meagre, and consists mainly in the story of its relations with Carthage, Greece and Rome. At some period unknown, prior to the 6th century, the Etrurians became a conquering people and extended their power not only northwards over, probably, Mantua, Felsina, Melpum and perhaps Hadria and Ravenna (Etruria Circumpadana), but also southwards into Latium and Campania. The chronology of this expansion is entirely unknown, nor can we recover with certainty the names of the cities which constituted the two leagues of twelve founded in the conquered districts on the analogy of the original league in Etruria proper (below). In the early history of Rome the Etruscans play a prominent part. According to the semi-historical tradition they were the third of the constituent elements which went to form the city of Rome. The tradition has been the subject of much controversy, and is still an unsolved problem. It is practically certain, however, that there is no foundation for the ancient theory (cf. Prop. iv. [v.] 1. 31) that the third Roman tribe, known as Luceres, represented an Etruscan element of the population, and it is held by many authorities that the tradition of the Tarquin kings of Rome represents, not an immigrant wave, but the temporary domination of Etruscan lords, who extended their conquests some time before 600 B.C. over Latium and Campania. This theory is corroborated by the fact that during the reigns of the Tarquin kings Rome appears as the mistress of a district including part of Etruria, several cities in Latium, and the whole of Campania, whereas our earliest picture of republican Rome is that of a small state in the midst of enemies. For this problem see further under ROME: *History*, section "The Monarchy."

After the expulsion of the Tarquins the chief events in Etruscan history are the vain attempt to re-establish themselves in Rome under Lars Porsena of Clusium, the defeat of Octavius Mamilius, son-in-law of Tarquinius Superbus, at Lake Regillus, and the treaty with Carthage. This last event shows that the Etruscan power was formidable, and that by means of their fleet the Etruscans held under their exclusive control the commerce of the Tyrrhenian Sea. By this treaty Corsica was assigned to the Etruscans while Carthage obtained Sardinia. Soon after this, decay set in. In 474 the Etruscan fleet was destroyed by Hiero I. (*q.v.*) of Syracuse; Etruria Circumpadana was occupied by the Gauls, the Campanian cities by the Samnites, who took Capua (see CAMPANIA) in 423, and in 396, after a ten years' siege, Veii fell to the Romans. The battle of the Vadimonian Lake (309) finally extinguished Etruscan independence, though for nearly two centuries still the prosperity of the Etruscan cities far exceeded that of Rome itself. Henceforward Etruria is finally merged in the Roman state.

ETRUSCAN ANTIQUITIES

The large recent discoveries of Etruscan objects have not materially altered the conclusions arrived at a generation ago. It is not so much our appreciation of the broad lines of the manners and arts of the Etruscans that has altered as our understanding of the geographic and social causes which made them what they were. One great difficulty in the study of the remains is that a very large portion of them have been found by unofficial excavators who have been naturally unwilling to tell whence they came, and that certain other excavations, such as those carried out by Comm. Barnabei for the Villa Giulia museum, have been carried out under conditions which help but little towards increasing our knowledge.[1] The increase has, however, been steady, even if not all one could wish.

Ethnology.—The origin of the Etruscans will most likely never be absolutely fixed,[2] but their own tradition (Tacitus, *Ann.* iv. 55) that they came out of Lydia seems not impossible. Herodotus (i. 94) and Strabo (v. 220) tell of Lydians landing at the mouth of the Po and crossing the Apennines into Etruria. Thus it seems certain that though the earliest immigrants, known to the later Etruscans as the *Rasena*, may have come down from the north, still they were joined by a migration from the east before they had developed a civilization of their own, and it is this double race that became the Etruscans as we know them in tradition and by their works. To give a date to the migration of the *Rasena* from the north, for which the only evidence is the fact that the Etruscan language is found in various parts of north Italy,[3] is impossible, but we can perhaps give an approximate one to the coming of the Lydians or Tyrrhenians (Thuc. iv. 109; Herod. i. 57). We know that there was a great wave of migration from Greece to Italy about 1000 B.C., and as the earliest imported Greek objects found in the tombs cannot be dated many generations later than this, this year may be considered as giving us roughly the time when the real Etruscan civilization began.

It has been, and still is, a common mistake to speak of the Etruscans as though they were closely confined to that part of Italy called Etruria on the maps, but it is quite certain that in the early stages of their development they were differentiated from the Umbrians on the north-east and the Latins on the south in ways due rather to the locality than to race or essential character.[4] To primitive peoples open seas or deserts are a greater hindrance to intercourse than mountains or rivers, and even these did not cut off Etruria from the neighbouring regions of Italy. The Apennines that separated her from Umbria were not difficult to cross, and the Tiber which formed the boundary between her and Latium has been a far greater element of separation in the minds of modern authors than it ever was in reality. Narrow, not particularly swift, often shallow, such a stream can never have caused more than a moment's delay to the hardy Etruscans. When Rome was founded, the river of course could be used like a moat round a castle as a means of defence, but that is very different from its being a permanent bar to the spread of a given culture. The fact that the alphabets used in other parts of Italy besides Etruria are derived from the Etruscan or from similar Grecian sources, that Rome was ruled by Etruscan kings, that the temple of Jupiter on the Capitoline was decorated by Etruscan artists (Livy x. 23; Pliny, *H.N.* xxxv. 157), that the decorations of the temple found by Signor Mazzoleni near Conca (*Notizie degli scavi*, 1896) are of the same kind as others found in Etruria, show that the influences which grew to their clearest development in the region west of the Tiber had a marked effect over a broader region than is usually admitted. This too was the belief of the Greek historians, many of whom considered Rome as a Tyrrhenian city.[1]

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[1] For Barnabei's excavations see Fausto Benedetti, *Gli Scavi di Narce ed il Museo di Villa Giulia* (1900).

[2] For a further discussion see *ad fin.*, section *Language*.

[3] See Pauli, *Altitalische Forschungen*, vol. i.; also sect. *Language* (below).

[4] Cf. the contents of the graves found by Boni in the Roman Forum (*Notizie degli Scavi*, 1902, 1903, 1905) with the objects represented in the plates of Montelius, *La Civilisation primitive en Italie*, pt. i. For the cemeteries at Novilara cf. Brizio, *Monumenti antichi*, vol. v.

Cities and Organization.—The chief cities of Etruria proper were Veii, Tarquinii, Falerii, Caere, Volci, Volsinii, Clusium, Arretium, Cortona, Perusia, Volaterrae (Volterra), Rusellae, Populonium and Faesulae. That the country was thickly settled is made plain by the ruins that have been found. It was governed by kings who were elected for life, but whose power depended largely on the leaders (*lucumones*) of the separate states or regions and on the aristocracy (Censorinus, *De die natali*, iv. 13). Later the office of king was abolished and replaced by annual magistrates (Livy v. 1). Below the aristocracy came the free people, who were divided into *curiae* (Serv. *ad Aen.* x. 202), and then the slaves. There can be little doubt that the early organization of the people at Rome was typical of Etruria (Niebuhr, *Röm. Gesch.* 2nd ed. i. 389).

A league of twelve cities is mentioned by the ancients (Livy iv. 23), whose delegates met at the temple of Voltumna, but we are not told which cities formed the league, and there can be little doubt that the list changed from time to time. A glance at the map makes clear some of the general relations of these cities to one another and to the outer world. They are well spread all over the country, and by no means only along the coast. None of the important ones is among the mountains. This means that the earliest inhabitants of the country were not roving traders like the Mycenaean Greeks, and that the cities drew their wealth and strength from agricultural pursuits, for which the country was well suited, as the three rivers, Arnus, Umbro and Tiber, with their feeders (not to mention several lesser streams), channel it in all directions. We get a hint as to the government of the cities from the fact that many of the Roman forms and apanages of office were derived from the Etruscans (Dion. Hal. iii. 61); for instance, the diadem worn by those honoured with a triumph, the ivory sceptre and the embroidered toga (Tertull. *De Cor.* 13), and so too the golden bulla and the praetexta (Festus, *s.v.* "Sardi"). Such things give us an idea as to the aristocratic basis of the government. Of the actual laws we know something also. Cicero (*Div.* ii. 23) tells the story of the miraculous uncovering by a ploughboy of a child who had the wisdom of a sage, and how the child's words were written down by the amazed folk, and became their archives and the source of their law. Coming down to historic times we find that their code, known as the *libri disciplinae Etruscae*, consisted of various parts (Festus, *s.v.* "Ritualis"). There were the *libri haruspicini* (Cic. *Div.* i. 33; 72), which dealt with the interpretation of the will of the gods by means of sacrifice; the *libri fulgurales*, which explained the messages of the gods in the thunder and lightning; and finally the *libri rituales*, which held the rules for the conduct of daily life—how to found cities, where to place the gates, how to take the census, and the general ordering of the people both in peace and war.

Natural Resources and Commerce.—Such was the country and such the laws. The people were a warrior stock with little commercial skill. Much of their wealth was due to trade, but they were not the restless, conquering blood that goes in search of new markets. They waited for the buyers to come to them. That their wealth and consequent power were gathered contemporaneously with that of Greece is shown by various facts. One of these is that Dionysius of Phocaea settled in Sicily after the Ionian revolt (in which his native city took part) had been quelled by Darius, and thence harried the Etruscans (Herod. vi. 17). Their power is also shown by the fact that they made an alliance with the Carthaginians, with the result that they obtained control of Corsica (Herod. i. 166), and this union continued for many generations.[2] That this treaty was no exceptional one is shown by Aristotle (*Pol.* iii. 96, *Op.* ii. 261), who says that there were numerous treatises, concerning their alliances and mutual rights, between the two peoples. That the Greeks held the Etruscans in considerable dread is suggested by the fact that Hesiod (*Theog.* 1011 foll.) names one of their leaders Agrios, "the Wild Man," and by the fear they had of the straits of Messina, where they imagined Scylla and Charybdis, which, unless the whirlpools were of very different character then than now, were as likely to be the pirate bands of Carthaginians and Etruscans who guarded the channel. And this explanation is strengthened by Euripides (*Med.* 1342, 1359), whose Medea compares herself to "Scylla, who dwells on the Tyrrhenian shore." The wealth that was the source of this power of the Etruscans must in the main have been drawn from agriculture and forestry. The rich land with its many streams could scarcely be surpassed for the raising of crops and cattle, and the hills were heavily timbered. That it was such material as this, which leaves no trace with the passing of time, that they sold cannot be doubted, for there is plenty of evidence that their country was visited by foreign traders of many lands, and that they bought largely of them, especially of metals. Metals also suggest that another source of their wealth was that of the middleman. Their towns were the centres of exchange, where the north and west met the south and east. They had no mines of gold or tin, but the carriers of tin, iron or amber[3] from the north met in the markets of Etruria the Phoenician and Greek merchants bringing gold and ivory and the other luxuries of the East. The quantities of gold, silver and bronze found in Etruscan tombs prove this clearly. Of these metals the only one found in unworked form, in what are practically pigs, is bronze. This in the form of *aes rude* has frequently been found in considerable quantities, and the larger and better formed bits of metals known as *aes signatum* are not rare. Both forms are usually spoken of as the earliest forms of money, but as the *aes rude* generally bears no marks of valuation or of any mint, and as the *aes signatum* is far too large and heavy for ordinary circulation, it is probable that these shapes of metal are not to be considered strictly or alone as coins, but as forms given to the alloy of tin and copper made and sold by the Etruscans to the foreigners for purposes of manufacture. This of course does not exclude their use as money. Where the copper for this bronze came from is not certain, but probably a great part was from the mines at Volaterrae. Still another proof that what the Etruscans sold was the product of their fields or crude metals imported from the north, is the fact that though in the museum at Carthage and elsewhere there are a few vases and other objects which probably come from Etruria, still such objects are extremely uncommon. On the other hand, articles obviously imported from the East are by no means uncommon in Etruria. Such are the ostrich shells from Volci,[4] the Phoenician cups from

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[1] *τήν τε Ῥώμην αὐτὴν τῶν συγγραφέων Τυρρηνίδα πόλιν εἶναι ὑπέλαβον*, Dion. Hal. i. 29; but see sect. *Language* for meaning of Τυρρηνία.

[2] For the wars of the Greeks against the Carthaginians and the Etruscans see Busolt, *Griechische Geschichte*, ii. 218 ff.

[3] Pliny (*H.N.* xxxvii. 11). He says that amber was brought by the Germans down the valley of the Po. Thence the trade-route crossed the Apennines to Pisa (Scylax in *Geographi minores*, ed. Didot, i. p. 25). In the consideration of problems suggested by amber it is too often forgotten that a very beautiful dark amber is found in Sicily.

[4] Montelius, *Civilization primitive en Italie*, ii. pl. 265; cf. Petrie, *Naukratis*, i. pl. 20, fig. 15, and Perrot-Chipiez, *Histoire de l'art*, iii.

Palestrina,[1] the Egyptian glazed vases and scarabs found on more than one site.[2] All this goes to show that the Etruscans lacked in their earlier days skilful workers in the arts and crafts.

Habits and Customs.—The lack of literary remains of the Etruscans does not cramp our knowledge of their habits as much as might be supposed, owing to the numerous paintings that are left. These paintings are on the walls of the tombs at Veii, Corneto, Chiusi (Clusium), and elsewhere,[3] and give a varied picture of the dress, utensils and habits of the people. The evidence of many ancient authors cannot be questioned that as a race the Etruscans in historic times were much given to luxurious living. So much so in fact that Virgil (*Georg.* ii. 193) speaks of the *pinguis Tyrrhenus* (a trumpeter at the altar) and Catullus (xxxix. 11) of the *obesus Etruscus*. Diodorus (v. 40) gives a succinct account in which he says that "their country was so fertile they derived therefrom not only sufficient for their needs but enough to supply them with luxuries. Twice a day they partook of elaborate repasts at which the tables were decked with embroidered cloths and vessels of gold and silver. The servants were numerous and noticeable for the richness of their attire. The houses, too, were large and commodious. In fact, giving themselves up to sensuous enjoyments they had naturally lost the glorious reputation their ancestors had won in war." This last remark shows that Diodorus recognized the important difference between the early Etruscans who built up the country and the later ones who merely enjoyed it. Naturally courtesans flourished in such a community. Timaeus and Theopompus tell how the women lived and ate and even exercised with the men (Athen. xii. 14; cf. iv. 38), habits which of course gave the Roman satirists many openings for attack (Plaut. *Cist.* ii. 3. 563; cf. Herod. i. 98; Strabo xi. 14). In dress they differed but little from the Romans, both wearing the toga and the tunic. Hats too, often of pointed form, were common (Serv. *ad Aen.* ii. 683), as the paintings show, but it was their shoes for which they were particularly famous. One author (Lydus, *de Magistr.* i. 17. 36) suggests that Romulus borrowed from Etruria the type of shoe he gave the senators, and this may well be true, though the form mentioned, the *kompagus*, is of late origin. At any rate *σανδάλια Τυρρηνικά* are frequently mentioned. From the pictures and remains we know that they had wooden soles strengthened with bronze, and that the uppers were of leather and bound with thongs.

Their occupations of trade and agriculture have been already mentioned. For their leisure hours they had athletic games including gladiatorial shows (Athen. iv. 153; cf. Livy ix. 40. 7; Strabo v. 250), hunting, music and dancing. All these are shown in the tomb pictures, and all, with the exception of the hunting, developed first as a part of religious service, and their importance is shown by the strictness of the rules that governed them (Cicero, *De harusp. resp.* ii. 23). Did a dancer lose step, or an attendant lift his hand from the chariot, the games lost their value as a religious service. An idea of the splendour of the triumphs that accompanied victorious generals and of the parades at the games is given by Appian (*De reb. Punic.* viii. 66) and Dionysius (vii. 92). The music that was an accompaniment of all their occupations, even of hunting (Aelian, *De natur. anim.* xii. 46), was mainly produced by the single or double flute, the mastery of which by the Etruscans was known to all the world. They also had small harps and trumpets.

For the regularization of all these duties and pleasures there was a calendar and time-division for the day. It is noteworthy that the beginning of the day was for them the moment when the sun was at the zenith (Serv. *ad Aen.* v. 738). In this they differed from the Greeks, who began their day with the sunset, and the Romans, who reckoned theirs from midnight. The weeks were of eight days, the first being market day and the day when the people could appeal to the king, and the months were lunar. The years were kept numbered by the annual driving of a nail into the walls of the temple of Nortia at Volsinii (Livy vii. 3. 7), a custom later adopted by the Romans, who used the Capitoline temple for the same purpose. In Rome this rite was performed on the Ides of September, and it is likely that it took place in Etruria on the same date, the natural end of the year among an agricultural folk. A still longer measure of time was the *saeculum*, which was supposed to be the length of the longest life of all those born in the year in which the preceding oldest inhabitant died (Censorinus, *De die natali*, 17. 5; cf. Zosimus ii. 1). According to later writers[4] the Etruscan race was to last ten *saecula*, and the emperor Augustus in his memoirs (Serv. *ad. Bucol.* ix. 47) says that the comet of the year 44 B.C. was said by the priests to betoken the beginning of the tenth *saeculum*. The earliest *saecula* had been, according to Varro, 100 years long. The later ones varied in length from 105 to 123 years. The round number 100 is obviously an *ex post facto* approximation, and the accuracy of the others is probably more apparent than real, but if we reckon back some 900 years from the date given by Augustus we arrive at just about the time when the archaeological evidence leads us to believe that the Etruscans in Italy were beginning to recognize their individuality.

Religion.—To retrace the religious development of the Etruscans from its mystic beginnings is beyond our power, and it is unlikely that any future discoveries will help us much. We are, however, able to draw a clear, if not a detailed, picture of the worship paid to the various divinities, partly from the direct information we have concerning them and partly from the analogies which may safely be drawn between them and the Romans.

The frequency of sacrifice among them and their belief in the short duration of the race[5] show clearly their belief in a good and a bad principle, and the latter seems to have been predominant in their minds. Storms, earthquakes, the birth of deformities, all gave evidence of evil powers, which could be appeased sometimes only by human sacrifice. We miss here the Greek joy in human life and the beauties of earth. The gods (*aesar*) were divided into two main groups, the *Dii Consentes* and a vaguer set of powers, the *Dii Involuti* (Seneca, *Quaest. Nat.* ii. 41), to whom even Jupiter bowed. They all dwelt in various parts of the heavens (Martianus Capella, *De nupt. Phil.* i. 41 ff.). Of the *Dii Consentes* the most important group consisted of Jupiter (*Tinia*), Juno (*Uni*) and Minerva (*Menrva*). In some towns, such as Veii and Falerii, Juno was the chief deity, and at Perusia she was worshipped like the Greek Aphrodite in conjunction with Vulcan (the Greek *Hephaestus*). This shows that though in exterior form the Etruscan gods were influenced by the Greeks, still their character and powers betoken different beliefs. An interesting point to note about Minerva (*Menrva*) is that she was the goddess of the music of flutes and horns. The myth of Athena and Marsyas probably originated in Asia Minor, and a Pelasgian Tyrrhenian founded in Argos the temple of Athena Salpinx (Paus. ii. 21. 3). The evident connexion between Asia Minor and Etruria in these facts cannot be overlooked. Besides these deities there were Venus (*Turan*), Bacchus (*Fufluns*), Mercury (*Turms*), Vulcan (*Sethlans*). Of these, Sethlans is in a way the most important, for he shows a connexion in prehistoric times between Etruria and the East.[6] Other deities of Greek origin there were—Ares, Apollo, Heracles, the Dioscuri; in fact, as the centuries passed, the Greek divinities were adopted almost without exception. Besides these there were also many gods of Latin or Sabine origin, of whom little is known but their names; these may often be local appellations for the same god. Among these were Voltumna at Volsinii and Vertumnus at Rome, Janus, Nortia, goddess of Fortuna, Fĕronia, whose temple was at a town of the same name at the foot of Soracte,[7] Mantus, Pales, Vejovis, Eileithyia and Ceres.

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[1] *Monumenti dell' Inst. Arch. Rom.* x. pl. 31; *Museo Etrusco Vaticano*, i. pl. 63-69; cf. *Annali dell' Inst. Arch.*, 1896, p. 199 ff.

[2] Vase with hieroglyphs found at Santa Marinella, *Bollettino dell' Inst. Arch.*, 1841, p. 111; *Mon. antichi*, viii. p. 88.

[3] G. Dennis, *Cities and Cemeteries of Etruria.*

[4] Varro *ap.* Serv. *ad Aen.* viii. 526; see Helbig, *Bull. dell' Inst. Arch.* (1876), 227.

[5] Censorinus, *De Die Nat.* 17.

[6] See Preller, *Röm. Myth.* s.v. "Volcanus." Opposed to this see Wissowa, *Religion u. Kultus der Römer*, who seems to misinterpret the evidence.

[7] Strabo v. 2. 39; cf. Livy i. 30; Dion. Hal. iii. 32.

Such were the leading gods; in addition there was the world of spirits whom we know in Rome as the Manes, Lares and Penates. The latter were of four classes, pertaining to Jove, Neptune, the gods of the lower world, and to men.[1] The Lares too were of various sorts (*familiares, compitales, viales*), and with them the souls of the dead, after the performance of due expiatory rites, took their place as *dii animales* (Serv. *ad Aen.* iii. 168 and 302). The Manes are the vaguest group of all and were confined almost wholly to the lower world (Festus, s.v. "Mundus"; Apuleius, *De deo Socratis*). Over all these ruled Mantus and Mania, the counterparts of Pluto and Persephone in Greece. As a result of this complete hierarchy of divine powers the priesthood of Etruria was large, powerful, and of such fame that Etruscan *haruspices* were sent for from distant places to interpret the sacrifices and the oracles (Livy v. i. 6, xxvii. 37. 6).

Art.—The evidence drawn from tradition and custom which we have so far considered in relation to the origin and beliefs of the Etruscans has taken us into the prehistoric times much earlier than those when the handicrafts developed into true fine arts. The contents of the earliest graves[2] show but few traces of any feeling for art either in architecture or in the lesser forms of household and personal decoration. Gradually, however, as one comes down towards the more fixed historic periods, certain objects, obviously imported from the eastern Mediterranean, occur, and these are the first signs of an interest in the beauty or curiosity of things, an interest that local workmen could not yet satisfy, but which stirred them to endeavour. It was probably during the 9th century that this began, not long after the period when foreign trade began to flourish.

The history of Etruscan art has usually been wrongly estimated owing to the widespread delusion that objects found in Etruria were in the true sense products of native artists and indicative of native-grown culture. It is only recently, and not even yet completely, that the term "Etruscan" has been given up as the name for the terra-cotta vases (which were found in the 19th century by the earlier archaeologists of the modern scientific school in great quantities in the Etruscan tombs); these are now known to have been made by Greek potters. There are few books on the subject of Etruscan art. The best known is Jules Martha's *L'Art étrusque* (2nd ed., 1889), a book which, though full of accurate data, shows absolute lack of discrimination between those works that are of Etruscan fabric and those that were brought from other lands, particularly Greece and the Greek colonies of Magna Graecia and Sicily. These latter are too generally forgotten in the study both of Greek and of Etruscan art, and all works which show the Greek spirit are vaguely supposed to have been produced on the Greek mainland. As much of the following must be to some extent controversial in character, a concrete illustration may serve to prevent misconception as to this important distinction. The beautiful throne in the Ludovisi collection representing the birth of Aphrodite is commonly spoken of as though made by some sculptor in Greece. It seems at least as likely that it comes from Sicily. Not only is the character of the modelling similar to what we find on Sicilian sculptures and coins, and not quite so sharp as on most works from Greece, but there is a lyrical feeling for nature in the pose of the figures and in the pebbled soil on which the main group stands, which seems to answer to the Sicilian feeling as we know it in poetry rather than to the Greek.

Architecture.

The houses of the earliest times were, to judge by the burial urns known from their shape as *hut-urns*, small single-room constructions of rectangular plan similar to certain types of the *capanne* used by the shepherds to-day. Probably the walls were wattled and the roofs were certainly thatched, for the urns show plainly the long beams fastened together at the top and hanging from the ridge down each side. Tombs cut in the rock offer other and later models of house construction, but give no suggestion that the Etruscans had any artistic sense in architecture. Such tombs are mostly later than the 5th century B.C., and show the most simple form of wood construction. Posts or columns hold up the walls and the sloping roofs, the latter made of beams with boards laid lengthwise, covered by others from ridge to eave, the intervening space forming a coffer, sometimes decorated. Though the walls of such tombs are often covered with paintings, the relation of the various parts (and, let it be remembered, these tombs represent the houses of the living) shows but the coarsest sense of proportion. The elements of the decoration, such as capitals, mouldings, rosettes, patterns, are borrowed from Greece, Egypt or elsewhere, and are used redundantly and with no refinement.[3]

The temples did not differ from those in Greece in any essential principal of construction except that they were generally square, from the desire to make them answer to the *templum* or quadripartite division of the heavens elaborated by the priests. In Roman times "Etruscan style" was the term used for colonnades with wide intercolumniations, and this shows how the early builders used wood with its possibility of long architrave beams rather than stone as in Greece. The interior arrangements of the temple also varied from the Grecian models, for owing to the fact that the gods of Etruria were often worshipped in groups of three the cella was divided into three chambers. The decoration —metopes, friezes, acroteria, &c.—was of terra-cotta fastened by nails to the wooden walls.

Though we know that the Etruscans were famous for their games,[4] still there are no remains of *circi*, and so too, though the *satyristae* were well known,[5] no theatres are left. They were obviously a race of no literary taste or culture. The theatre at Fiesole which is often referred to as Etruscan unquestionably dates from Roman times.

Underground tombs have already been mentioned in their relation to house-architecture, but there are the *tumuli* such as that called *la Cucumella* at Volci, that of the Curiatii at Albano, or that of Porsena at Clusium, which Pliny describes as one of the wonders of Italy (*H.N.* xxxvi. 19). These great walled-in mounds with their complex of interior chambers are interesting as reminiscent of tombs in Lydia, but architecturally they are barbaric and show no developed skill.

There remains one monument which has always been supposed to show a real advance made by the Etruscans in the art of architecture—the *cloaca maxima* in Rome. This round-arched drain was supposed to have been built by Etruscans, and it was only in 1903 that Commendatore Boni in excavating the Forum proved that the drain was originally uncovered, and that the arch was built at the end of the Republic. Thus the honour, not of discovering the arch, for it was known to the East, but of popularizing its use, does not belong to the Etruscans, though they did use it at a comparatively late time for city gates, as at Volterra.[6] The false arch and dome of the Mycenaeans seems to have been familiar to them, though there are but few cases of its use on a large scale. The best-known instances are the Tullianum or Mamertine prison in Rome, the Regulini-Galassi tomb at Cervetri,[7] one at Sesto Fiorentino near Florence,[8] at Cortona,[9] at Chiusi, and also those in Latium.[10]

Although there was, therefore, but little development in the greater arts of literature and architecture among the Etruscans, it is evident enough that there was much desire to possess the products of the lesser arts, such as sculpture, jewelry and household ornaments. But here too the study has been made difficult by the failure to distinguish between native and imported products. Before studying the objects themselves it is well to recall the legendary character of Etruscan chronology as reckoned in *saecula*. Helbig[1] showed that we cannot consider any of the traditional dates as being accurate until about 644 B.C., the beginning, that is, of the fifth *saeculum*. This is probably about one hundred years after the introduction of the Chalcidian (Ionic) alphabet into the country. One of the earliest examples of the use of it is on a vase found in the Regulini-Galassi tomb. In considering the trade of the country it has been pointed out that its chief political connexions were with Carthage, but the artistic sense of Carthaginians or other Phoenicians was not more developed than that of the Etruscans. They were traders, and doubtless brought the Etruscans some of the Egyptian and Eastern objects which have been found in their tombs, articles that date from the 7th and 6th centuries B.C. But beside the Phoenicians the Ionian Greeks from the 9th century had been trading and colonizing in Sicily and Italy. Herodotus (i. 163) tells how the Phocaeans were the first of the Greeks to take long voyages, and that they discovered the Adriatic and Tyrrhenian seas and Iberia. Thucydides (vi. 3. 1) says that it was Chalcidians from Euboea who first settled in Sicily. Pliny (*Hist. Nat.* xxxv. 12. 43) writes in the same sense, for he tells of Demaratus who came from Corinth with the artists Eucheir, Diopus, Eugrammus, about 650 B.C., and first started sculpture in Italy. These traditions of the coming of Ionian Greeks to Italy are completely borne out by the archaeological remains found in Ionian lands and in Etruria, and it is agreed that a great part of what has hitherto been considered Etruscan is no more Etruscan than the Moorish plates of the 15th century found in Italy are Florentine. The best works in most of the smaller arts are almost without exception Greek, the earlier Ionian, the later Attic; the remainder are made with the distinct intention of imitating Greek models, and so should be considered as Greek, inasmuch as they do not show a natural, original expression of feeling on the part of the Etruscan workman. The Etruscans were dull artists in all lines. They were skilful copyists, nothing more, as is absolutely proved by the simple fact that we know of no Etruscan artist by name. If one takes the articles which are of obviously local manufacture, such as the burial urns[2] or the ordinary bronze mirrors, or the pottery, it would be hard to find a similar quantity of work by any other race so lacking in originality of conception or high excellence of technique.

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[1] Nigidius Figulus *ap.* Arnob. *adv. Nat.* iii. 40; cf. *Nig. Fig. reliquiae*, ed. Ant. Swoboda (1888), p. 83.

[2] Montelius, *Civ. Prim. en Italie.*

[3] For an illustration of the Corneto tomb see ARCHITECTURE, vol. ii. p. 559.

[4] Appian viii. 66; Tertullian, *De spect.* 5; Plutarch, *Qu. Rom.* 107.

[5] Dion. Hal. vii. 72.

[6] Montelius, *Civ. Prim.* ii. pl. 172.

[7] *Ib.* pl. 333; cf. 343.

[8] *Ib.* pl. 166.

[9] *Ib.* pl. 173.

[10] *Monum. Ant.* xv. p. 151; *Bull. d. Com. Arch. di Roma*, 1898, p. 111

In the study of the monuments a division must be made distinguishing between the obviously Greek works, the works done with a desire to copy Greek models and the work of native artists. To separate the objects in the way suggested required a very considerable familiarity with Greek art, and though in many cases the result may be doubtful, still so much must be taken from the Etruscans that they are shown to have little more artistic feeling than the Romans. In the earlier centuries a strong eastern influence appears in the copying of sphinxes and similar eastern motives, but this soon gave way to the stronger Greek influence, as was natural, for the intercourse with the Phoenicians was spasmodic whereas that with the Greeks was constant. But even with the Greeks to kindle their imaginations, the Etruscans produced no school of art; no steady progression is traceable. In various towns there were various fashions of pottery or jewelry, but good, bad and indifferent constantly occur together in a way possible only among a people who possessed no natural artistic capacities and had no widespread standards of cultivated taste. The Ionians have been mentioned as having strongly affected the arts in Etruria, and, though in the later centuries Athens undoubtedly exported heavy consignments to Italy, the taste of the Etruscans seems generally to have preferred the rather heavy loose style of the Ionians, even when direct contact with them was lost and its place taken by direct relations with Athens and her colonies.

Pottery.

Pottery[3] practised enormously by the Etruscans shows as clearly as possible their essential strength and weakness as artists. Even the black ware called *bucchero* is now known to have been manufactured in other lands and not to be an exclusively Etruscan style. In the earlier tombs this ware is present in greater numbers than any other, and the vases exhibit considerable dexterity of manufacture so far as form goes. But it is evident from comparisons with early Ionian vases that the better proportioned of the shapes are direct copies of the Ionian. The decoration of the *bucchero* is either engraved, in which case it is almost always extremely rude, or formed by figures modelled or pressed by a mould on to the body of the vase. In these two last cases the figures are often suggestive of the farther East (Egyptian and Mesopotamia), but still more frequently they are taken from Greek originals, and the natural tendency of the Etruscan artist to be a copyist is very marked. Whence the moulds for these vases came is not known, but analogy with other classes of work makes it practically certain that some were imported and some made by the imitating workmen. There are other classes of vases which at first sight look as though they were imported from Greece, but by the nature of their clay are recognized to be Etruscan imitations of Greek originals. The imitation is often very skilful, for the Etruscan artist rivalled his Grecian master in deftness of hand, if not in imagination. Such, for instance, are the large amphoras decorated with bands of animals in the Corinthian style. Besides these native vases the tombs have yielded great quantities of others which used to be called Etruscan, but are now known to have been imported from Greece. Until the 6th century B.C. these vases are mostly Ionian, but at that time the trade of the Phocaeans was waning before that of Athens, and henceforward the Athenian ware is the commonest. Intercourse with Athens, however, came to an end about 480, when the Sicilian Greeks mastered the trade of the western Mediterranean, so that in the Etruscan tombs later than this date we find fewer and fewer imported vases, and more and more native imitations. It is generally taken for granted that these Attic vases were brought to Etruria by Greek traders, but considering how little the Greek historians, even Herodotus, knew of that country, this is unlikely. Then, too, the chief products Etruria had to give Greece were metals, so it is more likely that it was the Etruscan traders who, having carried metal to Greece (where Etruscan bronze was famous[4]), brought back the vases.

Scarabs.

Though most collections make no distinction between Greek and Etruscan scarabs the differences, though slight, are quite certain, and consist in the greater elaboration of the borders, edges and backs of the Etruscan examples. The commonest material for these gems is red carnelian, and agate frequently occurs. The beetle shape is undoubtedly due to the Phoenicians, who familiarized the Etruscans with the Egyptian scarab and with its signification as an amulet; while in technique they are more Greek, in use they are more Egyptian, for they were used not only as seals but as ornaments—as in the decoration of necklaces.[5] What we learn from them merely serves to strengthen what we learn from the pottery—that the Etruscans depended on the Greek world for their artistic conceptions. Though many Phoenician gems (in fact, scarcely any other kind) have been found in Sardinia, these are comparatively rare in Etruria, where the earliest gems occur about 650 B.C. Some of these earliest show the Ionian influence, which is also shown in certain gold rings, but most of them represent the Attic style as seen on the black-figured vases of Athens. To understand them one has but to know Attic sculpture, the complete history of which is repeated in these small and beautifully worked stones. At first one finds the single figures, awkward in form and modelling, but full of life in composition—one finds the same mistakes in anatomy (*i.e.* the muscles of the stomach); and then come the figures beautifully worked and accurately observed, but with the slight hardness and rigidity that belongs to all pre-Raphaelite work; and finally one sees the figures carved with the easy assurance of the master, sometimes single, sometimes in groups, but always Attic in their unrivalled representation of the beauties of the human figure, and in the innumerable lovely scenes taken from everyday life. Not infrequently inscriptions are cut in the gem, but these are not as on Greek gems the name of the carver or the owner, but the name of the Greek hero represented. In regard to technique one point is specially noteworthy. Many of the gems are carved with the round drill, and the disks made by this are not modelled into any real semblance of a figure. This is not a sign of the antiquity of the gem, for there are examples in which together with this method will be seen a figure finished with the greatest care; it is thus evident that the gem-cutter left the marks of his round drill because of their decorative value. This they undoubtedly possess, and it is one of the few cases in which the Etruscans showed any art sense.

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[1] *Annali dell' Inst. Arch.*, 1876, 230.

[2] Gerhard, *Etruskische Spiegel*; Körte, *Rilievi delle urne Etrusche*.

[3] See Pottier, *Catalogue des vases antiques, II. L'École Ionienne*, Boehlau, *Aus ionischen und italischen Nekropolen*; Karo, *De arte vascularia antiquissima*; Endt, *Ionische Vasenmalerei*. See further CERAMICS, § *Etruscan*.

[4] Athen. i. 28.

[5] Martha, *L'Art étrusque*, pl. 1, 4; *Bull. dell' Inst.* (1837) p. 46.

Bronze.

Bronze was used extensively. Weapons of course were fashioned of it, but these are simple in shape and decoration; no such examples as those from Mycenae occur. Objects of large size, as the bronze doors of Veii,[1] the chariots of Perugia in the New York museum, or large tripods or shields, show that the artisans had large quantities of the material at their disposal. As with the vases or gems, so in these metal objects the distinction must be drawn between pure Etruscan work and the work that was done by Greek workmen or by artisans copying the Greek style. As Etruscan art has been wrongly estimated through forgetfulness of the Greek influence, so Greek bronzes have possibly received credit that does not belong to them. Etruscan candelabra and vases were famous among the Greeks (Ath. i. 28. 6; xv. 700 c). The chariots above mentioned and the tripods in the Harvard museum are plainly Greek; the round shields with ornament in bands are native. Antefixes of tombs were of bronze, and in some cases the eyes of the figures were inlaid with glass paste. The best-known articles of bronze are the mirrors,[2] which are very dependent on Greece for their models, though the poor style in which the scenes that decorate them are in most cases carved shows that these articles of common use were produced, as was natural, mainly by ordinary workmen. In rare cases the figures are not engraved but are given in low relief. These mirrors seem to have been mainly intended for women, and the scenes on them in large numbers of cases are of such a character as to bear out this idea; for instead of scenes of battle such as occur on the gems, scenes with satyrs and maenads are commoner, or the story of Helen or the labours of Hercules. So far as development goes they pass through the same stages as the gems, though owing to their larger surface they are more generally decorated with groups of figures.[3] Another well-known class of work is the *cistae* or cylindrical bronze boxes found mostly at Praeneste, where they seem to have been especially popular. The engraved figures on them are of the same character as those on the mirrors, and it is noteworthy that these figures are often better in style than the figures modelled in the round that serve as handles, or than the legs which also are modelled. This, taken together with the fact that the same figures are repeated in several cases on more than one gem or mirror, makes it probable that the workmen, like the later potters of Arezzo, had a stock of models brought from Greece, which they repeated and combined to suit their fancy.

Gold and silver.

The paintings and contents of the tombs have made it plain that the wealth of the Etruscans was very considerable, and that they spent much on jewelry, gold and silver.[4] Their extravagance in this regard was well known,[5] and the rings, the necklaces, the diadems, the bracelets and the earrings show that there was a large class of well-to-do people. The eastern and Greek influences are clearly marked in the figures used in decoration, and in certain shapes of rings, but in one technical matter the Etruscans seem to have made a discovery: it was in the use of granulated ornament, that is, ornament made by soldering on to the gold object infinitely small globules of the same metal laid in various designs and patterns, each globule soldered by itself. Though this style of ornament occurs in Egypt, Cyprus, Rhodes and Magna Graecia, nowhere is it accomplished with such extraordinary minuteness as in Etruria. That they should do this was natural. The difficulty of it seems to have pleased them, for it is commoner than the earlier filigree work made of wire soldered on to the gold base. Reference has been made to the scarabs set as ornament in the gold necklaces, and similarly we find amber used and, in the later work, precious stones and pearls.

Sculpture.

As in Greece the Etruscans first carved their figures out of wood,[6] but what these figures were like we can only imagine. The earliest known figures in the round are even less successful than the contemporary Greek work. An early attempt at a female bust[7] is made not by casting but by riveting plates of bronze together. A half life size bust in the Tyszkiewicz collection[8] made probably about 600 B.C. is cast solid. Later they learned the art of hollow-casting, but their attempts to reproduce figures in the round are generally lacking in skill. One reason for this was the lack of good marble, the quarries at Carrara not having been used till Roman times. Terra-cotta was the material most commonly used, and their skill in modelling and colouring this was great. The earlier statues of large size have perished; but there are three famous sarcophagi which show the work of Ionian Etruscan artists;[9] one is in the British Museum, one in the Louvre and one in the Villa di Papa Giulio at Rome. The elaborate detail and careful work, the types of the figures and the style of their dress all point to the same Ionic origin as that of the bronze chariots already mentioned. The type of sarcophagus illustrated by these examples became very common, and in the figures that decorate the covers can be traced the various influences that affected the whole of Etruscan art. In an example from Volci[10] the later Attic influence is strongly marked. Such work shows little power of origination, but much of the interest taken by careful workmen by copying carefully, and the tendency that such workmen almost invariably display of overloading the subject with too much ornament and detail. The small ash-urns, either of stone or terra-cotta, are in certain ways more interesting than the more elaborate sarcophagi, for on these urns the heads of the figures reclining on one elbow which form the usual decoration of the covers are often obvious attempts at portraiture. Single busts[11] show this same desire for accurate likeness of the person represented, and in this one line of art the Etruscans showed a new feeling, one that found its finest expression in the hands of the later Roman portraitists. The main difference between such portraits and the Greek ones is that the Greek artist thought of his subject as illustrating character that showed itself in ways of repose and thought—the essential, lasting individuality. The Etruscan and Roman portraitist thought, on the other hand, of his subject as illustrating character in ways of action; hence pure Etruscan and Roman portraits are much more tense in line, and the expression of the eye is not dreamy but distinctly focussed. They are different, but, as art, one is as fine as the other. The scenes on the sides of these urns are, as in the case of the gems and mirrors, very frequently taken from Greek story, and often are scenes of battle.[12] Work in relief for the friezes and the other decorations of temples was very common, and shows remarkable skill in the mere processes of modelling and baking the slabs of terra-cotta that were fastened by nails to the beams. So far as the figures themselves are concerned, they seem to have but little meaning in connexion with the building they decorate.

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[1] Plutarch, *Camillus*, 12.

[2] Gerhard, *Etr. Spiegel* (continued by Klugmann and Körte).

[3] Mirrors of Greek style, Gerhard, 111, 112, 116, 240, 305, 352; Klugmann-Körte, 107, 131, 160.

[4] See plates in Martha and in *Monumenti dell' Inst.*, also *Mon. Ant.* iv. and Milani's *Studie materiali*.

[5] Juvenal v 164; Ovid, *Am.* iii. 13. 25 ff.

[6] Pliny, *H.N.* xiv. 9; xvi. 216.

[7] From the Polledrara tomb at Vulci, Martha fig. 335.

[8] *Coll. Tyszkiewicz*, pl. 13.

[9] *Mon dell' Inst.* vi. pl. 59, cf. *Annali* (1861); p. 402; *Mon. Ant.* viii. pl. xiii.-xiv.

[10] *Mon. dell' Inst.* viii. pl. 20; Martha p. 347.

[11] Martha pp. 333, 348.

[12] See Körte, *Rilievi delle urne Etrusche.*

Satyrs and maenads, chariot-races and such scenes taken over from Greek models are perhaps the commonest. In none of the obviously native work is there any more instinctive feeling for the greater qualities of sculpture than in the gems. Little is original, almost everything dependent on earlier masters. There is no absorption of the artist by his work which produces great work, great because the beholder thinks rather of the work produced than of the artist who produces it. For this reason such figures as the bronze chimaera or the bronze Athena in the Florence museum are presumably not Etruscan but Greek.

Painting.

There is no evidence that the Etruscans had easel-paintings like the Greeks, but their skill in painting is well illustrated by the pictures with which they frequently covered the inner walls of their tombs. The wall was prepared with a coating of fine white stucco on which the figures were painted with a large variety of tints. The best of them have been found at Tarquinii, Chiusi, Volci, Caere, Veii.[1] The paintings exhibit the usual Greek influences. They show a certain ponderous realism, but as works of art they are of little value. As pictures of the life and customs of the people they are of great importance.

Coins.

As works of art their coins[2] are the worst efforts of the Etruscans. Gold, silver and bronze were used, but no examples can be dated earlier than the beginning of the 5th century B.C. The coins are struck according to four different standards of weight, due perhaps to different trade-connexions. The bronze coinage shows a distinct scale of reduction in weight due to the increasing use of the precious metals. Many examples show a design only on one side. The designs of the majority of the types are taken from Greek models, but strangely enough the die-cutters show no such skill as that of the makers of gems.

Arms and Armour.—In the early periods the chief weapons (besides bows and arrows which bore flint or bronze heads) were few and simple, and were of bronze. Iron ones have been found, and their rarity is doubtless partly due to their having rusted away. Spears of very various weights were common and also swords and daggers. These latter had straight two-edged blades with the handle either of the same piece or of some other material fastened on with rivets. The blades of the daggers are generally engraved with lines and zigzags. Shields were of circular and oval shape. These two were of bronze, the round ones decorated in Homeric fashion with concentric circles of ornament, the motives being geometric patterns or an animal repeated endlessly. Breastplates with overlapping shoulder-straps and belts, broader in front than behind, with decoration of the same kind as the bucchero vases, are not uncommon. Greaves and helmets completed their equipment. The former seem to have been less ornate than those the Greeks wore; the latter were of various shapes, the commonest being round caps with a knob on the top, or a deeper shape with a crest from front to back. Some are shown with side-pieces raised like wings, but these are perhaps merely cheek-pieces raised on hinges. In later times they had trumpets and axes, and their arms became practically the same as the Roman, as one sees from the representations in the tombs. (R. N.)

LANGUAGE

1. By "Etruscan" is meant the language spoken by the people called Etrusci (more commonly Tusci) by the Romans, Turskum numen (*i.e. Tuscum nomen*) by their neighbours the Umbrians of Iguvium (*q.v.*), and Τυρσηνοί (later, *e.g.* in Strabo's time, Τυρρηνοί) by the Greeks. Their own name for themselves was *Rasĕnna* (or *Rasĕna*), according to Dionysius Halic. (i. 30), but it seems now to be fairly probable that this was no more than the name of a leading house (represented later on in Pisa and elsewhere) dominant at some fairly early date in some one locality (see below). Niebuhr attempted on slender grounds (*Rom. Hist.*, ed. 3 [Eng. trans.], i. p. 41) to distinguish between the Τυρρηνοί and the Tusci in order to accept the strongly supported tradition of a Lydian origin for the "Tyrrhenes" (see below), while rejecting it for the "Tuscans," but no one has since attempted to maintain the distinction (Dittenberger, *Hermes*, 1906, p. 85, footnote, regards the form in *-ηνοί* as a "Graecized form of a local name" equivalent to *Tusci*), and we now know enough of the morphology of Etruscan names to recognize *Tur-s-co-* and *Tur-s-ēno-* as closely parallel Etrusco-Latin stems, cf. *Venu-c-ius*: *Venu-sēnus* both from Etr. *venu* (Schulze, *Lat. Eigennamen*, p. 405) and *Ras-ena*: *Ras-c-anius* (*ibid.* p. 92); or *Voluscus, Volscus*: *Volusēnus* (where the formative suffixes in each word are Etrusco-Latin whether the root be the same or not). But the analysis of the names cannot be entirely satisfactory until the first syllable of Etrusci—in Greek writers sometimes *Ετρουσκοι*, *e.g.* in *Strabo*—ed. Meineke—has been explained.

2. The extent of territory over which this language was spoken varied considerably at different epochs, but we have only a few fixed points of chronology. From two separate sources, both traditional and probably sound (Dion. Hal. i. 26, and Plutarch, *Sulla*, 7; cf. Varro, quoted by Censorinus c. 17. 6), we should ascribe the first appearance of the Etruscans in Italy to the 12th century B.C. The intimate connexion in form between the names *Roma*, *Romulus* and the Etruscan gentes rumate, rumulna (*Romatia*, *Romilia*, &c.), and the fact that many of the early names in Rome (*e.g. Ratumenna*, *Capena*, *Tities*, *Luceres*, *Ramnes*) are characteristically Etruscan, justifies the conclusion that the foundation of the city, in the sense at least of its earliest fortification, was due to Etruscans (Schulze, p. 580). The most likely interpretation of Cato's date for the Etruscan "foundation" of Capua is 598 B.C. (Conway, *Italic Dialects*, pp. 99 and 83). In 524 B.C. (Dion. Hal. vii. 2) the Etruscans were defeated by Aristodemus of Cumae, and in 474 by Hiero of Syracuse in a great naval battle off Cumae. Between 445 and 425 (*It. Dial.* l.c.) they were driven out of Capua by the Samnites, but they lingered in parts of Campania (as far south as Salernum) till at least the next century, as inscriptions show (*ib.* pp. 94 ff., 53), as at Praeneste and Tusculum (*ib.* p. 310 ff.) till the 3rd century or later. In Etruria itself the oldest inscriptions (on the stelae of Faesulae and Volaterrae) can hardly be later than the 6th century B.C. (C. Pauli, *Altital. Forsch.* ii. part 2, 24 ff.); the Romans had become dominant early in the 3rd century (C.I.L. xi. 1 *passim*), but the bulk of the Etruscan inscriptions show later forms than those found in the old town of Volsinii destroyed by the Romans in 280 B.C. (C. Pauli, *ib.* i. 127). In the north of Italy we find Etruscan written in two alphabets (of Sondrio and Bozen) between 300 and 150 B.C. (*id. ib.* pp. 63 and 126). The evidence of an Etruscan linen book wrapped round a mummy (see below) seems to suggest that there was some Etruscan colony at Alexandria in the period of the Ptolemies. At least one Etruscan suffix has passed into the Romance languages, *-iθa* or *-ita* in Etr. *lautniθa* (from *lautni* "familiaris," or "libertus"), and Etr.-Lat. *Iulitta*, which became Ital. *-etta*, Fr.-Eng. *-ette*.

3. Finally must be mentioned the remarkable pre-Hellenic epitaph discovered on the island of Lemnos in 1885 (Pauli, *Altital. Forsch.* ii. 1 and 2), the language of which offers remarkable resemblances to Etruscan, especially in the phrase *sialχveis avis* (? = "fifty years old"); cf. Etr. *cealχus avils* (? "twenty years old"); and the pair of endings *-esi*, *-ale* in consecutive words; cf. Etr. *larθiale hulχniesi*; the style of the sculptural figure has also parallels in the oldest type of Etruscan monuments. The alphabet of this inscription is identical (Kirchhoff, *Stud. Griech. Alphab.*, 4th ed., p. 54) with that of the older group of Phrygian inscriptions, which mention King Midas and are therefore older than 620 B.C. With this should be combined the fact that a marked peculiarity of the South-Etruscan alphabet (↑=*f*, but earlier = the Greek *digamma*) has demonstrably arisen out of ϕ=*q*) on Phrygian soil, see *Class. Rev.* xii., 1898, p. 462. Despite the reasonable but not unanswerable difficulty of Kretschmer (*Einleitung in d. Geschichte d. griech. Sprache*, 1896, p. 240), the

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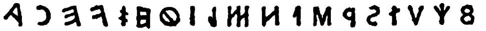
[1] See *Mon. dell' Inst.* i. pl. 32-33, v. 16, 17, 33, 34, vi. 30-32, 79, viii. 36, ix. 13-15; Micali, *Mon. Ined.* pl. 58. Cf. Helbig, *Annali* (1863) p. 336, (1870) pp. 5-74; Brunn, *ib.* (1866), p. 442.

[2] Mommsen, *Röm. Münzwesen*; G. F. Hill, *Handbook of Greek and Roman Coins*; Deecke, *Etruskische Forschungen*: also article NUMISMATICS.

weight of the evidence appears to be distinctly in favour of the Etruscan character of the language, and Pauli's view is now generally accepted by students of Etruscan; hence the inclusion of the inscription in the *Corpus Inscc. Etruscarum.*

4. The first attempt to interpret Etruscan inscriptions was made by Phil. Buonarroti (*Explic. et conject. ad monum.* &c., Florence, 1726), who, as was almost inevitable at that epoch, tried to explain the language as a dialect of Latin. But no real study was possible before the determination of the alphabet by Lepsius (*Inscc. Umbr. et Oscae*, Leipzig, 1841), and his discovery that five of the Tables of Iguvium (*q.v.*), though written in Etruscan alphabet, contained a language akin to Latin but totally different from Etruscan, though some of the non-Italic peculiarities of Etruscan had been already pointed out by Ottfried Müller (*Die Etrusker*, Breslau, 1828). The earliest inscriptions, *e.g.* the terra-cotta stele of Capua of the 5th century B.C., are written in "serpentine boustrophedon," but in its common form of the 3rd century B.C. the alphabet is retrograde, and has the following nineteen letters:—



a, c, e, v, z, h, θ, i, l, m, n, p, ś, r, s, t, u, χ, f

On older monuments 𐌊=*k* occurs as an archaic form of *c*; 𐌒=*q*; ⋈, a sibilant of some kind; and C=ç, this last mostly in foreign words. In the earlier monuments the cross-bars of *e* and *v* and *h* have a more decidedly oblique inclination, and *s* is often angular (ⲋ). The mediae *b, g, d*, though they often occur in words handed down by writers as Etruscan, are never found in the Etruscan inscriptions, though the presence of the mediae in the Umbrian and Oscan alphabets and in the abecedaria shows that they existed in the earliest form of the Etruscan alphabet. O is very rare. The form ↑ (earlier 𐌇↑)=*f* in south Etruscan and Faliscan inscriptions should also be mentioned. Its combination with 𐌇 *h* shows that it had once served to denote the sound of digamma just as Latin F. The varieties of the alphabet in use between the Apennines and the Alps were first examined by Mommsen (*Inschriften nord-etruskischen Alphabets*, 1853), and have since been discussed by Pauli (*Altitalische Forschungen*, 1885–1894, esp. vol. iii., *Die Veneter*, p. 218, where other references will be found, see also VENETI).

5. The determination of the alphabet was followed by a large number of different attempts to explain the Etruscan forms from words in some other language to which it was supposed that Etruscan might be akin; Scandinavian and Basque and Semitic have been tried among the rest. These attempts, however ingenious, have all proved fruitless; even the latest and least fanciful (*Remarques sur le parenté de la langue étrusque*, Copenhagen, 1899; *Bulletin de l'Académie Royale des Sciences et des Lettres de Danemark*, 1899, p. 373), in which features of some living dialects of the Caucasus are cautiously compared by Prof. V. Thomsen (as independently by Pauli, see § 12), is at the best premature, and as to the numerals probably misleading. Worst of all was the effort of W. Corssen (*Die Sprache der Etrusker*, 1875), in whom learning and enthusiasm were combined with loose methods of both epigraphy and grammar, to revive the view of Buonarroti. The only solid achievement in the period of Corssen's influence (1860–1880) was the description of the works of art (tombs, vases, mirrors and the like) from the different centres of Etruscan population; Dennis's *Cities and Cemeteries of Etruria* (1st ed., 1848; 2nd, 1878) contributes something even to the study of the language, because many of the figures in the scenes sculptured or engraved bear names in Etruscan form (*e.g. usils*, "sun"; or "of the sun," on the *templum* of Placentia; *fufluns*, "Bacchus"; *tuχulχa*, a demon or fury; see Dennis, *Cities*, 2nd ed., frontispiece, and p. 354).

6. The reaction against Corssen's method was led first by W. Deecke, *Corssen und die Sprache der Etrusker* (1876), *Etruskische Forschungen* (1875–1880), and continued by Carl Pauli at first jointly with Deecke and afterwards singly with greater power (*Etruskische Studien*, 1873), *Etr. Forschungen u. Studien* (Göttingen-Stuttgart, 1881–1884), *Altitalische Studien* (Hanover, 1883–1887); *Altitalische Forschungen* (Leipzig, 1885–1894). Of the work achieved during the last generation by him and the few but distinguished scholars associated with him (Danielsson, Schaefer, Skutsch and Torp) it may perhaps be said that, though the positive knowledge yet reaped is scanty, so much has been done in other ways that the prospect is full of promise. In the first place, the only sound method of dealing with an unknown language, that of interpreting the records of the language by their own internal evidence in the first instance (not by the use of imaginary parallels in better known languages whose kinship with the problematic language is merely assumed), has been finally established and is now followed even by scholars like Elia Lattes, who still retain some affection for the older point of view. By this means enough certainty has been obtained on many characteristic features of the language to bring about a general recognition of the fact that Etruscan, if we put aside its borrowings from the neighbouring dialects of Italy, is in no sense an Indo-European language. In the second place, the great undertaking of the *Corpus Inscriptionum Etruscarum*, founded by Carl Pauli, with the support of the Berlin Academy, conducted by him from 1893 till his death in 1901, and continued by Danielsson, Herbig and Torp, for the first time provided a sound basis for the study in a text of the inscriptions, edited with care and arranged according to their provenance. The first volume contains over four thousand inscriptions from the northern half of Etruria. Thirdly, the discoveries of recent years have richly increased the available material, especially by two documents each of some length. (1) The 5th-century stele of terra-cotta from S. Maria di Capua already cited, published by Buecheler in *Rhein. Museum*, lv., 1900, p. 1) and now in the Royal Museum at Berlin, is the longest Etruscan inscription yet found. Its best preserved part contains some two hundred words of continuous text, and is divided into paragraphs, of which the third may be cited in the reading approved by Danielsson and Torp, and with the division of words adopted by Torp (in his *Bemerkungen zur etrusk. Inschr. von S. Maria di Capua*, Christiania, 1905), to which the student may be referred. "iśvei tule ilucve, an priś laruns ilucuθuχ, nun: tiθuaial χues χaθc(e) anulis mulu rizile, ziz riin puiian acasri, ti-m an tule, leθam sul; ilucu-per priś an ti, ar vus; ta aius, nunθeri." (2) The linen wrappings of an Egyptian mummy (of the Ptolemaic period) preserved in the Agram museum were observed to show on their inner surface some writing, which proved to be Etruscan and to contain more than a thousand words of largely continuous text (Krall, "Die etruskischen Mumienbinden des Agramer. Museums," *Denkschr. d. k. Akad. d. Wissenschaften*, 41, Vienna, 1892). The writing has probably nothing to do with the mummy as it is on the inner surface of the bands, and these are torn fragments of the original book. The alphabet is of about the 3rd century B.C.

7. From the recurrence of a number of particular formulae with frequent numerals at intervals, the book seems to be a liturgical document. Torp has pointed out that the two documents have some forty words in common, and, with Lattes ("Primi Appunti sulla grande iscriz. Etrusca," &c., in *Rendic. d. Reale Inst. Lomb.*, serie ii. vol. xxxviii., 1900, p. 345 ff.), has shown that both contain lists of offerings made to certain gods (among them Suri, Leθam, and Calu); and Skutsch (*Rhein. Mus.* 56, 1901, p. 639) has added a plausible conjecture as to the occasions of the offerings, based on the phrase "flerχva neθunsl" "Neptuni statua" (or "statuae pars"); Torp has made it very probable that the words *vacl* (or *vacil*) and *nun*, which recur at regular intervals in both, mean "address," "recite," "pray," or the like, preceding or following spoken parts of the ritual.

8. Along with the growth of the material, some positive increase in knowledge of the language has been attained. Independently of the work done upon particular inscriptions, such as that which has just been described, a considerable addition has come from the elaborate study of Latin proper names already mentioned by Prof. W. Schulze of Berlin (*Zur Geschichte lateinischer Eigennamen*, Berlin, 1904), which has incidentally embodied and somewhat extended the points of Etruscan nomenclature previously observed. The chief results for our purpose may be briefly stated. It will be convenient to use the following terms:—

(1) *praenomen*=personal name of the individual.
e.g. Vel or *Lar* of a man, *Larθi* or *θana* of a woman.

(2) *nomen*=family name.

e.g. { *Tite* or *Vipi* or *Tetna*, of men.
{ *Titi* or *Vipinei* or *Tetinei*, of women.

(3) *cognomen* = additional family name.

e.g. *Faru* or *Petru* of men, *Farui*, *Velui* of women.

(4) *agnomen* = special cognomen derived from the cognomen of the father.

e.g. *Hanusa* (in Latin spelling *Hannossa*) or *Pulusa* (also *Pulius*) of a man; *Hanunia* of a woman.

All these are commonly in the "nominative" (as the examples just quoted from Schulze, pp. 316–327) in sepulchral inscriptions.

Besides these, we have certain other descriptions used in forms which may be called a "genitive-dative" case, or a "derivative possessive" Adjective. These may be entitled:—

(5) *paternum* (*a*) = praenomen of father, used generally after the *nomen* of son or daughter.

e.g. *arnθal* "of Arnθ," more commonly simply *ar*, so *ls* for *Laris-al*, to which *clan* "son," often abbreviated *c*, and *seχ* or *sec* (abbrev. *s*) "daughter," are sometimes added.

paternum (*b*) = *nomen* of father, used only after the *praenomen* of a daughter (*e.g.* *θana velθurnas*, "Thana daughter of Velthurna"), to which *seχ* "daughter," often abbreviated *s*, is sometimes added.

(6) *maternum* (*a*) = nomen of mother.

e.g. *pumpunial*, "of Pumpuni" (in Lat. form *Pomponia*); *alfnal* "of Alfnei" (Lat. *Alfia*); *hetarias*, "of Hetaria."

maternum (*b*) = cognomen of mother.

e.g. *vetnal*, "of Vetui," or "of Vetonia," *hesual*, "of Hesui."

maternum (*c*) = agnomen of mother.

e.g. *cumerunias*, "of Cumerunia," *i.e.* "of a daughter of the *cumeru*-family."

(7) *maritale*—(i.) *nomen*, or (ii.) *cognomen*, or (iii.) *agnomen* of husband, used directly after the *nomen* of the wife, the word *puia*, "wife," being often added.

e.g. (i.) *larθi cencui larcnasa*, "Larthia Cenconia, wife of a Largena"; (ii.) *larθia pulfnei spaspusa*, "Larthia Pulfennia, wife of a Spaspo"; this form being the same as that used for the *agnomen* of a man (see above)—(iii.) *hastia coinei leusla*, "Hastia Caia, wife of a son of a Leo"; and with a longer and possibly not synonymous form of suffix *θania titi latinial sec hanuslisa*, "Thania Titia, daughter of Latinia, wife of a Hanusa"—these secondary derivatives in *-sla*, &c., being an example of what is called *genetivus genetivi*, a characteristic Etruscan formation, not confined to this feminine use.

These examples will probably enable the reader to interpret the great mass of the names on Etruscan tombs. It should be added (1) that no clear distinction can be drawn between the use of the *cognomina* and the *nomina*, though it is probable that in origin the *cognomen* came from some family connected with the *gens* by marriage; and (2) that the *praenomen* generally comes first, but sometimes second (especially when both *nomen* and *praenomen* are added in the genitive to the name of a son or daughter).

9. The examples given illustrate also the few principles of inflexion and word-formation that are reasonably certain, for example, the various "genitival" endings. Those in *-ś* and *-l* are also found in dedications where in Latin a dative would be used:—*e.g.* (*mi*) *θuplθaś alpan turce* "(hoc) deae Thupelthae donum dedit," where *turce* shows the only verbal inflection yet certainly known; cf. *amce*, "was," *arce*, "made," *zilacnuce*, "held the office of a *Zilaχ*," *lupuce*, "passed away." More important are the formative principles which the proper names display. Endings *-a*, *-u*, *-e* and *-na* are common in the "Nominative"—and in Etruscan there appears to be no distinction between this case and the Accusative—of men's names; the endings *-i*, *-ei*, *-nei*, *-nia* and *-unia* are among the commonest for women's names. But no trace of gender has yet been observed in common nouns or adjectives. Nor is it always easy to distinguish a "Case" from a noun-stem. The women's names corresponding to the men's names in *-u* are sometimes *-ui*, sometimes *-nei*, sometimes longer forms (*ves-acnei*, beside *ves-u*, *hanunia* from *hanu*). And the so-called Genitives can themselves be inflected, as we have seen. The form *neθunsl* "of Neptune," may even have swallowed up the nominatival *-s* of the Italic *Neptunus*.

10. In view of the protracted discussion as to the numerals and the dice on which the first six are written, it should be added that only the following points are certain: (1) that *maχ* = one; (2) that the next five numbers are somehow represented by *ci*, *θu*, *huθ*, *sa* and *sal*; (3) and the next three somehow by *cesp-*, *semφ-* and *nuv*; (4) that the suffix *-alχ-* denotes the tens, or some of them, *e.g.* *cealχ-* beside *ci* (? 50 and 5); (5) that the suffix *-s* or *-z* is multiplicative (*es(a)ls* from *sal*). It is almost certain that *sal* must mean either 2 or 6, and of these a stronger case can, perhaps, be made for the latter meaning. *Zathrum* appears to be the corresponding ten (? 60). Skutsch's article in *Indogerm. Forschungen*, v. p. 256, remains the best account.

In close connexion with the numerals on sepulchral inscriptions appear the words *ril*, "old, aged," *avils*, "annorum," or "aetatis," and *tivr*, "month" (from *tiv*, "moon").

11. Schulze has shown (*e.g.*, p. 410) that a large number of familiar endings (*e.g.* those which when Latinized become *-acius*, *-alius*, *-annius*, *-arius*, *-asius*, *-atius*, *-avus*, *-avius*, *-ax*, and a similar series with *-o-*, *-ocius*, &c.), and further those with the elements, *-ino-*, *-ieno-*, *-enna*, *-ene-*, *-tern-*, *-turn-*, *-tric-*, &c., exhibit different methods by which *nomina* were built up from *praenomina* in Etruscan. Finally it is of considerable historical importance to observe that a great mass of the *praenomina* used for this purpose are clearly of Italic origin, *e.g.* *Helva*, *Barba*, *Vespa*, *Nero*, *Pedo*, from all of which (and many more) there are derivatives which at one stage or other were certainly or probably Etruscan. It is this incorporation of Italic elements into the Etruscan nomenclature—itself a familiar and inevitable feature of the pirate-type of conquest and settlement, under which many women who bear and nurse and first name the children belong to the conquered race—that has entrapped so many scholars into the delusion that the language itself was Indo-European.

12. So far the language has been discussed without any reference to ethnology. But the facts stated above in regard to the extension of the language in space and time are clearly adverse to the hypothesis that it came into Italy from the north, and fully bear out Livy's account (v. 33. 11) that the Etruscans of the Alpine valleys had been driven into that isolation by the invasion of the Gauls (beginning about 400 B.C.). And the accumulating evidence of a connexion with Asia Minor (see *e.g.* above §3) justifies confidence in the unbroken testimony of every Roman writer, which cannot but represent the traditions of the Etruscans themselves, and the evidence of similar traditions from the Asiatic side given by Herodotus (i. 97) to the effect that they came to Italy by sea from Lydia. Against this there has never been anything to set but the silence of "the Lydian historian Xanthus" (Dion. Hal. i. 28; cf. 30) who may have had many excellent reasons for it other than a disbelief of the tradition, and of whom in any case we know nothing save the vague commendation of Dionysius. And it is not merely the miscellanies of Athenaeus (*e.g.* xii. 519) but the unimpeachable testimony of the Umbrian Plautus (*Cistellaria*, 2. 3. 19), singularly neglected since Dennis's day, that convicts the Etruscans of an institution practised by the Lydians and other non-Indo-European peoples of Asia Minor, but totally repugnant to all the peoples among whom the Etruscans moved in their western settlement. The reader may be referred to Dennis's introductory chapter for a very serviceable collection of the other ancient testimony as to their origin. In the present state of our knowledge of the language it is best to disregard its apparent or alleged resemblances to various features of various Caucasian dialects pointed out by Thomsen (see above) and Pauli (*Altit. Forsch.* ii. 2, p. 147 ff.), and to acquiesce in Kretschmer's (*op. cit.* p. 408) *non liquet* as to the particular people of Asia Minor from whom the Etruscans sprang. But meanwhile it is clear that such evidence as has been obtained by epigraphic and linguistic research is not in any sense hostile but distinctly favourable to the tradition of their origin which they themselves must have maintained.

AUTHORITIES.—Beside those mentioned in the text, see Professor F. Skutsch's article "Etruskisch," in the new current (1908) edition of Pauly-Wissowa's *Encyclopaedia*; A. Torp's *Etruskische Beiträge*, and other shorter writings; E. Lattes's *Correzioni, giunte, postille al C.I. Etrusc.* (Florence, 1904), and his most valuable *Iscriz. paleolatine di provenienza Etrusca* (1895); Schaefer's articles in Pauli's *Altitalische Studien* (see above), and, with caution, Deecke's revision of Müller's *Etrusker* (Stuttgart, 1877). Some account of the relations of Etruscans with different Italic communities will be found in the relevant chapters of R. S. Conway's edition of the remains of *The Italic Dialects* (1897). Newly discovered Etruscan inscriptions are regularly published in the *Notizie degli scavi di antichità*, the official Italian journal of excavations (published by the *Reale Accad. dei Lincei*, but procurable separately). Fabretti's *Corpus Inscc. Italicarum* with its supplements was formerly useful, but in any doubtful reading its authority is worth little, and its commentary and glossary represent the epoch of Corssen. The regular contributions of Prof. Skutsch (under the general heading "Lateinische Sprache") to Vollmer's *Jahresbericht f. d. Fortschritte der romanischen Sprachwissenschaft*; and of Prof. Herbig to Bursian's *Jahresbericht über die Fortschritte der classischen Altertumswissenschaft* will both be of service. The present writer is indebted to both Professor Skutsch and Professor Torp for valuable guidance and instruction. (R. S. C.)

ETTENHEIM, a town of Germany, in the grand-duchy of Baden, pleasantly situated on the Ettenbach, under the western slope of the Black Forest, 7 m. E. from the Rhine by rail. Pop. (1900) 3106. It has a handsome Roman Catholic church, with ceiling frescoes, and containing the tomb of Cardinal Rohan, the last prince bishop of Strassburg, who resided here from 1790 till 1803; a Protestant church and a medieval town-hall.

Its industries include the manufacture of tobacco, soap and leather, and there is a considerable trade in wine and agricultural produce. Founded in the 8th century by Eddo, bishop of Strassburg, Ettenheim remained attached to that see until 1802, when it passed to Baden. Louis Antoine Henri de Bourbon-Condé, duke of Enghien (1772–1804), who had taken refuge here in 1801, was arrested in Ettenheim on the 15th of March 1804 and conveyed to Paris, where he was shot on the 20th of March following. The Benedictine abbey of Ettenheimmünster, which was founded in the 8th century and which was dissolved in 1803, occupied a site south of the town.

ETTINGSHAUSEN, CONSTANTIN, BARON VON (1826–1897), Austrian geologist and botanist, was born in Vienna on the 16th of June 1826. He graduated as a doctor of medicine in Vienna, and became in 1854 professor of botany and natural history at the medical and surgical military academy in that city. In 1871 he was chosen professor of botany at Graz, a position which he occupied until the close of his life. He was distinguished for his researches on the Tertiary floras of various parts of Europe, and on the fossil floras of Australia and New Zealand. He died at Graz on the 1st of February 1897.

PUBLICATIONS.—*Die Farnkräuter der Jetztwelt zur Untersuchung und Bestimmung der in den Formationen der Erdrinde eingeschlossenen Überreste von vorweltlichen Arten dieser Ordnung nach dem Flächen-Skelet bearbeitet* (1865); *Physiographie der Medicinal-Pflanzen* (1862); *A Monograph of the British Eocene Flora* (with J. Starkie Gardner), Palaeontograph. Soc. vol. i. (Filices, 1879–1882).

ETTLINGEN, a town of Germany, in the grand-duchy of Baden, on the Alb, and the railway Mannheim-Basel, 4½ m. S. of Karlsruhe. Pop. (1905) 8040. It is still surrounded by old walls and ditches, and presents a medieval and picturesque appearance. Among its more striking edifices are an old princely residence, with extensive grounds, an Evangelical and two Roman Catholic churches, and the buildings of a former monastery. There are also many Roman remains, notable among them the "Neptune" sculpture, now embedded in the wall of the town-hall. Its chief manufactures are paper-making, spinning, weaving and machine building. The cultivation of wine and fruit is also largely carried on, and in these products considerable trade is done.

The first notice of Ettlingen dates from the 8th century. It became a town in 1227 and was presented by the emperor Frederick II. to the margrave of Baden. In 1689 it was pillaged by the French, and near the town Moreau defeated the archduke Charles on the 9th and 10th of July 1796.

See Schwarz, *Geschichte der Stadt Ettlingen* (Carlsruhe, 1900).

ETTMÜLLER, ERNST MORITZ LUDWIG (1802–1877), German philologist, was born at Gersdorf near Löbau, in Saxony, on the 5th of October 1802. He was privately educated by his father, the Protestant pastor of the village, entered the gymnasium at Zittau in 1816 and studied from 1823 to 1826 at the university of Leipzig. After a period of about two years during which he was partly abroad and partly at Gersdorf, he proceeded to Jena, where in 1830 he delivered, under the auspices of the university, a course of lectures on the old Norse poets. Three years later he was called to occupy the mastership of German language and literature at the Zürich gymnasium; and in 1863 he left the gymnasium for the university, with which he had been partially connected twenty years before. He died at Zürich in April 1877. To the study of English Ettmüller contributed by an alliterative translation of Beowulf (1840), an Anglo-Saxon chrestomathy entitled *Engla and Seaxna scopas and boceras* (1850), and a well-known *Lexicon Anglo-Saxonicum* (1851), in which the explanations and comments are given in Latin, but the words unfortunately are arranged according to their etymological affinity, and the letters according to phonetic relations. He edited a large number of High and Low German texts, and to the study of the Scandinavian literatures he contributed an edition of the *Völuspa* (1831), a translation of the *Lieder der Edda von den Nibelungen* (1837) and an old Norse reading book and vocabulary. He was also the author of a *Handbuch der deutschen Literaturgeschichte* (1847), which includes the treatment of the Anglo-Saxon, the Old Scandinavian, and the Low German branches; and he popularized a great deal of literary information in his *Herbstabende und Winternächte: Gespräche über Dichtungen und Dichter* (1865–1867). The alliterative versification which he admired in the old German poems he himself employed in his *Deutsche Stammkönige* (1844) and *Das verhängnissvolle Zahnweh, oder Karl der Grosse und der Heilige Goar* (1852).

ETTMÜLLER, MICHAEL (1644–1683), German physician, was born at Leipzig on the 26th of May 1644, studied at his native place and at Wittenberg, and after travelling in Italy, France and England was recalled in 1668 to Leipzig, where he was admitted a member of the faculty of medicine in 1676. About the same time the university confided to him the chair of botany, and appointed him extraordinary professor of surgery and anatomy. He died on the 9th of March 1683, at Leipzig. He enjoyed a great reputation as a lecturer, and wrote many tracts on medical and chemical subjects. His collected works were published in 1708 by his son, Michael Ernst Ettmüller (1673–1732), who was successively professor of medicine (1702), anatomy and surgery (1706), physiology (1719) and pathology (1724) at Leipzig.

ETTRICK, a river and parish of Selkirkshire, Scotland. The river rises in Capel Fell (2223 ft.), a hill in the extreme S.W. of the shire, and flows in a north-easterly direction for 32 m. to its junction with the Tweed, its principal affluent being the Yarrow. In the parish of Ettrick were born James Hogg, the "Ettrick shepherd" (the site of the cottage being marked by a monument erected in 1898), Tibbie (Elizabeth) Shiel (1782–1878), keeper of the famous inn at the head of St Mary's Loch, both of whom are buried in the churchyard, and Thomas Boston (1713–1767), one of the founders of the Relief church. About 2 m. below Ettrick church is Thirlestane Castle, the seat of Lord Napier and Ettrick, a descendant of the Napiers of Merchiston, and beside it is the ruin of the stronghold that belonged to John Scott of Thirlestane, to whom, in reward for his loyalty, James V. granted a sheaf of spears as a crest, and the motto, "Ready, aye ready." Two miles up Rankle Burn, a right-hand tributary, lies the site of Buccleuch, another stronghold of the Scotts, which gave them the titles of earl (1619) and duke (1663). Only the merest fragment remains of Tushielaw tower, occupying high ground opposite the confluence of the Rankle and the Ettrick, the home of Adam Scott, "King of the Border," who was executed for his misdeeds in 1530. Lower down the dale is Deloraine, recalling one of the leading characters in *The Lay of the Last Minstrel*. If the name come from the Gaelic *dail Orain*, "Oran's field," the district was probably a scene of the labours of St Oran (d. 548), an Irish saint and friend of Columba. It seems that Sir Walter Scott's rhythm has caused the accent wrongly to be laid on the last, instead of the penultimate syllable. Carterhaugh, a corruption of Carelhaugh, occupying the land where Ettrick and Yarrow meet, was the scene of the ballad of "Young Tamlane," and of the historic football match in 1815, under the auspices of the duke of Buccleuch, between the burghers of Selkirk, championed by Walter Scott, sheriff of the Forest (not yet a baronet), and the men of Yarrow vale, championed by the Ettrick shepherd.

ETTY, WILLIAM (1787–1849), British painter, was born at York, on the 10th of March 1787. His father had been in early life a miller, but had finally established himself in the city of York as a baker of spice-bread. After some scanty instruction of the most elementary kind, the future painter, at the age of eleven and a half, left the paternal roof, and was bound apprentice in the printing-office of the *Hull Packet*. Amid many trials and discouragements he completed his term of seven years' servitude, and having in that period come by practice, at first surreptitious, though afterwards allowed by his master "in lawful hours," to know his own powers, he removed to London.

The kindness of an elder brother and a wealthy uncle, William Etty, himself an artist, stood him in good stead. He commenced his training by copying without instruction from nature, models, prints, &c.—his first academy, as he himself says, being a plaster-cast shop in Cock Lane, Smithfield. Here he made a copy from an ancient cast of Cupid and Psyche, which was shown to Opie, and led to his being enrolled in 1807 as student of the Academy, whose schools were at that time conducted in Somerset House. Among his fellow scholars at this period of his career were some who in after years rose to eminence in their art, such as Wilkie, Haydon, Collins, Constable. His uncle generously paid the necessary fee of one hundred guineas, and in the summer of 1807 he was admitted to be a private pupil of Sir Thomas Lawrence, who was at the very acme of his fame. Etty himself always looked on this privilege as one of incalculable value, and till his latest day regarded Lawrence as one of the chief ornaments of British art. For some years after he quitted Sir Thomas's studio, even as late as 1816, the influence of his preceptor was traceable in the mannerism of his works. Though he had by this time made great progress in his art, his career was still one of almost continual failure, hardly cheered by even a passing ray of success. In 1811, after repeated rejections, he had the satisfaction of seeing his "Telemachus rescuing Antiope" on the walls of the Academy. It was badly hung, however, and attracted little notice. For the next five years he persevered with quiet and constant energy in overcoming the disadvantages of his early training with yearly growing success, and he was even beginning to establish something like a name when in 1816 he resolved to improve his knowledge of art by a journey to Italy. After an absence of three months, however, he was compelled to return home without having penetrated farther south than Florence. Struggles and vexations still continued to harass him, but he bore up against them with patient endurance and force of will. In 1820 his "Coral-finders," exhibited at the Royal Academy, attracted much attention, and its success was more than equalled by that of "Cleopatra's arrival in Cilicia," shown in the following year. In 1822 he again set out on a tour to Italy, taking Paris on his way, and astonishing his fellow-students at the Louvre by the rapidity and fidelity with which he copied from the old masters in that gallery. On arriving at Rome he immediately resumed his studies of the old masters, and elicited many expressions of wonder from his Italian fellow-artists for the same qualities which had gained the admiration of the French. Though Etty was duly impressed by the grand *chefs-d'œuvre* of Raphael and Michelangelo at Rome, he was not sorry to exchange that city for Venice, which he always regarded as the true home of art in Italy. His own style as a colourist held much more of the Venetian than of any other Italian school, and he admired his prototypes with a zeal and exclusiveness that sometimes bordered on extravagance.

Early in 1824 he returned home to find that honours long unjustly withheld were awaiting him. In that year he was made an associate of the Royal Academy, and in 1828 he was promoted to the full dignity of an Academician. In the interval between these dates he had produced the "Combat (Woman interceding for the Vanquished)," and the first of the series of three pictures on the subject of Judith, both of which ultimately came into the possession of the Scottish Academy. Etty's career was from this time one of slow but uninterrupted success. In 1830 he again crossed the channel with the view to another art tour through the continent; but he was overtaken in Paris by the insurrection of the Three Days, and was so much shocked by the sights he was compelled to witness in that time that he returned home with all convenient speed. During the next ten years of his life the zeal and unabated assiduity of his studies were not at all diminished. He was a constant attendant at the Academy Life School, where he used to work regularly along with the students, notwithstanding the remonstrances of some of his fellow-Academicians, who thought the practice undignified. The course of his studies was only interrupted by occasional visits to his native city, and to Scotland, where he was welcomed with the utmost enthusiasm, and *fêted* with the most gratifying heartiness by his brother-artists at Edinburgh. On the occasion of one of these visits he gave the finishing touches to his trio of Judiths. In 1840, and again in 1841, Etty undertook a pilgrimage to the Netherlands, to seek and examine for himself the masterpieces of Rubens in the churches and public galleries there. Two years later he once more visited France with a view to collecting materials for what he called "his last epic," his famous picture of "Joan of Arc." This subject, which would have tasked to the full even his great powers in the prime and vigour of manhood, proved almost too serious an undertaking for him in his old age. It exhibits, at least, amid great excellences, undeniable proofs of decay on the part of the painter; yet it brought a higher price than any of his earlier and more perfect works, £2500. In 1848, after completing this work, he retired to York, having realized a comfortable independence. One wish alone remained for him now to gratify; he desired to see a "gathering" of his pictures. With much difficulty and exertion he was enabled to assemble the great majority of them from various parts of the British Islands; and so numerous were they that the walls of the large hall he engaged in London for their exhibition were nearly covered. This took place in the summer of 1849; on the 13th of November of that same year he died. He received the honours of a public funeral in his native city.

Etty holds a secure place among English artists. His drawing was frequently incorrect, but in feeling and skill as a colourist he has few equals. His most conspicuous defects as a painter were the result of insufficient general culture and narrowness of sympathy.

See Etty's autobiography, published in the *Art Journal* for 1849, and the *Life of William Etty, R.A.*, by Gilchrist (2 vols., 1855).

ETYMOLOGY (Gr. ἔτυμος, true, and λόγος, account), that part or branch of the science of linguistics which deals with the origin or derivation of words. The Greek word ἔτυμος, in so far as it was applied to words, referred to the real underlying meaning rather than to the origin. It was the Stoics who asserted that the discovery of τὸ ἔτυμον would explain the essence of the things and ideas represented by words. Plato in the *Cratylus* makes a nearer approach to the modern view when he connects, *e.g.* γυνή, woman, with γονή, seed, while he jests at such etymological feats as the derivation of οὐρανός, heaven, ἀπὸ τοῦ ὁρᾶν τὰ ἄνω, from looking at things above, or ἄνθρωπος, man, from ὁ ἀναθρῶν ἃ ὄπωπεν, he who looks up at what he sees. Until the comparative study of philology and the development of the laws underlying phonetic changes, the derivation of words was a matter mostly of guess-work, sometimes right but more often wrong, based on superficial resemblances of form and the like. This popular etymology, to which the Germans have given the name *Volksetymologie* or folk-etymology, has had much influence in the form which words take (*e.g.* "crawfish" or "crayfish," from the French *crevis*, modern *écrevisse*, or "sand-blind," from *samblind*, *i.e.* semi-, half-blind), and has frequently been the occasion of homonyms. W. W. Skeat has embodied in certain canons or rules some well-known principles which should be observed in giving the etymology of a word; these may be usefully given here: "(1) Before attempting an etymology, ascertain the earliest form and use of the word, and observe chronology. (2) Observe history and geography; borrowings are due to actual contact. (3) Observe phonetic laws, especially those which regulate the mutual relation of consonants in the various Aryan languages, at the same time comparing the vowel sounds. (4) In comparing two words, A and B, belonging to the same language, of which A contains the lesser number of syllables, A must be taken to be the more original word, unless we have evidence of contraction or other corruption. (5) In comparing two words, A and B, belonging to the same language and consisting of the same number of syllables, the older form can usually be distinguished by observing the sound of the principal vowel. (6) Strong verbs, in the Teutonic languages, and the so-called "irregular verbs" in Latin, are commonly to be considered as primary, other related forms being taken from them. (7) The whole of a word, and not a portion only, ought to be reasonably accounted for; and, in tracing changes of form, any infringement of phonetic laws is to be regarded with suspicion. (8) Mere resemblances of form and apparent connexion in sense between languages which have different phonetic laws or no necessary connexion are commonly a delusion, and are not to be regarded. (9) When words in two different languages are more nearly alike than the ordinary phonetic laws would allow, there is a strong probability that one language has borrowed the word from the other. Truly cognate words ought not to be *too much* alike. (10) It is useless to offer an explanation of an English word which will not *also* explain all the cognate forms" (Introduction to *Etymological Dictionary of the English Language*, 1898).

An English word is either "the extant formal representative or direct phonetic descendant of an earlier (Teutonic) word, or it has been *adopted* or *adapted* from some foreign language," adoption being a popular, and adaptation being a literary or learned process; finally, there is *formation*, *i.e.* the "combination of existing words (foreign or native) or parts of words with each other or with living formatives, *i.e.* syllables which no longer exist as separate words, but yet have an appreciable signification which they impart to the new product" (see Introduction to the Oxford *New English Dictionary*, p. xx). A further classification of words according to their origin is that into (1) naturals, *i.e.* purely native words, like "mother," "father," "house"; (2) those which become perfectly naturalized, though of foreign origin, like "cat," "mutton," "beef"; (3) denizens, words naturalized in usage but keeping the foreign pronunciation, spelling and inflections, *e.g.* "focus," "camera"; (4) aliens, words for foreign things, institutions, offices, &c., for which there is no English equivalent, *e.g.*, *menu*, *table d'hôte*, *impi*, *lakh*, *mollah*, *tarbush*; (5) casuals, *e.g.*, *bloc*, *Ausgleich*, *sabotage*, differing only from "aliens" in their temporary use. The full etymology of a word should include the phonetic descent, the source of the word, whether from a native or from a foreign origin, and, if the latter, whether by adoption or adaptation, or, if a *formed* word, the origin of the parts which go to make it up. In the present edition of the *Encyclopaedia Britannica* such full etymologies, which would be necessary and in place in an etymological dictionary, have not been given in every instance, but brief etymological notes are appended, showing in outline the sources and history, and in many cases the development in meaning. (See also DICTIONARY.)

EU, a town of north-western France, in the department of Seine-Inférieure, on the river Bresle, 64 m. N.N.E. of Rouen on the Western railway, and 2 m. E.S.E. of Le Tréport, at the mouth of the Bresle, which is canalized between the two towns. Pop. (1906) 4865. The extensive forest of Eu lies to the south-east of the town. Eu has three buildings of importance—the beautiful Gothic church of St Laurent (12th and 13th centuries) of which the exterior of the choir with its three tiers of ornamented buttressing and the double arches between the pillars of the nave are architecturally notable; the chapel of the Jesuit college (built about 1625), in which are the tombs of Henry, third duke of Guise, and his wife, Katherine of Cleves; and the château. The latter was begun by Henry of Guise in 1578, in place of an older château burnt by Louis XI. in 1475 to prevent its capture by the English. It was continued by Mademoiselle de Montpensier in the latter half of the 17th century, and restored by Louis Philippe who, in 1843 and 1845, received Queen Victoria within its walls. In 1902 the greater part of the building was destroyed by fire. The town has a tribunal of commerce and a communal college, flour-mills, manufactories of earthenware, biscuits, furniture, casks, and glass and brick works; the port has trade in grain, timber, hemp, flax, &c.

Eu (Augusta) was in existence under the Romans. The first line of its counts, supposed to be descended from the dukes of Normandy, had as heiress Alix (died 1227), who married Raoul (Ralph) de Lusignan, known as the Sire d'Issoudun from his lordship of that name. Through their grand-daughter Marie, the countship of Eu passed by marriage to the house of Brienne, two members of which, both named Raoul, were constables of France. King John confiscated the countship in 1350, and gave it to John of Artois (1352). His great-grandson, Charles, son of Philip of Artois, count of Eu, and Marie of Berry, played a conspicuous part in the Hundred Years' War. He was taken prisoner at the battle of Agincourt (1415), and remained in England twenty-three years, in accordance with the dying injunctions of Henry V. that he was not to be let go until his son, Henry VI., was of age to govern his dominions. He accompanied Charles VII. on his campaigns in Normandy and Guyenne, and was made lieutenant-general of these two provinces. It was he who effected a reconciliation between the king and the dauphin after the revolt of the latter. He was created a peer of France in 1458, and made governor of Paris during the war of the League of the Public Weal (1465). He died on the 15th of July 1472 at the age of about seventy-eight, leaving no children. His sister's son, John of Burgundy, count of Nevers, now received the countship, which passed through heiresses, in the 15th century, to the house of Cleves, and to that of Lorraine-Guise. In 1660 Henry II. of Lorraine, duke of Guise, sold it to "Mademoiselle," Anne Marie Louise d'Orléans, duchesse de Montpensier (*q.v.*), who made it over (1682) to the duke of Maine, bastard son of Louis XIV., as part of the price of the release of her lover Lauzun. The second son of the duke of Maine, Louis Charles de Bourbon (1701–1775), bore the title of count of Eu. In 1755 he inherited from his elder brother, Louis Auguste de Bourbon (1700–1755), prince de Dombes, great estates, part of which he sold to the king. The remainder, which was still considerable, passed to his cousin the duke of Penthièvre. These estates were confiscated at the Revolution; but at the Restoration they were bestowed by Louis XVII. on the duchess-dowager of Orléans who, in 1821, bequeathed them to her son, afterwards King Louis Philippe. They were again confiscated in 1852, but were restored to the Orléans family by the National Assembly after the Franco-German War. The title of count of Eu was revived in the 19th century in favour of the eldest son of the duke of Nemours, second son of King Louis Philippe.

EUBOEA (pronounced *Evvia* in the modern language), EURIPOS, or NEGROPONT, the largest island of the Grecian archipelago. It is separated from the mainland of Greece by the Euboic Sea. In general outline it is long and narrow; it is about 90 m. long, and varies in breadth from 30 m. to 4. Its general direction is from N.W. to S.E., and it is traversed throughout its length by a mountain range, which forms part of the chain that bounds Thessaly on the E., and is continued south of Euboea in the lofty islands of Andros, Tenos and Myconos. The principal peaks of this range are grouped in three knots which divide the island into three portions. Towards the north, opposite the Locrian territory, the highest peaks are Mts. Gaetsades (4436 ft.) and Xeron (3232 ft.). The former was famed in ancient times for its medicinal plants, and at its foot are the celebrated hot springs, near the town of Aedepsus (mod. Lipsos), called the Baths of Heracles, used, we are told, by the dictator L. Cornelius Sulla, and still frequented by the Greeks for the cure of gout, rheumatism and digestive disorders. These springs, strongly sulphurous, rise a short distance inland at several points, and at last pour steaming over the rocks, which they have yellowed with their deposit, into the Euboic Sea. Opposite the entrance of the Maliac Gulf is the promontory of Cenaeum, the highest point (2221 ft.) behind which is now called Lithada, a corruption of Lichades, the ancient name of the islands off the extremity of the headland. Here again we meet with the legends of Heracles, for this cape, together with the neighbouring coast of Trachis, was the scene of the events connected with the death of that hero, as described by Sophocles in the *Trachiniae*. Near the north-east extremity of the island, and almost facing the entrance of the Gulf of Pagasae, is the promontory of Artemisium, celebrated for the great naval victory gained by the Greeks over the Persians, 480 B.C. Towards the centre, to the N.E. of Chalcis, rises the highest of its mountains, Dirphys or Dirphe, now Mount Delphi (5725 ft.), the bare summit of which is not entirely free from snow till the end of May, while its sides are clothed with pines and firs, and lower down with chestnuts and planes. It is one of the most conspicuous summits of eastern Greece, and from its flanks the promontory of Chersonesus projects into the Aegean. At the southern extremity the highest mountain is Ocha, now called St Elias (4830 ft.).

The south-western promontory was named Geraestus, the south-eastern Caphareus; the latter, an exposed point, attracts the storms, which rush between it and the neighbouring cliffs of Andros as through a funnel. The whole of the eastern coast is rocky and destitute of harbours, especially the part called Coela, or "the Hollows," where part of the Persian fleet was wrecked. So greatly was this dreaded by sailors that the principal line of traffic from the north of the Aegean to Athens used to pass by Chalcis and the Euboic Sea.

Euboea was believed to have originally formed part of the mainland, and to have been separated from it by an earthquake. This is the less improbable because it lies in the neighbourhood of a line of earthquake movement, and both from Thucydides and from Strabo we hear of the northern part of the island being shaken at different periods, and the latter writer speaks of a fountain at Chalcis being dried up by a similar cause, and a mud volcano formed in the neighbouring plain. Evidences of volcanic action are also traceable in the legends connected with Heracles at Aedepsus and Cenaeum, which here, as at Lemnos and elsewhere in Greece, have that origin. Its northern extremity is separated from the Thessalian coast by a strait, which at one point is not more than a mile and a half in width. In the neighbourhood of Chalcis, both to the north and the south, the bays are so confined as readily to explain the story of Agamemnon's fleet having been detained there by contrary winds. At Chalcis itself, where the strait is narrowest, it is called the Euripus, and here it is divided in the middle by a rock, on which formerly a castle stood. The channel towards Boeotia, which is now closed, is spanned by a stone bridge. The other, which is far the deeper of the two, is crossed by an iron swing-bridge, allowing for the passage of vessels. This bridge, which dates from 1896, replaced a smaller wooden swing-bridge erected in 1856. The extraordinary changes of tide which take place in this passage have been a subject of wonder from classical times. At one moment the current runs like a river in one direction, and shortly afterwards with equal velocity in the other. Strabo speaks of it as varying seven times in the day, but it is more accurate to say, with Livy, that it is irregular. A bridge was first constructed here in the twenty-first year of the Peloponnesian War, when Euboea revolted from Athens; and thus the Boeotians, whose work it was, contrived to make that country "an island to every one but themselves." The Boeotians by this means secured a powerful weapon of offence against Athens, being able to impede their supplies of gold and corn from Thrace, of timber from Macedonia, and of horses from Thessaly. The name Euripus was corrupted during the middle ages into Evripo and Egripo, and in this latter form transferred to the whole island, whence the Venetians, when they occupied the district, altered it to Negroponte, referring to the bridge which connected it with the mainland.

The rivers of Euboea are few in number and scanty in volume. In the north-eastern portion the Budorus flows into the Aegean, being formed by two streams which unite their waters in a small plain, and were perhaps the Cereus and Neleus concerning which the story was told that sheep drinking the water of the one became white, of the other black. On the north coast, near Histiaea, is the Callas; and on the western side the Lelantus, near Chalcis, flowing through the plain of the same name. This plain, which intervenes between Chalcis and Eretria, and was a fruitful source of contention to those cities, is the most considerable of the few and small spaces of level ground in the island, and was fertile in corn. Aristotle, when speaking of the aristocratic character of the horse, as requiring fertile soil for its support, and consequently being associated with wealth, instances its use among the Chalcidians and Eretrians, and in the former of those two states we find a class of nobles called *Hippobotae*. This rich district was afterwards occupied by Athenian cleruchs. The next largest plain was that of Histiaea, and at the present day this and the neighbourhood of the Budorus (Ahmet-Aga) are the two best cultivated parts of Euboea, owing to the exertions of foreign colonists. The mountains afford excellent pasturage for sheep and cattle, which were reared in great quantities in ancient times, and seem to have given the island its name; these pastures belonged to the state. The forests are extensive and fine; and are now superintended by government officials, called δασοφύλακες, in spite or with the connivance of whom the timber is being rapidly destroyed—partly from the merciless way in which it is cut by the proprietors, partly from its being burnt by the shepherds, for the sake of the rich grass that springs up after such conflagrations, and partly owing to the goats, whose bite kills all the young growths. In the mountains were several valuable mines of iron and copper; and from Karystos, at the south of the island, came the green and white marble, the modern Cipollino, which was in great request among the Romans of the imperial period for architectural purposes, and the quarries of which belonged to the emperor. The scenery of Euboea is perhaps the most beautiful in Greece, owing to the varied combinations of rock, wood and water; for from the uplands the sea is almost always in view, either the wide island-studded expanse of the Aegean, or the succession of lakes formed by the Euboic Sea, together with mountains of exquisite outline, while the valleys and maritime plains are clothed either with fruit trees or with plane trees of magnificent growth.

On the other hand, no part of Greece is so destitute of interesting remains of antiquity as Euboea. The only site which has attracted archaeologists is that of Eretria (*q.v.*), which was excavated by the American School of Athens in 1890–1895.

Like most of the Greek islands, Euboea was originally known under other names, such as Macris and Doliche from its shape, and Ellopia and Abantis from the tribes inhabiting it. The races by which it was occupied at an early period were different in the three districts, into which, as we have seen, it was naturally divided. In the northern portion we find the Histiaei and Ellopes, Thessalian races, which probably had passed over from the Pagasaean Gulf. In central Euboea were the Curetes and Abantes, who seem to have come from the neighbouring continent by way of the Euripus; of these the Abantes, after being reinforced by Ionians from Attica, rose to great power, and exercised a sort of supremacy over the whole island, so that in Homer the inhabitants generally are called by that name. The southern part was occupied by the Dryopes, part of which tribe, after having been expelled from their original seats in the south of Thessaly by the Dorians, migrated to this island, and established themselves in the three cities of Karystos, Dystos and Styra. The population of Euboea at the present day is made up of elements not less various, for many of the Greek inhabitants seem to have immigrated, partly from the mainland, and partly from other islands; and besides these, the southern portion is occupied by Albanians, who probably have come from Andros; and in the mountain districts nomad Vlach shepherds are found.

History.—The history of the island is for the most part that of its two principal cities, Chalcis and Eretria, the latter of which was situated about 15 m. S.E. of the former, and was also on the shore of the Euboic Sea. The neighbourhood of the fertile Lelantian or Lelantine plain, and their proximity to the place of passage to the mainland, were evidently the causes of the choice of site, as well as of their prosperity. Both cities were Ionian settlements from Attica, and their importance in early times is shown by their numerous colonies in Magna Graecia and Sicily, such as Cumae, Rhegium and Naxos, and on the coast of Macedonia, the projecting portion of which, with its three peninsulas, hence obtained the name of Chalcidice. In this way they opened new trade routes to the Greeks, and extended the field of civilization. How great their commerce was is shown by the fact that the Euboic scale of weights and measures was in use at Athens (until Solon, *q.v.*) and among the Ionic cities generally. They were rival cities, and at first appear to have been equally powerful; one of the earliest of the sea-fights mentioned in Greek history took place between them, and in this we are told that many of the other Greek states took part. It was in consequence of the aid which the people of Miletus lent to the Eretrians on this occasion that Eretria sent five ships to aid the Ionians in their revolt against the Persians (see IONIA); and owing to this, that city was the first place in Greece proper to be attacked by Datis and Artaphernes in 490 B.C. It was utterly ruined on that occasion, and its inhabitants were transported to Persia. Though it was restored after the battle of Marathon, on a site at a little distance from its original position, it never regained its former eminence, but it was still the second city in the island. From this time its neighbour Chalcis, which, though it suffered from a lack of good water, was, as Strabo says, the natural capital from its commanding the Euripus, held an undisputed supremacy. Already, however, this city had suffered from the growing power of Athens. In the year 506, when the Chalcidians joined with the Boeotians and the Spartan king Cleomenes in a league against that state, they were totally defeated by the Athenians, who established 4000 Attic settlers (see CLERUCHY) on their lands, and seem to have reduced the whole island to a condition of dependence. Again, in 446, when Euboea endeavoured to throw off the yoke, it was once more reduced by Pericles, and a new body of settlers was planted at Histiaea in the north of the island, after the inhabitants of that town had been expelled. This event is referred to by Aristophanes in the *Clouds* (212), where the old farmer, on being shown Euboea on the map "lying outstretched in all its length," remarks,—"I know; we laid it prostrate under Pericles." The Athenians fully recognized its importance to them, as supplying them with corn and cattle, as securing their commerce, and as guaranteeing them against piracy, for its proximity to the coast of Attica rendered it extremely dangerous to them when in other hands, so that Demosthenes, in the *De corona*, speaks of a time when the pirates that made it their headquarters so infested the neighbouring sea as to prevent all navigation. But in the 21st year of the Peloponnesian war the island succeeded in regaining its independence. After this we find it taking sides with one or other of the leading states, until, after the battle of Chaeronea, it passed into the hands of Philip II. of Macedon, and finally into those of the Romans. By Philip V. of Macedon Chalcis was called one of the three fetters of Greece, Demetrias on the Gulf of Pagasae and Corinth being the other two.

In modern history Euboea or Negropont comes once more prominently into notice at the time of the fourth crusade. In the partition of the Eastern empire by the Latins which followed that event the island was divided into three fiefs, the occupants of which ere long found it expedient to place themselves under the protection of the Venetian republic, which thenceforward became the sovereign power in the country. For more than two centuries and a half during which the Venetians remained in possession, it was one of the most valuable of their dependencies, and the lion of St Mark may still be seen, both over the sea gate of Chalcis and in other parts of the town. At length in 1470, after a valiant defence, this well-fortified city was wrested from them by Mahommed II., and the whole island fell into the hands of the Turks. One desperate attempt to regain it was made by Francesco Morosini (d. 1694) in 1688, when the city was besieged by land and sea for three months; but owing to the strength of the place, and the disease which thinned their ranks, the assailants were forced to withdraw. At the conclusion of the Greek War of Independence, in 1830, the island was delivered from the Turkish sway, and constituted a part of the newly established Greek state. Euboea at the present time produces a large amount of grain, and its mineral wealth is also considerable, great quantities of magnesia and lignite being exported. In 1899 it was constituted a separate *nome* (pop. 1907, 116,903).

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EUBULIDES, a native of Miletus, Greek philosopher and successor of Eucleides as head of the Megarian school. Nothing is known of the events of his life. Indirect evidence shows that he was a contemporary of Aristotle, whom he attacked with great bitterness. There was also a tradition that Demosthenes was one of his pupils. His name has been preserved chiefly by some celebrated, though false and captious, syllogisms of which he was the reputed author. Though mainly examples of verbal quibbling, they serve to show the difficulties of language and of explaining the relations of sense-given impressions. Eubulides wrote a treatise on Diogenes the Cynic and also a number of comedies. (See MEGARIAN SCHOOL OF PHILOSOPHY.)

EUBULUS, of Anaphlystus, Athenian demagogue during the time of Demosthenes. He was a persistent opponent of that statesman, and was chiefly instrumental in securing the acquittal of Aeschines (who had been his own clerk) when accused of treachery in connexion with the embassy to Philip of Macedon. Eubulus took little interest in military affairs, and was (at any rate at first) a strong advocate of peace at any price. He devoted himself to matters of administration, especially in the department of finance, and although he is said to have increased the revenues and to have done real service to his country, there is no doubt that he took advantage of his position to make use of the material forces of the state for his own aggrandizement. His proposal that any one who should move that the Theoric Fund should be applied to military purposes should be put to death may have gained him the goodwill of the people, but it was not in the true interest of the state. Later, Eubulus himself seems to have recognized this, and to have been desirous of modifying or repealing the regulation, but it was too late; Athens had lost all feelings of patriotism; cowardly and indolent, she rivalled even Tarentum in her luxury and extravagance (Theopompus in Athenaeus iv. p. 166). As one of the chief members of an embassy to Philip, Eubulus allowed himself to be won over, and henceforth did his utmost to promote the cause of the Macedonian. The indignant remonstrances of Demosthenes failed to weaken Eubulus's hold on the popular favour, and after his death (before 330) he was distinguished with special honours, which were described by Hypereides in a speech (*Περὶ τῶν Εὐβούλου δωρεῶν*) now lost. Eubulus was no doubt a man of considerable talent and reputation as an orator, but none of his speeches has survived, nor is there any appreciation of them in ancient writers. Aristotle (*Rhetoric*, i. 15. 15) mentions a speech against Chares, and Theopompus (in his *Philippica*) had given an account of his life, extracts from which are preserved in Harpocration.

See Demosthenes, *De corona*, pp. 232, 235; *De falsa legatione*, pp. 434, 435, 438; *Adversus Leptinem*, p. 498; *In Midiam*, pp. 580, 581; Aeschines, *De falsa legatione, ad fin.*; Index to C. W. Müller's *Oratores Attici*; A. D. Schäfer, *Demosthenes und seine Zeit* (1885).

EUBULUS, Athenian poet of the Middle comedy, flourished about 370 B.C. Fragments from about fifty of the 104 plays attributed to him are preserved in Athenaeus. They show that he took little interest in political affairs, but confined himself chiefly to mythological subjects, ridiculing, when opportunity offered, the bombastic style of the tragedians, especially Euripides. His language is pure, and his versification correct.

Fragments in T. Kock, *Comicorum Atticorum fragmenta*, ii. (1884).

EUCALYPTUS, a large genus of trees of the natural order Myrtaceae, indigenous, with a few exceptions, to Australia and Tasmania. In Australia the Eucalypti are commonly called "gum-trees" or "stringy-bark trees," from their gummy or resinous products, or fibrous bark. The genus, from the evidence of leaf-remains, appears to have been represented by several species in Eocene times. The leaves are leathery in texture, hang obliquely or vertically, and are studded with glands which contain a fragrant volatile oil. The petals cohere to form a cap[1] which is discarded when the flower expands. The fruit is surrounded by a woody cup-shaped receptacle and contains very numerous minute seeds. The Eucalypti are rapid in growth, and many species are of great height, *E. amygdalina*, the tallest known tree, attaining to as much as 480 ft., exceeding in height the Californian big-tree (*Sequoia gigantea*), with a diameter of 81 ft. *E. globulus*, so called from the rounded form of its cap-like corolla, is the blue gum tree of Victoria and Tasmania. The leaves of trees from three to five years of age are large, sessile and of a glaucous-white colour, and grow horizontally;

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[1] Whence the name (εὐκάλυπτος, well-covered) given by L'Héritier, 1788.

those of older trees are ensiform, 6–12 in. long, and bluish-green in hue, and are directed downwards. The flowers are single or in clusters, and nearly sessile. This species is one of the largest trees in the world, and attains a height of 375 ft. Since 1854 it has been successfully introduced into the south of Europe, Algeria, Egypt, Tahiti, New Caledonia, Natal and India, and has been extensively planted in California, and, with the object of lessening liability to droughts, along the line of the Central Pacific railway. It would probably thrive in any situation having a mean annual temperature not below 60° F., but it will not endure a temperature of less than 27° F. Its supposed property of reducing the amount of malaria in marshy districts is attributable to the drainage effected by its roots, rather than to the antiseptic exhalations of its leaves. To the same cause also is ascribed the gradual disappearance of mosquitoes in the neighbourhood of plantations of this tree, as at Lake Fezara, in Algeria. Since about 1870, when the tree was planted in its cloisters, the monastery of St Paolo a la trè Fontana has become habitable throughout the year, although situated in one of the most fever-stricken districts of the Roman Campagna. An essential oil is obtained by aqueous distillation of the leaves of this and other species of *Eucalyptus*, which is a colourless or straw-coloured fluid when freshly prepared, with a characteristic odour and taste, of sp. gr. 0.910 to 0.930, and soluble in its own weight of alcohol. This consists of many different bodies, the most important of which is eucalyptol, a volatile oil, which constitutes about 70%. This is the portion of eucalyptus oil which passes over between 347° and 351° F., and crystallizes at 30° F. It consists chiefly of a terpene and cymene. Eucalyptus oil also contains, after exposure to the air, a crystallizable resin derived from eucalyptol. The dose of the oil is ½ to 3 minims. Eucalyptol may be given in similar doses, and is preferable for purposes of inhalation. The oil derived from *E. amygdalina* contains a large quantity of phellandrene, which forms a crystalline nitrate, and is very irritating when inhaled. The oils from different species of *Eucalyptus* vary widely in composition.

Eucalyptus oil is probably the most powerful antiseptic of its class, especially when it is old, as ozone is formed in it on exposure to air. Internally it has the typical actions of a volatile oil in marked degree. Like quinine, it arrests the normal amoeboid movements of the polymorphonuclear leucocytes, and has a definite antiperiodic action; but it is a very poor substitute for quinine in malaria. In large doses it acts as an irritant to the kidneys, by which it is largely excreted, and as a marked nervous depressant, abolishing the reflex functions of the spinal cord and ultimately arresting respiration by its action on the medullary centre. An emulsion, made by shaking up equal parts of the oil and powdered gum-arabic with water, has been used as a urethral injection, and has also been given internally in drachm doses in pulmonary tuberculosis and other microbic diseases of the lungs and bronchi. The oil has somehow acquired an extraordinary popular reputation in influenza, but there is no evidence to show that it has any marked influence upon this disease or that its use tends to lessen the chances of infection. It has been used as an antiseptic by surgeons, and is an ingredient of "catheter oil," used for sterilizing and lubricating urethral catheters, now that carbolic oil, formerly employed, has been shown to be practically worthless as an antiseptic. *Eucalyptus rostrata* and other species yield eucalyptus or red gum, which must be distinguished from Botany Bay kino. Red gum is very powerfully astringent and is given internally, in doses of 2 to 5 grains, in cases of diarrhoea and pharyngeal inflammation. It is prepared by the pharmacist in the form of tinctures, insufflations, syrups, lozenges, &c. Red gum is official in Great Britain. *E. globulus*, *E. resinifera*, and other species, yield what is known as Botany Bay kino, an astringent dark-reddish amorphous resin, which is obtained in a semi-fluid state by making incisions in the trunks of the trees. The kino of *E. gigantea* contains a notable proportion of gum. J. H. Maiden enumerates more than thirty species as kino-yielding. From the leaves and young bark of *E. mannifera* and *E. viminalis* is procured Australian manna, a hard, opaque, sweet substance, containing melitose. On destructive distillation the leaves yield much gas, 10,000 cub. ft. being obtained from one ton. The wood is extensively used in Australia as fuel, and the timber is of remarkable size, strength and durability. Maiden enumerates nearly 70 species as timber-yielding trees including *E. amygdalina*, the wood of which splits with remarkable facility, *E. botryoides*, hard, tough and durable and one of the finest timbers for shipbuilding, *E. diversicolor* or "karri," *E. globulus*, *E. leucoxylon* or ironbark, *E. marginata* or "jarrah" (see JARRAH WOOD), *E. obliqua*, *E. resinifera*, *E. siderophloia* and others. The timber is often very hard, tough and durable, and useful for shipbuilding, building, fencing, planks, &c. The bark of different species of *Eucalyptus* has been used in paper-making and tanning, and in medicine as a febrifuge.

For further details see Baron von Müller's monograph of the genus, *Eucalyptographia* (Melbourne, 1879–1884); J. H. Maiden, *Useful Native Plants of Australia* (1889).

EUCHARIS, in botany, a genus of the natural order Amaryllidaceae, containing a few species, natives of Columbia. *Eucharis amazonica* or *grandiflora* is the best-known and most generally cultivated species. It is a bulbous plant with broad stalked leaves, and an erect scape 1½ to 2 ft. long, bearing an umbel of three to ten large white showy flowers. The flowers resemble the daffodil in having a prominent central cup or corona, which is sometimes tinged with green. It is propagated by removing the offsets, which may be done in spring, potting them singly in 6-in. pots. It requires good loamy soil, with sand enough to keep the compost open, and should have a good supply of water and a temperature of 65° to 70° during the night, with a rise of 8° or 10° in the day. During summer growth is to be encouraged by repotting, but the plants should afterwards be slightly rested by removal to a night temperature of about 60°, water being withheld for a time, though they must not go too long dry, the plant being an evergreen. By the turn of the year they may again have more heat and more water, and this will probably induce them to flower. After this is over they may be shifted and grown again as before; and, as they get large, either be divided to form new plants or allowed to develop into nobler specimens. With a stock of the smaller plants to start them in succession, they may be had in flower all the year round. A few years ago the bulbs of *E. amazonica* were badly inflicted with a disease known as the Eucharis mite, and all kinds of remedies were tried without avail, although steeping in Condy's fluid appeared to give the best results. The disease appears to have died out again. Other species of Eucharis now met with in gardens are *E. Bakeriana*, *E. Mastersii*, *E. Lowii* and *E. Sanderii*. A remarkable hybrid was raised a few years ago between *Eucharis* and the allied genus *Urceolina*, to which the compound name *Urceocharis* was given.

EUCHARIST (Gr. εὐχαριστία, thanksgiving), in the Christian Church, one of the ancient names of the sacrament of the Lord's Supper or Holy Communion. The term εὐχαριστία was at first applied to the act of thanksgiving associated with the sacrament; later, so early as the 2nd century, to the objects, *e.g.* the sacramental bread and wine, for which thanks were given; and so to the whole celebration. The term *Mass*, which has the same connotation, is derived from the Lat. *missa* or *missio*, because the children and catechumens, or unbaptized believers, were dismissed before the eucharistic rite began. Other names express various aspects of the rite: Communion (Gr. κοινωνία), the fellowship between believers and union with Christ; *Lord's Supper*, so called from the manner of its institution; *Sacrament* as a consecration of material elements; the *Mystery* (in Eastern churches) because only the initiated participated; the *Sacrifice* as a rehearsal of Christ's passion. In this article the history of the rite is first traced up to A.D. 200 in documents taken in their chronological order; differences of early and later usage are then discussed; lastly, the meaning of the original rite is examined.

St Paul (1 Cor. xi. 17–34) attests that the faithful met regularly in church, *i.e.* in religious meetings, to eat the dominical or Lord's Supper, but that this aim was frustrated by some who ate up their provisions before others, so that the poor were left hungry while the rich got drunk; and the meetings were animated less by a spirit of brotherhood and charity than of division and faction. He directs that, when they so meet, they shall wait for one another. Those who are too hungry to wait shall eat at home; and not put to shame those who have no houses (and presumably not enough food either), by bringing their viands to church and selfishly eating them apart.

It was therefore not the quantity or quality of the food eaten that constituted the meal a Lord's Supper; nor even the circumstances that they ate it "in church," as was assumed by those guilty of the practices here condemned; but only the pervading sense of brotherhood and love. The contrast lay between the *Dominical Supper* or food and drink shared unselfishly by all with all, and the *private supper*, the feast of Dives, shamelessly gorged under the eyes of timid and shrinking Lazarus. By way of enforcing this point Paul repeats the tradition he had received direct from the Lord, and already handed on to the Corinthians, of how "the Lord Jesus on the night in which he was betrayed" (not necessarily the night of Passover) "took bread and having given thanks brake it and said, This is my body, which is for your sake; this do in remembrance of me. In like manner also the cup, after supper, saying, This cup is the new covenant through my blood: this do, as oft as ye drink it, in remembrance of me." Paul adds that this rite commemorated the Lord's death and was to be continued until he should come again, as in that age they expected him to do after no long interval; "As often as ye eat this bread and drink the cup, ye do (or ye shall) proclaim the Lord's death till he come."

The same epistle (x. 17) attests that one loaf only was broken and distributed: "We who are many, are one loaf (or bread), one body; for we all partake of the one loaf (or bread)" As a single loaf could not satisfy the hunger of many, the rehearsal in these meals of Christ's own action must have been a crowning episode, enhancing their sanctity. The *Fractio Panis* probably began, as the drinking of the cup certainly ended, the supper; the interval being occupied with the common consumption by the faithful of the provisions they brought. This much is implied by the words "after supper." If, in any case, all present had eaten in their homes beforehand, the giving of the cup would immediately follow on the breaking and eating of the one loaf, but Paul's words indicate that the common meal within the church was the norm. Those who ate at home marked themselves out as both greedy and lacking in charity. There is no demand that they should come fasting, or Paul could not recommend in (xi. 34) that those who were too hungry to wait until all the brethren were assembled in church, should eat at home and beforehand.

Mark xiv. 22-25, Matt. xxvi. 26-29, Luke xxii. 14-20, are, in order of time, our next accounts, Mark representing the oldest tradition. They all in substance repeat Paul's account; but identify the night on which Jesus was betrayed with that of the Pascha. In Matthew and Mark, Jesus says of the bread "Take ye it, this is my body," omitting the idea of sacrifice imported by Paul's addition "which is for you"; but in them Jesus enunciates the same idea when he says of the cup: "This is my blood of the covenant which is poured out for many," Mathew adding "for the remission of sins," a phrase which savours of Heb. ix. 22: "apart from the shedding of blood there is no remission." It is a later addition, and so may be the words "which is poured out for many." But the words which follow have an antique ring: "Amen, I say unto you, I will no more drink of the fruit of the vine, until that day when I drink it new in the kingdom of God." For here Jesus affirms his conviction, in view of his impending death, which unlike his disciples he foresaw, that, when the kingdom of God is instituted on earth, he will take his place in it. But this is the last time he will sit down upon earth with his disciples at the table of the millenarist hope. These sources do not hint that the Last Supper is to be repeated by Christ's followers until the advent of the kingdom. Luke's account is too much interpolated from Paul, and the texts of his oldest MSS. too discrepant, for us to rely on it except so far as it supports the other gospels. It emphasizes the fact that the Last Supper was the Pascha. "With desire have I desired to eat this Passover, before I suffer"; and places the bread after the wine, unless indeed the Pauline interpolation comprises the whole of verse 19.

The fourth gospel, written perhaps A.D. 90–100, sublimates the rite, in harmony with its general treatment of the life of Jesus: "I am the living bread which cometh down out of heaven, that a man may eat thereof and not die" (John vi. 51). As in 1 Cor. x. the flesh of Christ is contrasted with the manna which saved not the Jews from death, so here the latter ask: "How can this man give us his flesh to eat?" and Jesus answers: "Amen, Amen I say unto you, Except ye eat the flesh of the Son of Man and drink his blood, ye have not life in yourselves. . . . He that eateth my flesh and drinketh my blood abideth in me and I in him." In an earlier passage, again in reference to the manna, Jesus is called "the bread of God, which cometh down out of heaven, and giveth life unto the world." They ask: "Lord, ever more give us this bread," and he answers: "I am the bread of life: he that cometh to me shall not hunger, and he that believeth on me shall never thirst." This writer's thought is coloured by the older speculations of Philo, who in metaphor called the Logos the heavenly bread and food, the cupbearer and cup of God; and he seems even to protest against a literal interpretation of the words of institution, since he not only pointedly omits them in his account of the Last Supper, but in v. 63 of this chapter writes: "It is the Spirit that quickeneth; the flesh profiteth nothing: the *words* that I have spoken unto you are spirit and are life."

In Acts ii. 46 we read that, "the faithful continued steadfastly with one accord in the temple"; at the same time "breaking bread at home they partook of food with gladness and singleness of heart, praising God." All such repasts must have been sacred, but we do not know if they included the Eucharistic rite. The care taken in the selecting and ordaining of the seven deacons argues a religious character for the common meals, which they were to serve. Their main duty was to look after the duty of the Hellenistic widows, but inasmuch as meats strangled or consecrated to idols were forbidden, it probably devolved on the deacons to take care that such were not introduced at these common meals. The Essenes, similarly, appointed houses all over Palestine where they could safely eat, and priests of their own to prepare their food. Some Christians escaped the difficulties of their position by eating no meat at all. "He that is weak," says Paul (Rom. xiv. 1), "eateth herbs"; that is, becomes a vegetarian. Rather than scandalize weaker brethren, Paul was willing to eat herbs the rest of his life.

The travel-document in Acts often refers to the solemn breaking of bread. Thus Paul in xxvii. 35, having invited the ship's company of 276 persons to partake of food, took bread, gave thanks to God in the presence of all, and brake it and began to eat. The rest on board then began to be of good cheer, and themselves also took food. Here it is not implied that Paul shared his food except with his co-believers, but he ate before them all. Whether he repeated the words of institution we cannot say.

In Acts xx. 7 the faithful of Troas gather together to break bread "on the first day of the week" after sunset. After a discourse Paul, who was leaving them the next morning, broke bread and ate. This was surely such a meeting as we read of in 1 Cor. x., and was held on Sunday by night; but long before dawn, since after it Paul "talked with them a long while, even till break of day." In 1 Cor. xvi. 1 Paul bids the Corinthians, as he had bidden the churches of Galatia, lay up in store on the first of the week, each one of them, money for the poor saints of Jerusalem. This is the first notice of Sunday Eucharistic collections of alms for the poor.

Here seems to belong in the order of development the Cathar Eucharist (see CATHARS). The Cathars used only the Lord's prayer in consecrating the bread and used water for wine.

The next document in chronological order is the so-called Teaching of the Apostles (A.D. 90–110). This assigns prayers and rubrics for the celebration of the Eucharist:—

IX.

" 1. Now with regard to the Thanksgiving, thus give ye thanks.

" 2. First concerning the cup:—We give thanks to thee, our Father, for the holy vine[1] of David thy servant, which thou didst make known to us through Jesus thy servant;[2] to thee be the glory for ever.

" 3. And concerning the broken bread:—We give thanks to thee, our Father, for the life and knowledge which thou didst make known to us through Jesus thy servant; to thee be the glory for ever.

" 4. As this broken bread was (once) scattered on the face of the mountains and, gathered together, became one,[3] even so may thy Church be gathered together from the ends of the earth into thy kingdom; for thine is the glory and the power through Jesus Christ for ever.

" 5. But let no one eat or drink of your Thanksgiving (Eucharist), but they who have been baptized into the name of the Lord; for concerning this the Lord hath said, Give not that which is holy unto the dogs.[4]

X.

" 1. Then, after being filled, thus give ye thanks:—

" 2. We give thanks to thee, holy Father, for thy holy name, which thou hast caused to dwell in our hearts, and for the knowledge and faith and immortality which thou didst make known to us through Jesus Christ thy servant; to thee be the glory for ever.

" 3. Thou Almighty Sovereign, didst create all things for thy name's sake, and food and drink thou didst give to men for enjoyment, that they should give thanks unto thee; but to us thou didst of thy grace give spiritual food and drink and life eternal through thy servant.

" 4. Before all things, we give thee thanks that thou art mighty; to thee be the glory for ever.

" 5. Remember, Lord, thy church to deliver it from all evil, and to perfect it in thy love, and gather it together from the four winds,[5] the sanctified, unto thy kingdom, which thou hast prepared for it; for thine is the power and the glory for ever.

" 6. Come grace, and pass this world away. Hosanna to the God of David! If any one is holy, let him come. If any one is not, let him repent. Maranatha.[6] Amen.

" But allow the prophets to give thanks as much as they will."

From a subsequent section, ch. xiv. 1, we learn that the Eucharist was on Sunday:—" Now when ye are assembled together on the Lord's day of the Lord, break bread and give thanks, having first confessed your transgressions, so that your sacrifice may be pure."

The above, like the uninterpolated Lucan account, places the cup first and has no mention of the body and blood of Christ. But in this last and other respects it contrasts with the other synoptic and with the Pauline accounts. The cup is not the *blood* of Jesus, but *the holy vine of David*, revealed through Jesus; and the holy vine can but signify the spiritual Israel, the *Ecclesia* or church or Messianic Kingdom, into which the faithful are to be gathered.

The one loaf, as in Paul, symbolizes the unity of the *ecclesia*, but the cup and bread, given for enjoyment, are symbols at best of the spiritual food and drink of the life eternal given of grace by the Almighty Father through his servant (lit. boy) Jesus. The bread and wine are indeed an offering to God of what is his own, pure because offered in purity of heart; but they are not interpreted of the sacrifice of Jesus' body broken on the cross, or of his blood shed for the remission of sin. It is not, as in Paul, a meal commemorative of Christ's death, nor connected with the Passover, as in the Synoptics. Least of all is it a sacramental eating of the flesh and drinking of the blood of Jesus, a perpetual renewal of kinship, physical and spiritual, with him. The teaching rather breathes the atmosphere of the fourth gospel, which sets the Last Supper before the feast of the Passover (xiii. 1), and pointedly omits Christ's institution of the Eucharist, substituting for it the washing of his disciples' feet. The blessing of the Bread and Cup, as an incident in a feast of Christian brotherhood, is all that the *Didache* has in common with Paul and the Synoptists. The use of the words " after being filled," in x. 1, implies that the brethren ate heartily, and that the cup and bread formed no isolated episode. The Baptized alone are admitted to this Supper, and they only after confession of their sins. Every Sunday at least they are to celebrate it. A prophet can " in the Spirit appoint a table," that is, order a Lord's Supper to be eaten, whenever he is warned by the Spirit to do so. But he must not himself partake of it—a very practical rule. The prophets are to give thanks as they like at these " breakings of bread," without being restricted to the prayers here set forth. In xv. 3 the overseers or bishops and deacons, though their functions are less spiritual than administrative and economic, are allowed to take the place of the prophets and teachers. The phrase used is λειτουργεῖν τὴν λειτουργίαν, " to liturgize the liturgy." This word " liturgy " soon came to connote the Eucharist. The prophets who normally preside over the Suppers are called " your high-priests," and receive from the faithful the first-fruits of the winepress and threshing-floor, of oxen and sheep, and of each batch of new-made bread, and of oil. Out of these they provide the Suppers held every Lord's day, offering them as " a pure sacrifice." Bishops and deacons hold a subordinate place in this document; but the contemporary Epistle of Clement of Rome attests that these bishops " had offered the gifts without blame and holily." The word " liturgy " is also used by Clement.

Pliny's Letter (Epist. 96), written A.D. 112 to the emperor Trajan, about the Christians of Bithynia, attests that on a fixed day, *stato die* (no doubt Sunday), they met before dawn and recited antiphonally a hymn " to Christ as to a god." They then separated, but met again later to partake of a meal, which, however, was of an ordinary and innocent character. Pliny regarded their meal as identical in character with the common meals of *hetairiae*, *i.e.* the trade-gilds or secret societies, which were then, as now, often inimical to the government. Even benefit societies were feared and forbidden by the Roman autocrats, and the " dominical suppers " of the Christians were not likely to be spared. Pliny accordingly forbade them in Bithynia, and the renegade Christians to whom he owed his information gave them up. These suppers included an Eucharist, for it was because the faithful ate in the latter of the flesh and blood of the Son of God that the charge of devouring children was made against them. If, then, this afternoon meal did not include it, Pliny's remark that their food was ordinary and innocent is unintelligible.

Ignatius, about A.D. 120, in his letter to the Ephesians, defines the one bread broken in the Eucharist as a " drug of immortality, and antidote that we should not die, but live for ever in Jesus Christ." He also rejects as invalid any Eucharist not held " under the bishop or one to whom he shall have committed it." For the Christian prophet has disappeared, and with him the custom of holding Eucharists in private dwellings.

In the Epistle to Diognetus, formerly assigned to Justin Martyr, we read (*v.* 7) that " Christians have in vogue among themselves a table common, yet not common " (*i.e.* unclean). In Justin's first apology (*c.* 140) we have two detailed accounts of the Eucharist, of which the first, in ch. 65, describes the first communion of the newly baptized:—

" After we have thus washed the person who has believed and conformed we lead him to the brethren so called, where they are gathered together, to offer public prayer both for ourselves and for the person illuminated, and for all others everywhere, earnestly, to the end that having learned the truth we may be made worthy to be found not only in our actions good citizens, but guardians of the things enjoined.

" We salute one another with a kiss at the end of the prayers. Then there is presented to the president of the brethren bread and a cup of water (and of a mixture,)[7] and he having taken it sends up praise and glory to the father of all things by the name of the Son and Holy Spirit, and he offers at length thanksgiving (*eucharistia*) for our having been made worthy of these things by him. But when he concludes the prayer and thanksgiving all the people present answer with acclamation 'Amen.' But the word 'Amen' in Hebrew signifies 'so be it.' And when the president has given thanks, and all the people have so answered, those who are called by us deacons distribute to each of those present, for them to partake of the bread (and wine)[8] and water, for which thanks have been given, and they carry portions away to those who are not present. And this food is called by us *Eucharistia*, and of it none may partake save those who believe our teachings to be true and have been washed in the bath which is for remission of sin and rebirth, and who so live as

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[1] Ps. lxxx. 8-19.

[2] Acts iv. 25, 27.

[3] 1 Cor. x. 17; Soph. iii. 10.

[4] Matt. vii. 6.

[5] Matt. xxiv. 31.

[6] 1 Cor. xvi. 22.

[7] We should probably omit the words bracketed.

[8] The codex Othobonianus omits the words bracketed.

> Christ taught. For we do not receive these things as common bread or common drink. For as Jesus Christ our Saviour was made flesh by Word of God and possessed flesh and blood for our sake; so we have been taught that the food blessed (lit. thanked for) by prayer of Word spoken by him, food by which our blood and flesh are by change of it (into them) nourished, is both flesh and blood of Jesus so made flesh. For the apostles in the memorials made by them, which are called gospels, have so related it to have been enjoined on them: to wit, that Jesus took bread, gave thanks and said: This do ye in memory of me, this is my body, and the cup likewise he took and gave thanks and said, This is my blood; and he distributed to them alone. And this rite too the evil demons by way of imitation handed down in the mysteries of Mithras. For that bread and a cup of water is presented in the rites of their initiation with certain conclusions (*or* epilogues), you either know or can learn."

The second account, in ch. 67, adds that the faithful both of town and country met for the rite on Sunday, that the prophets were read as well as the gospels, that the president after the reading delivered an exhortation to imitate in their lives the goodly narratives; and that each brought offerings to the president out of which he aided orphans and widows, the sick, the prisoners and strangers sojourning with them. These contributions of the faithful seem to be included by Justin along with the bread and cup as sacrifices acceptable to God. But he also particularly specifies (Dialog. 345) that perfect and pleasing sacrifices alone consist in prayers and thanksgivings (*thusia*). The elements are *gifts* or *offerings*. Justin was a Roman, but may not represent the official Roman church. The rite as he pictures it agrees well with the developed liturgies of a later age.

Irenaeus (Gaul and Asia Minor, before 190) in his work *against heresies*, iv. 31, 4, points to the sacrament in proof that the human body may become incorruptible:

> "As bread from the earth on receiving unto itself the invocation of God is no longer common bread, but is an Eucharist, composed of two elements, an earthly and a heavenly, so our bodies by partaking of the Eucharist cease to be corruptible, and possess the hope of eternal resurrection."

There is a similar passage in the 36th fragment (ed. Harvey ii. p. 500), sketching the rite and calling the elements antitypes:

> "The oblation of the Eucharist is not fleshly, but spiritual and so pure. For we offer to God the bread and the cup of blessing (εὐλογία), thanking him for that he bade the earth produce these fruits for our sustenance. And therewith having finished the offering (προσφορά) we invoke the Holy Spirit to constitute this offering, both the bread body of Christ and the cup the blood of Christ, that those who partake of these antitypes (ἀντίτυπα, *i.e.* surrogates) may win remission of sins and life eternal."

Here we note the stress laid on the Invocation of the Spirit to operate the transformation of the elements, though in what sense they are transformed is not defined. This *Epiklesis* survives in the Greek liturgies, but in the Roman a prayer takes its place that the angel of the Lord may take the oblation laid on the visible altar, and carry it up to the altar sublime into the presence of the divine majesty. We must not forget that the church of Irenaeus was Greek.

To the second century, lastly, belongs in part the evidence of the catacombs, on the walls of which are depicted persons reclining at tables supporting a fish, accompanied by one or more baskets of loaves, and more rarely by flasks of wine or water. The fish represents Christ; and in the Inscription of Abercius, bishop of Hierapolis about A.D. 160, we have this symbolism enshrined in a literary form: "In company with Paul I followed, while everywhere Faith led the way, and set before me the fish from the fountain, mighty and stainless, whom a pure virgin grasped, and gave this to friends to eat always, having good wine and giving the mixt cup with bread." This representation of baskets of loaves and several fishes, or of one fish and several loaves, seems to contradict the usage of one loaf. It may represent the *agapê* or Lord's Supper as a whole, of which the one loaf and cup formed an episode. Or the entire stock of bread may have been regarded as flesh of Jesus in virtue of the initial consecration of one single loaf.

To the second century also belong two gnostic uses. Firstly, that of Marcus, a Valentinian, of South Gaul about 150, whose influence extended to Asia Minor. Irenaeus relates (Bk. I., ch. vii. 2), that this "magician" used in the Eucharist cups apparently mixt with wine, but really containing water, and during long invocations made them appear "purple and red, as if the universal Grace χάρις dropped some of her blood into the cup through his invocation, and by way of inspiring worshippers with a passion to taste the cup and drink deep of the influence termed Charis." Such a rite presupposes a belief in a real change of the elements; and water must have been used. In the sequel Irenaeus recites the Invocation read by Marcus before the communicants:—

> "Grace that is before all things, that passeth understanding and words, replenish thy inner man, and make to abound in thee the knowledge of her, sowing in the good soil the grain of mustard seed."

The *Acts of Thomas*, secondly, ch. 46, attest an Eucharistic usage, somewhat apart from the orthodox. The apostle spreads a linen cloth on a bench, lays on it bread of blessing (εὐλογία), and says:

> "Jesus Christ, Son of God, who hast made us worthy to commune in the Eucharist of thy holy body and precious blood, Lo, we venture on the thanksgiving (*Eucharistia*) and invocation of thy blessed name, come now and communicate with us. And he began to speak and said: Come Pity supreme, come communion of the male, come Lady who knowest the mysteries of the Elect one, . . . come secret mother . . . come and communicate with us in this Eucharist which we perform in thy name and in the love (*agapê*) in which we are met at thy calling. And having said this he made a cross upon the bread, and brake it and began to distribute it. And first he gave to the woman, saying: This shall be to thee for remission of sins and release of eternal transgressions. And after her he gave also to all the rest that had received the seal."

In the 2nd century the writer who nearest approaches to the later idea of Transubstantiation is the gnostic Theodotus (*c.* 160):

> "The bread no less than the oil is hallowed by the power of the name. They remain the same in outward appearance as they were received, but by that power they are transformed into a spiritual power. So the water when it is exorcised and becomes baptismal, not only drives out the evil principle, but also contracts a power of hallowing."

In the Fathers of the first three or four centuries can be traced the same tendency to spiritualize the Eucharist as we encountered in the fourth gospel, and in the *Didache*. Ignatius, though in *Smyrn.* 7 he asserts the Eucharist to be Christ's "flesh which suffered for our sins," elsewhere speaks of the blood as being "joy eternal and lasting," as "hope," as "love incorruptible," and of the flesh as "faith" or as "the gospel." Clement of Alexandria (*c.* 180) regards the rite as an initiation in divine knowledge and immortality. The only food he recognizes is spiritual; *e.g.* knowledge of the divine Essence is "eating and drinking of the divine Word." So Origen declares the bread which God the Word asserted was his body to be that which nourishes souls, the word from God the Word proceeding, the Bread from the heavenly Bread. Not the visible bread held in his hand, nor the visible cup, were Christ's body and blood, but the word in the mystery of which the bread was to be broken and the wine to be poured out. "We drink Christ's blood," he says elsewhere, "when we receive His words in which standeth Life." So the author of the *Contra Marcellum* writes in view of John vi. 63 as follows (*De eccl. Theol.* p. 180):

> "In these words he instructed them to interpret in a spiritual sense his utterances about his flesh and blood. Do not, he said, think that I mean the flesh which invests and covers me, and bid you eat that; nor suppose either that I command you to drink my sensible and somatic blood. Nay, you know well that my words which I have spoken unto you are spirit and life. It follows that the very words and discourses are his flesh and blood, of which he that constantly partakes, nourished as it were upon heavenly bread, will partake of the heavenly life. Let not then, he says, this scandalize you which I have said about eating of my flesh and about drinking of my blood. Nor let the obvious and first hand meaning of what I said about my flesh and blood disturb you when you hear it. For these words avail nothing if heard and understood literally (*or* sensibly). But it is the spirit which quickens them that can understand spiritually what they hear."

But these views were not those of the uninstructed pagans who filled the churches and needed a rite which brought them, as their old sacrifices had done, into physical contact and union with their god. Their point of view was better expressed in the scruples of priests, who, as Tertullian (*c.* 200) records (*De

Corona, iii.), were careful lest a crumb of the bread or a drop of the wine should fall on the ground, and by such incidents the body of Christ be harassed and attacked!

The Eucharist as a Sacrifice.—Before the 3rd century we cannot trace the view that in the Eucharistic rite the death of Christ, regarded from the Pauline standpoint as an atoning or redemptive sacrifice for the sins of mankind, is renewed and repeated, though the germ out of which it would surely grow is already present in the words "My blood . . . which is shed for many" of Matt. and Mark; yet more surely in Paul's "my body which is in your behoof" and "this do in commemoration of me," where the Greek word for *do*, Gr. ποιεῖτε, Lat. *facite*, could to pagan ears mean "this do ye sacrifice." In the first two centuries the rite is spoken of as an offering and as a bloodless sacrifice; but it is God's own creations, the bread and wine, alms and first-fruits, which, offered with a pure conscience, he receives as from friends, and bestows in turn on the poor; it is the praise and prayers which are the sacrifice. In these centuries baptism was the rite for the remission of sin, not the Eucharist; it is the prophet in the *Didache* who presides at the Lord's Supper, not the Levitically conceived priest; nor as yet has the Table become an Altar. Among Christians, prayers, supplications and thanksgivings have taken the place of the sacrifices of the old covenant.

In Cyprian of Carthage (*c.* 250) we first find the Eucharist regarded as a sacrifice of Christ's body and blood offered by the priest for the sins of the living and dead. We cannot drink the blood of Christ unless Christ has been first trodden under foot and pressed. . . . As Jesus our high priest offered himself as a sacrifice to his Father, so the human priest takes Christ's place, and imitates his action by offering in church a true and full sacrifice to God the Father (Ep. 63). He speaks of the dominical host (*hostia*), and takes the verb to *do* in Paul's letter in the sense of to *sacrifice*. As early as Tertullian prayers for the dead, who were named, were offered in the rite; but there was as yet no idea of the sacrifice of Christ being reiterated in their behalf. After Cyprian's day this view gains ground in the West, and almost obscures the older view that the rite is primarily an act of communion with Christ. In harmony with Cyprian's new conception is another innovation of his age and place, that of children communicating; both were the natural accompaniment of infant baptism, of which we first hear in his letters. In the East we do not hear of the sacrifice of the body and blood before Eusebius, about the year 300. In the Armenian church of the 12th century the idea of a reiterated sacrificial death of Christ still seemed bizarre and barbarous.[1] But as early as 558 in Gaul the bread was arranged on the altar in the form of a man, so that one believer ate his eye, another his ear, a third his hand, and so on, according to their respective merits! This was forbidden by Pope Pelagius I.; but in the Greek church the custom survives, the priest even stabbing with "the holy spear" in its right side the human figure planned out of the bread, by way of rehearsing in pantomime the narrative of John xix. 34.

The change from a commemoration of the Passion to a re-enacting of it came slowly in the Greek church. Thus Chrysostom (*Hom.* 17, *ad Heb.*), after writing "We offer (ποιοῦμεν) not another sacrifice, but the same," instantly corrects himself and adds: "or rather we perform a commemoration of the sacrifice." This was exactly the position also of the Armenian church.

Wine or Water?—Justin Martyr perhaps contemplated the use of water instead of wine, and Tatian his pupil used it. The Marcionites, the Ebionites, or Judaeo-Christians of Palestine, the Montanists of Phrygia, Africa and Galatia, the confessor Alcibiades of Lyons, *c.* A.D. 177 (Euseb. *Hist. Eccl.* v. 3. 2), equally used it. Cyprian (*Ep.* 63) affirms (*c.* 250) that his predecessors on the throne of Carthage had used water, and that many African bishops continued to do so, "out of ignorance," he says, "and simplemindedness, and God would forgive them." Pionius, the Catholic martyr of Smyrna, *c.* 250, also used water. In the *Acts of Thomas* it is used. Such uniformity of language has led Prof. Harnack to suppose that in the earliest age water was used equally with wine, and Eusebius the historian, who had means of judging which we have not, saw no difficulty in identifying with the first converts of St Mark the Therapeutae of Philo who took only bread and water in their holy repast.

Abercius and Irenaeus are the first to speak of wine mixt with water, of a *krâma* (κρᾶμα) or *temperamentum*. In the East, then as now, no one took wine without so mixing it. Cyprian insists on the admixture of water, which he says represented the humanity of Jesus, as wine his godhood. The users of water were named *Aquarii* or *hydroparastatae* in the 4th century, and were liable to death under the code of Theodosius. Some of the Monophysite churches, *e.g.* the Armenian, eschewed water and used pure wine, so falling under the censure of the council in *Trullo* of A.D. 692. Milk and honey was added at first communions. Oil was sometimes offered, as well as wine, but it would seem for consecration only, and not for consumption along with the sacrament. With the bread, however, was sometimes consecrated cheese, *e.g.* by the African Montanists in the 2nd century. Bitter herbs also were often added, probably because they were eaten with the Paschal lamb. Many early canons forbid the one and the other. Hot water was mixt with the wine in the Greek churches for some centuries, and this custom is seen in catacomb paintings. It increased the resemblance to real blood.

Position of the Faithful at the Eucharist.—Tertullian, Eusebius, Chrysostom and others represent the faithful as standing at the Eucharist. In the art of the catacombs they sit or recline in the ordinary attitude of banqueters. In the age of Christ standing up at the Paschal meal had been given up, and it was become the rule to recline. Kneeling with a view to adoration of the elements was unheard of in the primitive church, and the Armenian Fathers of the 12th century insist that the sacrament was intended by Christ to be eaten and not gazed at (Nerses, *op. cit.* p. 167). Eucharistic or any other liturgical vestments were unknown until late in the 5th century, when certain bishops were honoured with the same *pallium* worn by civil officials (see VESTMENTS).

In the Latin and in the Monophysite churches of Armenia and Egypt unleavened bread is used in the Eucharist on the somewhat uncertain ground that the Last Supper was the Paschal meal. The Greek church uses leavened.

Transubstantiation.—In the primitive age no one asked how Christ was present in the Eucharist, or how the elements became his body and blood. The Eucharist formed part of an *agapé* or love feast until the end of the 2nd century, and in parts of Christendom continued to be so much later. It was, save where animal sacrifices survived, *the* Christian sacrifice, *par excellence* the counterpart for the converted of the sacrificial communions of paganism; and though charged with higher significance than these, it yet reposed on a like background of religious usage and beliefs. But when the Agapé on one side and paganism on the other receded into a dim past, owing to the enhanced sacrosanctity of the Eucharist and because of the severe edicts of the emperor Theodosius and his successors, the psychological background fell away, and the Eucharist was left isolated and hanging in the air. Then men began to ask themselves what it meant. Rival schools of thought sprang up, and controversy raged over it, as it had aforetime about the *homoousion*, or the two natures. Thus the sacrament which was intended to be a bond of peace, became a chief cause of dissension and bloodshed, and was often discussed as if it were a vulgar talisman.

Serapion of Thmuis in Egypt, a younger contemporary of Athanasius, in his Eucharistic prayers combines the language of the *Didache* with a high sacramentalism alien to that document which now only survived in the form of a grace used at table in the nunneries of Alexandria (see AGAPÉ). He entreats "the Lord of Powers to fill this sacrifice with his Power and Participation," and calls the elements a "living sacrifice, a bloodless offering." The bread and wine before consecration are "likenesses of his body and blood," this in virtue of the words pronounced over them by Jesus on the night of his betrayal. The prayer then continues thus: "O God of truth, let thy holy Word settle upon this bread, that the bread may become body of the word, and on this cup, that the cup may become blood of the truth. And cause all who communicate to receive a drug of life for healing of every disease and empowering of all moral advance and virtue." Here the bread and wine become by consecration tenements in which the Word is reincarnated, as he aforetime dwelled in flesh. They cease to be mere *likenesses* of the body and blood, and are changed into receptacles of divine power and intimacy, by swallowing which we are benefited in soul and body. Cyril of Jerusalem in his *catechises* 5[1] enunciates the same idea of *μεταβολή* or transformation.

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[1] See Nerses of Lambron, *Opera Armenica* (Venice, 1847), pp. 74, 75, 101, &c.

Gregory of Nyssa also about the same date (in Migne, *Patrolog. Graeca*, vol. 46, col. 581, oration on the Baptism) asserts a "transformation" or "transelementation" (*μεταστοιχείωσις*) of the elements into centres of mystic force; and assimilates their consecration to that of the water of baptism, of the altar, of oil or chrism, of the priest. He compares it also to the change of Moses' rod into a snake, of the Nile into blood, to the virtue inherent in Elijah's mantle or in the wood of the cross or in the clay mixt of dust and the Lord's spittle, or in Elisha's relics which raised a corpse to life, or in the burning bush. All these, he says, "were parcels of matter destitute of life and feeling, but through miracles they became vehicles of the power of God absorbed or taken into themselves." He thus views the consecration of the elements as akin to other consecrations; and, like priestly ordination, as involving "a metamorphosis for the better," a phrase which later on became classical. John of Damascus (*c.* 750) believed the bread to be mysteriously changed into the Christ's body, just as when eaten it is changed into any human body; and he argued that it is wrong to say, as Irenaeus had said, that the elements are mere antitypes after as before consecration. In the West, Augustine, like Eusebius and Theodoret, calls the elements signs or symbols of the body and blood signified in them; yet he argues that Christ "took and lifted up his own body in his hands when he took the bread." At the same time he admits that "no one eats Christ's flesh, unless he has first adored" (*nisi prius adoraverit*). But he qualifies this "Receptionist" position by declaring that Judas received the sacrament, as if the unworthiness of the recipient made no difference.

Out of this mist of contradictions scholastic thought strove to emerge by means of clear-cut definitions. The drawback for the dogmatist of such a view as Serapion broaches in his prayers was this, that although it explained how the Logos comes to be immanent in the elements, as a soul in its body, nevertheless it did not guarantee the presence in or rather substitution for the natural elements of Christ's real body and blood. It only provided an *ἀντίτυπον* or surrogate body. In 830–850, Paschasius Radbert taught that after the priest has uttered the words of institution, nothing remains save the body and blood under the outward form of bread and wine; the substance is changed and the accidents alone remain. The elements are miraculously recreated as body and blood. This view harmonized with the docetic view which lurked in East and West, that the manhood of Jesus was but a likeness or semblance under which the God was concealed. So Marcion argued that Christ's body was not really flesh and blood, or he could not have called it bread and wine. Paschasius shrank from the logical outcome of his view, namely, that Christ's body or part of it is turned into human excrement, but Ratramnus, another monk of Corbey, in a book afterwards ascribed to Duns Scotus, drew this inference in order to discredit his antagonists, and not because he believed it himself. The elements, he said, remain physically what they were, but are spiritually raised as symbols to a higher power. Perhaps we may illustrate his position by saying that the elements undergo a change analogous to what takes place in iron, when by being brought into an electric field it becomes magnetic. The substance of the elements remain as well as their accidents, but like baptismal water they gain by consecration a hidden virtue benefiting soul and body. Ratramnus's view thus resembled Serapion's, after whom the elements furnish a new vehicle of the Spirit's influence, a new body through which the Word operates, a fresh sojourning among us of the Word, though consecrated bread is in itself no more Christ's natural body than are we who assimilate it. Other doctors of the 9th century, *e.g.* Hincmar of Reims and Haimo of Halberstadt, took the side of Paschasius, and affirmed that the substance of the bread and wine is changed, and that God leaves the colour, taste and other outward properties out of mercy to the worshippers, who would be overcome with dread if the underlying real flesh and blood were nakedly revealed to their gaze!

Berengar in the 11th century assailed this view, which was really that of transubstantiation, alleging that there is no substance in matter apart from the accidents, and that therefore Christ cannot be *corporally* present in the sacrament; because, if so, he must be *spatially* present, and there will be two material bodies in one space; moreover his body will be in thousands of places at once. Christ, he said, is present spiritually, so that the elements, while remaining what they were, unremoved and undestroyed, are advanced to be something better: *omne cui a Deo benedicatur, non absumi, non auferri, non destrui, sed manere et in melius quam erat necessario provehi.* This was the phrase of Gregory of Nyssa.

Berengar in a weak moment in 1059 was forced by the pope to recant and assert that "the true body and blood are not only a sacrament, but in truth touched and broken by the hands of the priests and pressed by the teeth of the faithful," and this position remains in every Roman catechism. Such dilemmas as whether a mouse can devour the true body, and whether it is not involved in all the obscenities of human digestive processes, were ill met by this ruling. Each party dubbed the other *stercoranists* (dung-feasters), and the controversy was often marred by indecencies.

As in the 3rd century the Roman church decided in respect of baptism that the sacrament carries the church and not the church the sacrament, so in the dispute over the Eucharist it ended, in spite of more spiritual views essayed by Peter Lombard, by insisting on the more materialistic view at the fourth Lateran Council in 1215, whose decree runs thus:—"The body and blood of Jesus Christ are truly contained in the sacrament of the altar under the species of bread and wine, the bread and wine respectively being transubstantiated into body and blood by divine power, so that in order to the perfecting of the mystery of unity we may ourselves receive from his (body) what he himself receives from ours." In 1264 Urban IV. instituted the Corpus Christi Feast by way of giving liturgical expression to this view.

Communion in One Kind.—Up to about 1100 laymen in the West received the communion in both kinds, and except in a few disciplinary cases the wine was not refused. In 1099, by a decree of Pope Paschal II., children might omit the wine and invalids the bread. The communion of the laity in the bread alone was enjoined by the council of Constance in 1415, and by the council of Trent in 1562. The reformed churches of the West went back to the older rule which Eastern churches had never forsaken.

Mass.—The term *mass*, which survives in Candlemas, Christmas, Michaelmas, is from the Latin *missa*, which was in the 3rd century a technical term for the dismissal of any lay meeting, *e.g.* of a law-court, and was adopted in that sense by the church as early as Ambrose (*c.* 350). The catechumens or unbaptized, together with the penitents, remained in church during the Litany, collect, three lections, two psalms and homily. The deacon then cried out: "Let the catechumens depart. Let all catechumens go out." This was the *missa* of the catechumens. The rest of the rite was called *missa fidelium*, because only the initiated remained. Similarly the collect with which often the rite began is the prayer *ad collectam*, *i.e.* for the congregation met together or collected. The corresponding Greek word was *synaxis*.

After the catechumens were gone the priest said: "The Lord be with you, let us pray," and the service of the mass followed.

In the West, says Duchesne (*Origines*, p. 179), not only catechumens, but the baptized who did not communicate left the church before the communion of the faithful began (? after the communion of the clergy). In Anglican churches non-communicants used to leave the church after the prayer for the Church Militant. Ritualists now keep unconfirmed children in church during the entire rite, through ignorance of ancient usage, in order that they may learn to adore the consecrated elements. For this moment of homage to material elements ritually filled with divine potency may be so exaggerated as to obscure the rite's ancient significance as a communion of the faithful in mystic food.

Ideas of Reformers.—The 16th-century reformers strove to avoid the literalism of the words "This is my body," accepted frankly by the Roman and Eastern churches, and urged a Receptionist view, viz. that Christ is in the sacrament only spiritually consumed by worthy recipients alone, the material body not being actually chewed. This is seen by a comparison of other confessions with the Profession of Catholic Faith in accordance with the council of Trent, in the bull of Pius IV., which runs thus:—

> "I profess that in the Mass is offered to God a true, proper and propitiatory sacrifice, for the living and the dead, and that in the most holy sacrament of the Eucharist there is truly really and in substance the body and blood, together with the soul and divinity of our Lord Jesus Christ, and that there does take place a conversion of the entire substance of the bread into the body, and of the entire substance of the wine into the blood, which conversion the Catholic Church doth call Transubstantiation. I also admit that under one of the other species alone the entire and whole Christ and the true sacrament is received."

The 28th Article of Religion of the Church of England is as follows:—

> "The Supper of the Lord . . . is a Sacrament of our Redemption by Christ's death: insomuch that to such as rightly, worthily, and with faith, receive the same, the Bread which we break is a partaking of the Body of Christ, and likewise the Cup of Blessing is a partaking of the Blood of Christ.
>
> "Transubstantiation . . . cannot be proved by holy writ. . . .
>
> "The Body of Christ is given, taken and eaten, in the Supper, only after a heavenly and spiritual manner. And the mean whereby the Body of Christ is received and eaten in the Supper is Faith.
>
> "The Sacrament of the Lord's Supper was not by Christ's ordinance reserved, carried about, lifted up, or worshipped."

At the end of the communion rite the prayer-book, in view of the ordinance to receive the Sacrament kneeling, adds the following:—

> "It is hereby declared, that thereby no adoration is intended, or ought to be done, either unto the Sacramental Bread or Wine, there bodily received, or unto any Corporal Presence of Christ's natural Flesh and Blood. For the Sacramental Bread and Wine remain still in their very natural substances, and therefore may not be adored (for that were idolatry, to be abhorred of all faithful Christians); and the natural Body and Blood of our Saviour Christ are in Heaven, and not here; it being against the truth of Christ's natural Body to be at one time in more places than one."

These monitions and prescriptions are rapidly becoming a dead-letter, but they possess a certain historical interest.

The Helvetic Confession[1] of A.D. 1566 (*caput* xxi. *De sacra coena Domini*) runs as follows:—

> "That it may be more rightly and clearly understood how the flesh and blood of Christ can be food and drink of the faithful, and be received by them unto eternal life, let us add these few remarks. Chewing is not of one kind alone. For there is a corporeal chewing, by which food is taken into the mouth by man, bruised with the teeth and swallowed down into the belly. . . . As the flesh of Christ cannot be corporeally chewed without wickedness and truculence, so it is not food of the belly. . . . There is also a spiritual chewing of the body of Christ, not such that by it we understand the very food to be changed into spirit, but such that, the body and blood of the Lord abiding in their essence and peculiarity, they are spiritually communicated to us, not in any corporeal way, but in a spiritual, through the Holy Spirit which applies and bestows on us those things which were prepared through the flesh and blood of the Lord betrayed for our sake to death, to wit, remission of sins, liberation and life eternal, so that Christ lives in us and we in him. . . .
>
> "In addition to the aforesaid spiritual chewing, there is also a sacramental chewing of the Lord's body, by which the faithful not only partakes spiritually and inwardly of the true body and blood of the Lord, but outwardly by approaching the Lord's table, receives the visible sacrament of his body and blood. . . . But he who without faith approaches the sacred table, albeit he communicate in the sacrament, yet he perceives not the matter of the sacrament, whence is life and salvation. . . ."

The Augustan Confession presented by the German electors to Charles V. in the section on the Mass merely protests against the view that "the Lord's Supper is a work (*opus*) which being performed by a priest earns remission of sin for the doer and for others, and that in virtue of the work done (*ex opere operato*), without a good motive on the part of the user. Also that being applied for the dead, it is a satisfaction, that is to say, earns for them remission of the pains of purgatory."

The Saxon Confession of Wittenberg, June 1551, while protesting against the same errors, equally abstains from trying to define narrowly how Christ is present in the sacrament.

Consubstantiation.—The symbolical books of the Lutheran Church, following the teaching of Luther himself, declare the doctrine of the real presence of Christ's body and blood in the eucharist, *together with* the bread and wine (*consubstantiation*), as well as the ubiquity of his body, as the orthodox doctrine of the church. One consequence of this view was that the unbelieving recipients are held to be as really partakers of the body of Christ in, with and under the bread as the faithful, though they receive it to their own hurt. (Hagenbach, *Hist. of Doctr.* ii. 300.)

Of all the Reformers, the teaching of Zwingli was the farthest removed from that of Luther. At an early period he asserted that the Eucharist was nothing more than food for the soul, and had been instituted by Christ only as an act of commemoration and as a visible sign of his body and blood (*Christenliche Ynleitung*, 1523, quoted by Hagenbach, *Hist. of Doctr.* ii. 296, Clark's translation). But that Zwingli did not reject the higher religious significance of the Eucharist, and was far from degrading the bread and wine into "nuda et inania symbola," as he was accused of doing, we see from his *Fidei ratio ad Carolum Imperatorem* (*ib.* p. 297).

Original Significance of the Eucharist.—It is doubtful if the attempts of reformers to spiritualize the Eucharist bring us, except so far as they pruned ritual extravagances, nearer to its original significance; perhaps the Roman, Greek and Oriental churches have better preserved it. This significance remains to be discussed; the cognate question of how far the development of the Eucharist was influenced by the pagan mysteries is discussed in the article SACRAMENT.

That the Lord's Supper was from the first a meal symbolic of Christian unity and commemorative of Christ's death is questioned by none. But Paul, while he saw this much in it, saw much more; or he could not in the same epistle, x. 18-22 assimilate communion in the flesh and blood of Jesus, on the one hand, to the sacrificial communion with the altar which made Israel after the flesh one; and on the other to the communion with devils attained by pagans through sacrifices offered before idols. It has been justly remarked of the Pauline view, that—

> "The union with the Lord Himself, to which those who partake of the Lord's Supper have, is compared with the union which those who partake of a sacrifice have with the deity to whom the altar is devoted—in the case of the Israelites with God, of the heathen with demons. This idea that to partake of sacrifice is to devote oneself to the deity, lies at the root of the ancient idea of worship, whether Jewish or heathen; and St Paul uses it as being readily understood. In this connexion the symbol is never a mere symbol, but a means of real union. 'The cup is the covenant'" (Prof. Sanday in Hastings' *Dictionary of the Bible*, 3. 149).

Paul caps his argument thus:—"Ye cannot drink the cup of the Lord and the cup of demons: ye cannot partake of the table of the Lord and of the table of demons. Or do we provoke the Lord to jealousy? Are we stronger than he?" And these words with their context prove that Paul, like the Fathers of the church, regarded the gods and goddesses as real living supernatural beings, but malignant. They were the powers and principalities with whom he was ever at war. The Lord also is jealous of them, if any one attempt to combine their cult with his, for to do so is to doubt the supremacy of his name above all names. Both in its inner nature then and outward effects the Eucharist was the Christian counterpart of these two other forms of communion of which one, the heathen, was excluded from the first, and the other, the Jewish, soon to disappear. It is their analogue, and to understand it we must understand them, not forgetting that Paul, as a Semite, and his hearers, as converted pagans, were imbued with the sacrificial ideas of the old world.

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[1] This represents the views of Calvin.

"A kin," remarks W. Robertson Smith (*Religion of the Semites*, 1894), "was a group of persons whose lives were so bound up together, in what must be called a physical unity, that they could be treated as parts of one common life. The members of one kindred looked on themselves as one living whole, a single animated mass of blood, flesh and bones, of which no member could be touched without all the members suffering." "In later times," observes the same writer (*op. cit.* p. 313), "we find the conception current that any food which two men partake of together, so that the same substance enters into their flesh and blood, is enough to establish some sacred unity of life between them; but in ancient times this significance seems to be always attached to participation in the flesh of a sacrosanct victim, and the solemn mystery of its death is justified by the consideration that only in this way can the sacred cement be procured, which creates or keeps alive a living bond of union between the worshippers and their god. This cement is nothing else than the actual life of the sacred and kindred animal, which is conceived as residing in its flesh, but specially in its blood, and so, in the sacred meal, is actually distributed among all the participants, each of whom incorporates a particle of it with his own individual life."

The above conveys the cycle of ideas within which Paul's reflection worked. Christ who knew no sin (2 Cor. v. 21) had been made sin, and sacrificed for us, becoming as it were a new Passover (1 Cor. v. 7). By a mysterious sympathy the bread and wine over which the words, "This is my body which is for you," and "This cup is the new covenant in my blood," had been uttered, became Christ's body and blood; so that by partaking of these the faithful were united with each other and with Christ into one kinship. They became the body of Christ, and his blood or life was in them, and they were members of him. Participation in the Eucharist gave actual life, and it was due to their irregular attendance at it that many members of the Corinthian church "were weak and sickly and not a few slept" (*i.e.* had died). As the author already cited adds (p. 313): "The notion that by eating the flesh, or particularly by drinking the blood, of another living being, a man absorbs its nature or life into his own, is one which appears among primitive peoples in many forms."

But this effect of participation in the bread and cup was not in Paul's opinion automatic, was no mere *opus operatum*; it depended on the ethical co-operation of the believer, who must not eat and drink *unworthily*, that is, after refusing to share his meats with the poorer brethren, or with any other guilt in his soul. The phrases "discern the body" and "discern ourselves" in 1 Cor. xi. 29, 31 are obscure. Paul evidently plays on the verb, *krinō*, *diakrinō*, *katakrinō* (κρίνω, διακρίνω, κατακρίνω). The general sense is clear, that those who consume the holy food without a clear conscience, like those who handle sacred objects with impure hands, will suffer physical harm from its contact, as if they were undergoing the ordeal of touching a holy thing. The idea, therefore, seems to be that as we must distinguish the holy food over which the words "This is my body" have been uttered from common food, so we must separate ourselves before eating it from all that is guilty and impure. The food that is *taboo* must only be consumed by persons who are equally *taboo* or pure. If they are not pure, it condemns them.

The "one" loaf has many parallels in ancient sacrifices, *e.g.* the Latin tribes when they met annually at their common temple partook of a "single" bull. And in Greek *Panegureis* or festivals the sacrificial wine had to be dispensed from one common bowl: "Unto a common cup they come together, and from it pour libations as well as sacrifice," says Aristides Rhetor in his *Isthmica in Neptunum*, p. 45. To ensure the continued unity of the bread, the Roman church ever leaves over from a preceding consecration half a holy wafer, called *fermentum*, which is added in the next celebration.

With what awe Paul regarded the elements mystically identified with Christ's body and life is clear from his declaration in 1 Cor. xi. 27, that he who consumes them unworthily is guilty or holden of the Lord's body and blood. This is the language of the ancient ordeal which as a test of innocence required the accused to touch or still better to eat a holy element. A wife who drank the holy water in which the dust of the Sanctuary was mingled (Num. v. 17 foll.) offended so deeply against it, if unfaithful, that she was punished with dropsy and wasting. The very point is paralleled in the *Acts of Thomas*, ch. xlviii. A youth who has murdered his mistress takes the bread of the Eucharist in his mouth, and his two hands are at once withered up. The apostle immediately invites him to confess the crime he must have committed, "for, he says, the Eucharist of the Lord hath convicted thee."

It has been necessary to consider at such length St Paul's account of the Eucharist, both because it antedates nearly by half a century that of the gospels, and because it explains the significance which the rite had no less for the Gnostics than for the great church. The synoptists' account is to be understood thus: Jesus, conscious that he now for the last time lies down to eat with his disciples a meal which, if not the Paschal, was anyhow anticipatory of the Millennial Regeneration (Matt. xix. 28), institutes, as it were, a blood-brotherhood between himself and them. It is a covenant similar to that of Exodus xxiv., when after the peace-offering of oxen, Moses took the blood in basins and sprinkled half of it on the altar and on twelve pillars erected after the twelve tribes, and the other half on the people, to whom he had first read out the writing of the covenant and said, "Behold the blood of the covenant which the Lord hath made with you concerning all these words."

But the covenant instituted by Jesus on the eve of his death was hardly intended as a new covenant with God, superseding the old. This reconstruction of its meaning seems to have been the peculiar revelation of the Lord to Paul, who viewed Christ's crucifixion and death as an atoning sacrifice, liberating by its grace mankind from bonds of sin which the law, far from snapping, only made more sensible and grievous. This must have been the gist of the special revelation which he had received from Christ as to the inner character of a supper which he already found a ritual observance among believers. The Eucharist of the synoptists is rather a covenant or tie of communion between Jesus and the twelve, such as will cause his life to survive in them after he has been parted from them in the flesh. An older prophet would have slain an animal and drunk its blood in common with his followers, or they would all alike have smeared themselves with it. In the East, even now, one who wishes to create a blood tie between himself and his followers and cement them to himself, makes under his left breast an incision from which they each in turn suck his blood. Such barbarism was alien to the spirit of the Founder, who substitutes bread and wine for his own flesh and blood, only imparting to these his own quality by the declaration that they *are* himself. He broke the bread not in token of his approaching death, but in order to its equal distribution. Wine he rather chose than water as a surrogate for his actual blood, because it already in Hebrew sacrifices passed as such. "The Hebrews," says Robertson Smith (*op. cit.* p. 230), "treated it like the blood, pouring it out at the base of the altar." As a red liquid it was a ready symbol of the blood which is the life. It was itself the covenant, for the genitive τῆς διαθήκης in Mark xiv. 24 is epexegetic, and Luke and Paul rightly substitute the nominative. It was, as J. Wellhausen remarks,[1] a better cement than the bread, because through the drinking of it the very blood of Jesus coursed through the veins of the disciples, and that is why more stress is laid on it than on the bread. To the apostles, as Jews bred and born, the action and words of their master formed a solemn and

[1] *Das Evangelium Marci*, p. 121.

intelligible appeal. It belongs to the same order of ideas that the headship of the Messianic *ecclesia* in Judea was assigned after the death of Jesus to his eldest brother James, and after him for several generations to the eldest living representative of his family.

To the modern mind it is absurd that an image or symbol should be taken for that which is imaged or symbolized, and that is why the early history of the Eucharist has been so little understood by ecclesiastical writers. And yet other religions, ancient and modern, supply many parallels, which are considered in the article SACRAMENT.

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Reservation of the Eucharist

The practice of reserving the sacred elements for the purpose of subsequent reception prevailed in the church from very early times. The Eucharist being the seal of Christian fellowship, it was a natural custom to send portions of the consecrated elements by the hands of the deacons to those who were not present (Justin Martyr, *Apol.* i. 65). From this it was an easy development, which prevailed before the end of the 2nd century, for churches to send the consecrated Bread to one another as a sign of communion (the *εὐχαριστία* mentioned by Irenaeus, *ap.* Eus. *H.E.* v. 24), and for the faithful to take it to their own homes and reserve it in *arcae* or caskets for the purpose of communicating themselves (Tert. *ad Uxor.* ii. 5, *De orat.* 19; St Cypr. *De lapsis*, 132). Being open to objection on grounds both of superstition and of irreverence, these customs were gradually put down by the council of Laodicea in A.D. 360. But some irregular forms of reservation still continued; the prohibition as regards the lay people was not extended, at any rate with any strictness, to the clergy and monks; the Eucharist was still carried on journeys; occasionally it was buried with the dead; and in a few cases the pen was even dipped in the chalice in subscribing important writings. Meanwhile, both in East and West, the general practice has continued unbroken of reserving the Eucharist, in order that the "mass of the presanctified" might take place on certain "aliturgic" days, that the faithful might be able to communicate when there was no celebration, and above all that it might be at hand to meet the needs of the sick and dying. It was reserved in a closed vessel, which took various forms from time to time, known in the East as the *ἀρτοφόριον*, and in the West as the *turris*, the *capsa*, and later on as the *pyx*. In the East it was kept against the wall behind the altar; in the West, in a locked aumbry in some part of the church, or (as in England and France) in a pyx made in the form of a dove and suspended over the altar.

In the West it has been used in other ways. A portion of the consecrated Bread from one Eucharist, known as the "Fermentum," was long made use of in the next, or sent by the bishop to the various churches of his city, no doubt with the object of emphasizing the solidarity and the continuity of "the one Eucharist"; and amongst other customs which prevailed for some centuries, from the 8th onward, were those of giving it to the newly ordained in order that they might communicate themselves, and of burying it in or under the altar-slab of a newly consecrated church. At a later date, apparently early in the 14th century, began the practice of carrying the Eucharist in procession in a monstrance; and at a still later period, apparently after the middle of the 16th century, the practice of Benediction with the reserved sacrament, and that of the "forty hours' exposition," were introduced in the churches of the Roman communion. It should be said, however, that most of these practices met with very considerable opposition both from councils and from theologians and canonists, amongst others from the English canonist William Lyndwood (*Provinciale*, lib. iii. c. 26), on the following grounds amongst others: that the Body of Christ is the food of the soul, that it ought not to be reserved except for the benefit of the sick, and that it ought not to be applied to any other use than that for which it was instituted.

In England, during the religious changes of the 16th century, such of these customs as had already taken root were abolished, and with them the practice of reserving the Eucharist in the churches appears to have died out too. The general feeling on the subject is expressed by the language of the 28th Article, first drafted in 1553, to the effect that "the sacrament of the Lord's Supper was not by Christ's ordinance reserved, carried about, lifted up or worshipped," and by the fact that a form was provided for the celebration of the Holy Eucharist for the sick in their own homes. This latter practice was in accordance with abundant precedent, but had become very infrequent, if not obsolete, for many years before the Reformation. The first Prayer-Book of Edward VI. provided that if there was a celebration in church on the day on which a sick person was to receive the Holy Communion, it should be reserved, and conveyed to the sick man's house to be administered to him; if not, the curate was to visit the sick person before noon and there celebrate according to a form which is given in the book. At the revision of the Prayer-Book in 1552 all mention of reservation is omitted, and the rubric directs that the communion is to be celebrated in the sick person's house, according to a new form; and this service has continued, with certain minor changes, down to the present day. That the tendency of opinion in the English Church during the period of the Reformation was against reservation is beyond doubt, and that the practice actually died out would seem to be equally clear. The whole argument of some of the controversial writings of the time, such as Bishop Cooper on *Private Mass*, depends upon that fact, and when Cardinal du Perron alleged against the English Church the lack of the reserved Eucharist, Bishop Andrewes replied, not that the fact was otherwise, but that reservation was unnecessary in view of the English form for the Communion of the Sick. "So that reservation needeth not; the intent is had without it" (*Answers to Cardinal Perron, &c.*, p. 19, Library of Anglo-Catholic Theology). It does not follow, however, that a custom which has ceased to exist is of necessity forbidden, nor even that what was rejected by the authorities of the English Church in the 16th century is so explicitly forbidden as to be unlawful under its existing system; and not a few facts have to be taken into account in any investigation of the question. (1) The view has been held that in the Eucharist the elements are only consecrated as regards the particular purpose of reception in the service itself, and that consequently what remains unconsumed may be put to common uses. If this view were held (and it has more than once made its appearance in church history, though it has never prevailed), reservation might be open to objection on theological grounds. But such is not the view of the Church of England in her doctrinal standards, and there is an express rubric directing that any that remains of that which was consecrated is not to be carried out of the church, but reverently consumed. There can therefore be no theological obstacle to reservation in the English Church: it is a question of practice only. (2) Nor can it be said that the rubric just referred to is in itself a condemnation of reservation: it is rather directed, as its history proves, against the irreverence which prevailed when it was made; and in fact its wording is based upon that of a pre-Reformation order which coexisted with the practice of reservation (Lyndwood, *Provinciale*, lib. iii. tit. 26, note q). (3) Nor can it be said that the words of the 28th Article (see above) constitute in themselves an express prohibition of reservation, strong as their evidence may be as to the practice and feeling of the time. The words are the common property of an earlier age which saw nothing objectionable in reservation for the sick. (4) It has indeed been contended (by Bishop Wordsworth of Salisbury) that reservation was not actually, though tacitly, continued under the second Prayer-Book of Edward VI., since that book orders that the curate shall "minister," and not "celebrate," the communion in the sick person's house. But such a tacit sanction on the part of the compilers of the second Prayer-Book is in the highest degree improbable, in view of their known opinions on the subject; and an examination of contemporary writings hardly justifies the contention that the two words are so carefully used as the argument would demand. Anyhow, as the bishop notes, this could not be the case with the Prayer-Book of 1661, where the word is "celebrate." (5) The Elizabethan Act of Uniformity contained a provision that at the universities the public services, with the exception of the Eucharist, might be in a language other than English, and in 1560 there appeared a Latin version of the Prayer-Book, issued under royal letters patent, in which there was a rubric prefixed to the Order for the Communion of the Sick, based on that in the first Prayer-Book of Edward VI. (see above), and providing that the Eucharist should be reserved for the sick person if there had been a celebration on the same day. But although the book in question was issued under letters patent, it is not really a translation of the Elizabethan book at all, but simply a reshaping of Aless's clever and inaccurate translation of Edward VI.'s first book. In the rubric in question words are altered here and there in a way which shows that its reappearance can hardly be a mere printer's error; but in any case its importance is very slight, for the Act of Uniformity specially provides that the English service alone is to be used for the Eucharist. (6) It has been pointed out that reservation for the sick prevails in the Scottish Episcopal Church, the doctrinal standards of which correspond with those of the Church of England. But it must be remembered that the Scottish Episcopal Church has an additional order of its own for the Holy Communion, and that consequently its clergy are not restricted to the services in the Book of Common Prayer. Moreover, the practice of reservation which has prevailed in Scotland for over 150 years would appear to have arisen out of the special circumstances of that church during the 18th century, and not to have prevailed continuously from earlier times. (7) Certain of the divines who took part in the framing of the Prayer-Book of 1661 seem to speak of the practice as though it actually prevailed in their day. But Bishop Sparrow's words on the subject (*Rationale*, p. 349) are not free from difficulty on any hypothesis, and Thorndike (*Works*, v. 578, Library of Anglo-Catholic Theology) writes in such a style that it is often hard to tell whether he is describing the actual practice of his day or that which in his view it ought to be. (8) There appears to be more evidence than is commonly supposed to show that a practice analogous to that of Justin Martyr's day has been adopted from time to time in England, viz. that of conveying the sacred elements to the houses of the sick during, or directly after, the celebration in church. And in 1899 this practice received the sanction of Dr Westcott, then bishop of Durham. (9) On the other hand, the words of the oath taken by the clergy under the 36th of the Canons of 1604 are to the effect that they will use the form prescribed in the Prayer-Book and none other, except so far as shall be otherwise ordered by lawful authority; and the Prayer-Book does not even mention the reservation of the Eucharist, whilst the Articles mention it only in the way of depreciation.

The matter has become one of no little practical importance owing to modern developments of English Church life. On the one hand, it is widely felt that neither the form for the Communion of the Sick, nor yet the teaching with regard to spiritual communion in the third rubric at the end of that service, is sufficient to meet all the cases that arise or may arise. On the other hand, it is probable that in many cases the desire for reservation has arisen, in part at least, from a wish for something analogous to the Roman Catholic customs of exposition and benediction; and the chief objection to any formal practice of reservation, on the part of many who otherwise would not be opposed to it, is doubtless to be found in this fact. But however that may be, the practice of reservation of the Eucharist, either in the open church or in private, has become not uncommon in recent days.

The question of the legality of reservation was brought before the two archbishops in 1899, under circumstances analogous to those in the Lambeth Hearing on Incense (*q.v.*). The parties concerned were three clergymen, who appealed from the direction of their respective diocesans, the bishops of St Albans and Peterborough and the archbishop of York: in the two former cases the archbishop (Temple) of Canterbury was the principal and the archbishop of York (Maclagan) the assessor, whilst in the latter case the functions were reversed. The hearing extended from 17th to 20th July; counsel were heard on both sides, evidence was given in support of the appeals by two of the clergy concerned and by several other witnesses, lay and clerical, and the whole matter was gone into with no little fulness. The archbishops gave their decision on the 1st of May 1900 in two separate judgments, to the effect that, in Dr Temple's words, "the Church of England does not at present allow reservation in any form, and that those who think that it ought to be allowed, though perfectly justified in endeavouring to get the proper authorities to alter the law, are not justified in practising reservation until the law has been so altered." The archbishop of York also laid stress upon the fact that the difficulties in the way of the communion of the sick, when they are really ready for communion, are not so great as has sometimes been suggested.

See W. E. Scudamore, *Notitia eucharistica* (2nd ed., London, 1876); and art. "Reservation" in *Dictionary of Christian Antiquities*, vol. ii. (London, 1893); *Guardian* newspaper, July 19 and 26, 1899, and May 2, 1900; *The Archbishops of Canterbury and York on Reservation of the Sacrament* (London, 1900); J. S. Franey, *Mr Dibdin's Speech on Reservation, and some of the Evidence* (London, 1899); F. C. Eeles, *Reservation of the Holy Eucharist in the Scottish Church* (Aberdeen, 1899); Bishop J. Wordsworth, *Further Considerations on Public Worship* (Salisbury, 1901). (W. E. Co.)

EUCHRE, a game of cards. The name is supposed by some to be a corruption of *écarté*, to which game it bears some resemblance, others connect it with the Ger. *Juchs* or *Jux*, a joke, owing to the presence in the pack, or "deck," of a special card called "the joker"; but neither derivation is quite satisfactory. The "deck" consists of 32 cards, all cards between the seven and ace being rejected from an ordinary pack. Sometimes the sevens and eights are rejected as well. The "joker" is the best card, *i.e.* the highest trump. Second in value is the "right bower" (from Dutch *boer*, farmer, the name of the knave), or knave of trumps; third is the "left bower," the knave of the other suit of the same colour as the right bower, also a trump: then follow ace, king, queen, &c., in order. Thus if spades are trumps the order is (1) the joker, (2) knave of spades, (3) knave of clubs, (4) ace of spades, &c. The joker, however, is not always used. When it is, the game is called "railroad" euchre. In suits not trumps the cards rank as at whist. Euchre can be played by two, three or four persons. In the cut for deal, the highest card deals, the knave being the highest and the ace the next best card. The dealer gives five cards to each person, two each and then three each, or vice versa: when all have received their cards the next card in the pack is turned up for trumps.

Two-handed Euchre.—If the non-dealer, who looks at his cards first, is satisfied, he says "I order it up," *i.e.* he elects to play with his hand as it stands and with the trump suit as turned up. The dealer then rejects one card, which is put face downwards at the bottom of the pack, and takes the trump card into his hand. If, however, the non-dealer is not satisfied with his original hand, he says "I pass," on which the dealer can either "adopt," or "take it up," the suit turned up, and proceed as before, or he can pass, turning down the trump card to show that he passes. If both players pass, the non-dealer can make any other suit trumps, by saying "I make it spades," for example, or he can pass again, when the dealer can either make another suit trumps or pass. If both players pass, the hand is at an end. If the trump card is black and either player makes the other black suit trumps, he "makes it next"; if he makes a red suit trumps he "crosses the suit"; the same applies to trumps in a red suit, *mutatis mutandis*. The non-dealer leads; the dealer must follow suit if he can, but he need not win the trick, nor need he trump if unable to follow suit. The left bower counts as a trump, and a trump must be played to it if led. The game is five up. If the player who orders up or adopts makes five tricks (a "march") he scores two points; if four or three tricks, one point; if he makes less than three tricks, he is "euchred" and the other player scores two. A rubber consists of three games, each game counting one, unless the loser has failed to score at all, when the winner counts two for that game. This is called a "lurch." When a player wins three tricks, he is said to win the "point." The rubber points are two, as at whist. All three games are played out, even if one player win the first two. It is sometimes agreed that if a score "laps," *i.e.* if the winner makes more than five points in a game, the surplus may be carried on to the next game. The leader should be cautious about ordering up, since the dealer will probably hold one trump in addition to the one he takes in. If the point is certain, the leader should pass, in case the dealer should take up the trump. If the dealer "turns it down," it is not wise to "make it," unless the odds on getting the point against one trump are two to one. With good cards in two suits, it is best to make it "next," as the dealer is not likely to have a bower in that suit. The dealer, if he adopts, should discard a singleton, unless it is an ace. If the dealer's score is three, only a very strong hand justifies one in "ordering up." It is generally wise in play to discard a singleton and not to unguard another suit. With one's adversary at four, the trump should be adopted even on a light hand.

Three-handed (*cut-throat*) *Euchre.*—In this form of the game the option of playing or passing goes round in rotation, beginning with the player on the dealer's left. The player who orders up, takes up, or makes, plays against the other two; if he is euchred his adversaries score two each; by other laws he is set back two points, and should his score be at love, he has then to make seven points. The procedure is the same as in two-handed euchre.

Four-handed Euchre.—The game is played with partners, cutting and sitting, and the deal passing, as at whist. If the first player passes, the second may say "I assist," which is the same as "ordering up," or he may pass. If the first player has ordered up, his partner may say "I take it from you," which means that he will play alone against the two adversaries, the first player's cards being put face downwards on the table, and not being used in that hand. Any player can similarly play "a lone hand," his partner taking no part in the play. Even if the first hand plays alone, the third may take it from him. Similarly the dealer may take it from the second hand, but the second hand cannot take it from the dealer. If all four players pass, the first player can pass, make it, or play alone, naming the suit he makes. The third hand can "take it" from the first, or play alone in the suit made by the first, the dealer having a similar right over his own partner. If all four pass again, the hand is at an end and the deal passes. The game is five up, points being reckoned as before. If a lone player makes five tricks his side scores four: if three tricks, one: if he fails to make three tricks the opponents score four. It is not wise for the first hand to order up or cross the suit unless very strong. It is good policy to lead trumps through a hand that assists, bad policy to do so when the leader adopts. Trumps should be led to a partner who has ordered up or made it. It is sometimes considered wise for the first hand to "keep the bridge," *i.e.* order up with a bad hand, to prevent the other side from playing alone, if their score is only one or two and the leader's is four. This right is lost if a player reminds his partner, after the trump card has been turned, that they are at the point of bridge. If the trump under these circumstances is not ordered up, the dealer should turn down, unless very strong. The second hand should not assist unless really strong, except when at the point of four-all or four-love. When led through, it is generally wise, *ceteris paribus*, to head the trick. The dealer should always adopt with two trumps in hand, or with one trump if a bower is turned up. At four-all and four-love he should adopt on a weaker hand. Also, being fourth player, he can make it on a weaker hand than other players. If the dealer's partner assists, the dealer should lead him a trump at the first opportunity; it is also a good opportunity for the dealer to play alone if moderately strong. If a player who generally keeps the bridge passes, his partner should rarely play alone.

Extracts from Rules.—If the dealer give too many or too few cards to any player, or exposes two cards in turning up, it is a misdeal and the deal passes. If there is a faced card in the pack, or the dealer exposes a card, he deals again. If any one play with the wrong number of cards, or the dealer plays without discarding, trumps being ordered up, his side forfeits two points (a lone hand four points) and cannot score during that hand. The revoke penalty is three points for each revoke (five in the case of a lone hand), and no score can be made that hand; a card may be taken back, before the trick is quitted, to save a revoke, but it is an exposed card. If a lone player expose a card, no penalty; if he lead out of turn, the card led may be called. If an adversary of a lone player plays out of turn to his lead, all the cards of both adversaries can be called, and are exposed on the table.

Bid Euchre.—This game resembles "Napoleon" (*q.v.*). It is played with a euchre deck, each player receiving five cards, the others being left face-downwards. Each player "bids," *i.e.* declares and makes a certain number of tricks, the highest bidder leading and his first card being a trump. When six play, the player who bids highest claims as his partner the player who has the best card of the trump suit, not in the bidder's hand: if it is among the undealt cards, which is ascertained by the fact that no one else holds it, he calls for the next best and so on. The partners then play against the other four.

EUCKEN, RUDOLF CHRISTOPH (1846-), German philosopher, was born on the 5th of January 1846 at Aurich in East Friesland. His father died when he was a child, and he was brought up by his mother, a woman of considerable activity. He was educated at Aurich, where one of his teachers was the philosopher Wilhelm Reuter, whose influence was the dominating factor in the development of his thought. Passing to the university of Göttingen he took his degree in classical philology and ancient history, but the bent of his mind was definitely towards the philosophical side of theology. Subsequently he studied in Berlin, especially under Trendelenburg, whose ethical tendencies and historical treatment of philosophy greatly attracted him. From 1871 to 1874 Eucken taught philosophy at Basel, and in 1874 became professor of philosophy at the university of Jena. In 1908 he was awarded the Nobel prize for literature. Eucken's philosophical work is partly historical and partly constructive, the former side being predominant in his earlier, the latter in his later works. Their most striking feature is the close organic relationship between the two parts. The aim of the historical works is to show the necessary connexion between philosophical concepts and the age to which they belong; the same idea is at the root of his constructive speculation. All philosophy is philosophy of life, the development of a new culture, not mere intellectualism, but the application of a vital religious inspiration to the practical problems of society. This practical idealism Eucken described by the term "Activism." In accordance with this principle, Eucken has given considerable attention to social and educational problems.

His chief works are:—*Die Methode der aristotelischen Forschung* (1872); the important historical study on the history of conceptions, *Die Grundbegriffe der Gegenwart* (1878; Eng. trans. by M. Stuart Phelps, New York, 1880; 3rd ed. under the title *Geistige Strömungen der Gegenwart*, 1904; 4th ed., 1909); *Geschichte der philos. Terminologie* (1879); *Prolegomena zu Forschungen über die Einheit des Geisteslebens* (1885); *Beiträge zur Geschichte der neueren Philosophie* (1886, 1905); *Die Einheit des Geisteslebens* (1888); *Die Lebensanschauungen der grossen Denker* (1890; 7th ed., 1907; Eng. trans., W. Hough and Boyce Gibson, *The Problem of Human Life*, 1909); *Der Wahrheitsgehalt der Religion* (1901; 2nd ed., 1905); *Thomas von Aquino und Kant* (1901); *Gesammelte Aufsätze zu Philos. und Lebensanschauung* (1903); *Philosophie der Geschichte* (1907); *Der Kampf um einen geistigen Lebensinhalt* (1896, 1907); *Grundlinien einer neuen Lebensanschauung* (1907); *Einführung in die Philosophie der Geisteslebens* (1908; Eng. trans., *The Life of the Spirit*, F. L. Pogson, 1909, Crown Theological Library); *Der Sinn und Wert des Lebens* (1908; Eng. trans., 1909); *Hauptprobleme der Religionsphilosophie der Gegenwart* (1907). The following of Eucken's works also have been translated into English:—*Liberty in Teaching in the German Universities* (1897); *Are the Germans still a Nation of Thinkers?* (1898); *Progress of Philos. in the 19th Century* (1899); *The Finnish Question* (1899); *The Present Status of Religion in Germany* (1901). See W. R. Boyce Gibson, *Rudolf Eucken's Philosophy of Life* (2nd ed., 1907), and *God with Us* (1909); for the historical work, Falckenberg's *Hist. of Philos.* (Eng. trans., 1895, index); also H. Pöhlmann, *R. Euckens Theologie mit ihren philosophischen Grundlagen dargestellt* (1903); O. Siebert, *R. Euckens Welt- und Lebensanschauung* (1904).

EUCLASE, a very rare mineral, occasionally cut as a gem-stone for the cabinet. It bears some relation to beryl in that it is a silicate containing beryllium and aluminium, but hydrogen is also present, and the analyses of euclase lead to the formula $HBeAlSiO_5$ or $Be(AlOH)SiO_4$. It crystallizes in the monoclinic system, the crystals being generally of prismatic habit, striated vertically, and terminated by acute pyramids. Cleavage is perfect, parallel to the clinopinacoid, and this suggested to R. J. Haüy the name euclase, from the Greek εὖ, easily, and κλάσις, fracture. The ready cleavage renders the stone fragile with a tendency to chip, and thus detracts from its use for personal ornament. The colour is generally pale-blue or green, though sometimes the mineral is colourless. When cut it resembles certain kinds of beryl (aquamarine) and topaz, from which it may be distinguished by its specific gravity (3·1). Its hardness (7·5) is rather less than that of topaz. Euclase occurs with topaz at Boa Vista, near Ouro Preto (Villa Rica) in the province of Minas Geraes, Brazil. It is found also with topaz and chrysoberyl in the gold-bearing gravels of the R. Sanarka in the South Urals; and is met with as a rarity in the mica-schist of the Rauris in the Austrian Alps.

EUCLID [Eucleides], of Megara, founder of the Megarian (also called the eristic or dialectic) school of philosophy, was born *c.* 450 B.C., probably at Megara, though Gela in Sicily has also been named as his birthplace (Diogenes Laërtius ii. 106), and died in 374. He was one of the most devoted of the disciples of Socrates. Aulus Gellius (vi. 10) states that, when a decree was passed forbidding the Megarians to enter Athens, he regularly visited his master by night in the disguise of a woman; and he was one of the little band of intimate friends who listened to the last discourse. He withdrew subsequently with a number of fellow disciples to Megara, and it has been conjectured, though there is no direct evidence, that this was the period of Plato's residence in Megara, of which indications appear in the *Theaetetus*. He is said to have written six dialogues, of which only the titles have been preserved. For his doctrine (a combination of the principles of Parmenides and Socrates) see Megarian School.

EUCLID, Greek mathematician of the 3rd century B.C.; we are ignorant not only of the dates of his birth and death, but also of his parentage, his teachers, and the residence of his early years. In some of the editions of his works he is called *Megarensis*, as if he had been born at Megara in Greece, a mistake which arose from confounding him with another Euclid, a disciple of Socrates. Proclus (A.D. 412–485), the authority for most of our information regarding Euclid, states in his commentary on the first book of the *Elements* that Euclid lived in the time of Ptolemy I., king of Egypt, who reigned from 323 to 285 B.C., that he was younger than the associates of Plato, but older than Eratosthenes (276–196 B.C.) and Archimedes (287–212 B.C.). Euclid is said to have founded the mathematical school of Alexandria, which was at that time becoming a centre, not only of commerce, but of learning and research, and for this service to the cause of exact science he would have deserved commemoration, even if his writings had not secured him a worthier title to fame. Proclus preserves a reply made by Euclid to King Ptolemy, who asked whether he could not learn geometry more easily than by studying the *Elements*—"There is no royal road to geometry." Pappus of Alexandria, in his *Mathematical Collection*, says that Euclid was a man of mild and inoffensive temperament, unpretending, and kind to all genuine students of mathematics. This being all that is known of the life and character of Euclid, it only remains therefore to speak of his works.

Among those which have come down to us the most remarkable is the *Elements* (Στοιχεῖα) (see Geometry). They consist of thirteen books; two more are frequently added, but there is reason to believe that they are the work of a later mathematician, Hypsicles of Alexandria.

The question has often been mooted, to what extent Euclid, in his *Elements*, is a discoverer or a compiler. To this question no entirely satisfactory answer can be given, for scarcely any of the writings of earlier geometers have come down to our times. We are mainly dependent on Pappus and Proclus for the scanty notices we have of Euclid's predecessors, and of the problems which engaged their attention; for the solution of problems, and not the discovery of theorems, would seem to have been their principal object. From these authors we learn that the property of the right-angled triangle had been found out, the principles of geometrical analysis laid down, the restriction of constructions in plane geometry to the straight line and the circle agreed upon, the doctrine of proportion, for both commensurables and incommensurables, as well as loci, plane and solid, and some of the properties of the conic sections investigated, the five regular solids (often called the Platonic bodies) and the relation between the volume of a cone or pyramid and that of its circumscribed cylinder or prism discovered. Elementary works had been written, and the famous problem of the duplication of the cube reduced to the determination of two mean proportionals between two given straight lines. Notwithstanding this amount of discovery, and all that it implied, Euclid must have made a great advance beyond his predecessors (we are told that "he arranged the discoveries of Eudoxus, perfected those of Theaetetus, and reduced to invincible demonstration many things that had previously been more loosely proved"), for his *Elements* supplanted all similar treatises, and, as Apollonius received the title of "the great geometer," so Euclid has come down to later ages as "the elementator."

For the past twenty centuries parts of the *Elements*, notably the first six books, have been used as an introduction to geometry. Though they are now to some extent superseded in most countries, their long retention is a proof that they were, at any rate, not unsuitable for such a purpose. They are, speaking generally, not too difficult for novices in the science; the demonstrations are rigorous, ingenious and often elegant; the mixture of problems and theorems gives perhaps some variety, and makes their study less monotonous; and, if regard be had merely to the metrical properties of space as distinguished from the graphical, hardly any cardinal geometrical truths are omitted. With these excellences are combined a good many defects, some of them inevitable to a system based on a very few axioms and postulates. Thus the arrangement of the propositions seems arbitrary; associated theorems and problems are not grouped together; the classification, in short, is imperfect. Other objections, not to mention minor blemishes, are the prolixity of the style, arising partly from a defective nomenclature, the treatment of parallels depending on an axiom which is not axiomatic, and the sparing use of superposition as a method of proof.

Of the thirty-three ancient books subservient to geometrical analysis, Pappus enumerates first the *Data* (Δεδομένα) of Euclid. He says it contained 90 propositions, the scope of which he describes; it now consists of 95. It is not easy to explain this discrepancy, unless we suppose that some of the propositions, as they existed in the time of Pappus, have since been split into two, or that what were once scholia have since been erected into propositions. The object of the *Data* is to show that when certain things—lines, angles, spaces, ratios, &c.—are given by hypothesis, certain other things are given, that is, are determinable. The book, as we are expressly told, and as we may gather from its contents, was intended for the investigation of problems; and it has been conjectured that Euclid must have extended the method of the *Data* to the investigation of theorems. What prompts this conjecture is the similarity between the analysis of a theorem and the method, common enough in the *Elements*, of *reductio ad absurdum*—the one setting out from the supposition that the theorem is true, the other from the supposition that it is false, thence in both cases deducing a chain of consequences which ends in a conclusion previously known to be true or false.

The *Introduction to Harmony* (Εἰσαγωγὴ ἁρμονική), and the *Section of the Scale* (Κατατομὴ κανόνος), treat of music. There is good reason for believing that one at any rate, and probably both, of these books are not by Euclid. No mention is made of them by any writer previous to Ptolemy (A.D. 140), or by Ptolemy himself, and in no ancient codex are they ascribed to Euclid.

The *Phaenomena* (Φαινόμενα) contains an exposition of the appearances produced by the motion attributed to the celestial sphere. Pappus, in the few remarks prefatory to his sixth book, complains of the faults, both of omission and commission, of writers on astronomy, and cites as an example of the former the second theorem of Euclid's *Phaenomena*, whence, and from the interpolation of other proofs, David Gregory infers that this treatise is corrupt.

The *Optics* and *Catoptrics* (Ὀπτικά, Κατοπτρικά) are ascribed to Euclid by Proclus, and by Marinus in his preface to the *Data*, but no mention is made of them by Pappus. This latter circumstance, taken in connexion with the fact that two of the propositions in the sixth book of the *Mathematical Collection* prove the same things as three in the *Optics*, is one of the reasons given by Gregory for deeming that work spurious. Several other reasons will be found in Gregory's preface to his edition of Euclid's works.

In some editions of Euclid's works there is given a book on the *Divisions of Superficies*, which consists of a few propositions, showing how a straight line may be drawn to divide in a given ratio triangles, quadrilaterals and pentagons. This was supposed by John Dee of London, who transcribed or translated it, and entrusted it for publication to his friend Federico Commandino of Urbino, to be the treatise of Euclid referred to by Proclus as τὸ περὶ διαιρέσεων βιβλίον. Dee mentions that, in the copy from which he wrote, the book was ascribed to Machomet of Bagdad, and adduces two or three reasons for thinking it to be Euclid's. This opinion, however, he does not seem to have held very strongly, nor does it appear that it was adopted by Commandino. The book does not exist in Greek.

The fragment, in Latin, *De levi et ponderoso*, which is of no value, and was printed at the end of Gregory's edition only in order that nothing might be left out, is mentioned neither by Pappus nor Proclus, and occurs first in Bartholomew Zamberti's edition of 1537. There is no reason for supposing it to be genuine.

The following works attributed to Euclid are not now extant:—

1. Three books on *Porisms* (Περὶ τῶν πορισμάτων) are mentioned both by Pappus and Proclus, and the former gives an abstract of them, with the lemmas assumed. (See PORISM.)

2. Two books are mentioned, named Τόπων πρὸς ἐπιφανείᾳ, which is rendered *Locorum ad superficiem* by Commandino and subsequent geometers. These books were subservient to the analysis of loci, but the four lemmas which refer to them and which occur at the end of the seventh book of the *Mathematical Collection*, throw very little light on their contents. R. Simson's opinion was that they treated of curves of double curvature, and he intended at one time to write a treatise on the subject. (See Trail's *Life of Dr Simson*).

3. Pappus says that Euclid wrote four books on the *Conic Sections* (βιβλία τέσσαρα Κωνικῶν), which Apollonius amplified, and to which he added four more. It is known that, in the time of Euclid, the parabola was considered as the section of a right-angled cone, the ellipse that of an acute-angled cone, the hyperbola that of an obtuse-angled cone, and that Apollonius was the first who showed that the three sections could be obtained from any cone. There is good ground therefore for supposing that the first four books of Apollonius's *Conics*, which are still extant, resemble Euclid's *Conics* even less than Euclid's *Elements* do those of Eudoxus and Theaetetus.

4. A book on *Fallacies* (Περὶ ψευδαρίων) is mentioned by Proclus, who says that Euclid wrote it for the purpose of exercising beginners in the detection of errors in reasoning.

This notice of Euclid would be incomplete without some account of the earliest and the most important editions of his works. Passing over the commentators of the Alexandrian school, the first European translator of any part of Euclid is Boëtius (500), author of the *De consolatione philosophiae*. His *Euclidis Megarensis geometriae libri duo* contain nearly all the definitions of the first three books of the *Elements*, the postulates, and most of the axioms. The enunciations, with diagrams but no proofs, are given of most of the propositions in the first, second and fourth books, and a few from the third. Some centuries afterwards, Euclid was translated into Arabic, but the only printed version in that language is the one made of the thirteen books of the *Elements* by Nasir Al-Din Al-Tūsī (13th century), which appeared at Rome in 1594.

The first printed edition of Euclid was a translation of the fifteen books of the *Elements* from the Arabic, made, it is supposed, by Adelard of Bath (12th century), with the comments of Campanus of Novara. It appeared at Venice in 1482, printed by Erhardus Ratdolt, and dedicated to the doge Giovanni-Mocenigo. This edition represents Euclid very inadequately; the comments are often foolish, propositions are sometimes omitted, sometimes joined together, useless cases are interpolated, and now and then Euclid's order changed.

The first printed translation from the Greek is that of Bartholomew Zamberti, which appeared at Venice in 1505. Its contents will be seen from the title: *Euclidis megarēsis philosophi platonici Mathematicaruꝫ disciplinarū Janitoris: Habent in hoc volumine quicūqꝫ ad mathematicā substantiā aspirāt: elemētorum libros xiii cū expositione Theonis insignis mathematici . . . Quibus . . . adjuncta. Deputatum scilicet Euclidi volumē xiiii cū expositiōe Hypsi. Alex. Itidēqꝫ Phaeno. Specu. Perspe. cum expositione Theonis ac mirandus ille liber Datorum cum expositiōe Pappi Mechanici una cū Marini dialectici protheoria. Bar. Zāber. Vene. Interpte.*

The first printed Greek text was published at Basel, in 1533, with the title Εὐκλείδου Στοιχείων βιβλ. ιε ἐκ τῶν Θέωνος συνουσιῶν. It was edited by Simon Grynaeus from two MSS. sent to him, the one from Venice by Lazarus Bayfius, and the other from Paris by John Ruellius. The four books of Proclus's commentary are given at the end from an Oxford MS. supplied by John Claymundus.

The English edition, the only one which contains all the extant works attributed to Euclid, is that of Dr David Gregory, published at Oxford in 1703, with the title, Εὐκλείδου τὰ σωζόμενα. *Euclidis quae supersunt omnia.* The text is that of the Basel edition, corrected from the MSS. bequeathed by Sir Henry Savile, and from Savile's annotations on his own copy. The Latin translation, which accompanies the Greek on the same page, is for the most part that of Commandino. The French edition has the title, *Les Œuvres d'Euclide, traduites en Latin et en Français, d'après un manuscrit très-ancien qui était resté inconnu jusqu'à nos jours. Par F. Peyrard, Traducteur des œuvres d'Archimède.* It was published at Paris in three volumes, the first of which appeared in 1814, the second in 1816 and the third in 1818. It contains the *Elements* and the *Data*, which are, says the editor, certainly the only works which remain to us of this ever-celebrated geometer. The texts of the Basel and Oxford editions were collated with 23 MSS., one of which belonged to the library of the Vatican, but had been sent to Paris by the comte de Peluse (Monge). The Vatican MS. was supposed to date from the 9th century; and to its readings Peyrard gave the greatest weight. What may be called the German edition has the title Εὐκλείδου Στοιχεῖα. *Euclidis Elementa ex optimis libris in usum Tironum Graece edita ab Ernesto Ferdinando August.* It was published at Berlin in two parts, the first of which appeared in 1826 and the second in 1829. The above mentioned texts were collated with three other MSS. Modern standard editions are by Dr Heiberg of Copenhagen, *Euclidis Elementa, edidit et Latine interpretatus est J. L. Heiberg*. vols. i.-v. (Lipsiae, 1883-1888), and by T. L. Heath, *The Thirteen Books of Euclid's Elements*, vols. i.-iii. (Cambridge, 1908).

Of translations of the *Elements* into modern languages the number is very large. The first English translation, published at London in 1570, has the title, *The Elements of Geometrie of the most auncient Philosopher Euclide of Megara. Faithfully (now first) translated into the Englishe toung, by H. Billingsley, Citizen of London. Whereunto are annexed certaine Scholies, Annotations and Inventions, of the best Mathematiciens, both of time past and in this our age.* The first French translation of the whole of the *Elements* has the title, *Les Quinze Livres des Elements d'Euclide. Traduicts de Latin en François. Par D. Henrion, Mathematicien.* The first edition of it was published at Paris in 1615, and a second, corrected and augmented, in 1623. Pierre Forcadel de Beziés had published at Paris in 1564 a translation of the first six books of the *Elements*, and in 1565 of the seventh, eighth and ninth books. An Italian translation, with the title, *Euclide Megarense acutissimo philosopho solo introduttore delle Scientie Mathematice. Diligentemente rassettato, et alla integrità ridotto, per il degno professore di tal Scientie Nicolò Tartalea Brisciano*, was published at Venice in 1569, and Federico Commandino's translation appeared at Urbino in 1575; a Spanish version, *Los Seis Libros primeros de la geometria de Euclides. Traduzidos en lēgua Española por Rodrigo Camorano, Astrologo y Mathematico*, at Seville in 1576; and a Turkish one, translated from the edition of J. Bonnycastle by Husain Rifki, at Bulak in 1825. Dr Robert Simson's editions of the first six and the eleventh and twelfth books of the *Elements*, and of the *Data*.

AUTHORITIES.—The authors and editions above referred to; Fabricius, *Bibliotheca Graeca*, vol. iv.; Murhard's *Litteratur der mathematischen Wissenschaften*; Heilbronner's *Historia matheseos universae*; De Morgan's article "Eucleides" in Smith's *Dictionary of Biography and Mythology*; Moritz Cantor's *Geschichte der Mathematik*, vol. i. (J. S. M.)

EUCRATIDES, king of Bactria (*c.* 175-129 B.C.), came to the throne by a rebellion against the dynasty of Euthydemus, whose son Demetrius had conquered western India. His authority was challenged by a great many other pretenders and Greek dynasts in Sogdiana, Aria (Herat), Drangiana (Sijistan), &c., whose names—Pantaleon, Agathocles, Antimachus, Antalcidas "the victorious" (νικηφόρος), Plato, whose unique coin is dated from the year 147 of the Seleucid era (=166 B.C.), and others—are known only from coins with Greek and Indian legends. In the west the Parthian king Mithradates I. began to enlarge his kingdom and attacked Eucratides; he succeeded in conquering two provinces between Bactria and Parthia, called by Strabo "the country of Aspiones and Turiua," two Iranian names. But the principal opponent of Eucratides was Demetrius (*q.v.*) of India, who attacked him with a large army "of 300,000 men"; Eucratides fled with 300 men into a fortress and was besieged. But at last he beat

Demetrius, and conquered a great part of western India. According to Apollodorus of Artemita, the historian of the Parthians, he ruled over 1000 towns (Strabo xv. 686; transferred to Diodotus of Bactria in Justin 41, 4. 6); and the extent of his kingdom over Bactria, Sogdiana (Bokhara), Drangiana (Sijistan), Kabul and the western Punjab is confirmed by numerous coins. On these coins, which bear Greek and Indian legends (in Kharoshti writing, cf. Bactria), he is called "the great King Eucratides." On one his portrait and name are associated on the reverse with those of Heliocles and Laodice; Heliocles was probably his son, and the coin may have been struck to celebrate his marriage with Laodice, who seems to have been a Seleucid princess. In Bactria Eucratides founded a Greek city, Eucratideia (Strabo xi. 516, Ptolem. vi. 11. 8). On his return from India Eucratides was (about 150 B.C.) murdered by his son, whom he had made co-regent (Justin 41, 6). This son is probably the Heliocles just mentioned, who on his coins calls himself "the Just" (*βασιλέως Ἡλιοκλέους δικαίου*). In his time the Graeco-Bactrian kingdom lost the countries north of the Hindu Kush. Mongolian tribes, the Yue-chi of the Chinese, called by the Greeks Scythians, by the Indians Saka, among which the Tochari are the most conspicuous, invaded Sogdiana in 159 B.C. and conquered Bactria in 139. Meanwhile the Parthian kings Mithradates I. and Phraates II. conquered the provinces in the west of the Hindu Kush (Justin 41, 6. 8); for a short time Mithradates I. extended his dominion to the borders of India (Diod. 33. 18, Orosius v. 4. 16). When Antiochus VII. Sidetes tried once more to restore the Seleucid dominion in 130, Phraates allied himself with the Scythians (Justin 42, 1. 1); but after his decisive victory in 129 he was attacked by them and fell in the battle. The changed state of affairs is shown by the numerous coins of Heliocles; while his predecessors maintained the Attic standard, which had been dominant throughout the Greek east, he on his later coins passes over to a native silver standard, and his bronze coins became quite barbarous. Besides his coins we possess coins of many other Greek kings of these times, most of whom take the epithet of "invincible" (*ἀνίκητος*) and "saviour" *σωτήρ*). They are records of a desperate struggle of the Greeks to maintain their nationality and independence in the Far East; one usurper after the other rose to fight for the rescue of the kingdom. But these internal wars only accelerated the destruction; about 120 B.C. almost the whole of eastern Iran was in the hands either of a Parthian dynasty or of the Mongol invaders, who are now called Indo-Scythians. Only in the Kabul valley and western India the Greeks maintained themselves about two generations longer (see Menander). (Ed. M.)

EUDAEMONISM (from Gr. *εὐδαιμονία*, literally the state of being under the protection of a benign spirit, a "good genius"), in ethics, the name applied to theories of morality which find the chief good of man in some form of happiness. The term Eudaemonia has been taken in a large number of senses, with consequent variations in the meaning of Eudaemonism. To Plato the "happiness" of all the members of a state, each according to his own capacity, was the final end of political development. Aristotle, as usual, adopted "eudaemonia" as the term which in popular language most nearly represented his idea and made it the keyword of his ethical doctrine. None the less he greatly expanded the content of the word, until the popular idea was practically lost: if a man is to be called *εὐδαίμων*, he must have all his powers performing their functions freely in accordance with virtue, as well as a reasonable degree of material well-being; the highest conceivable good of man is the life of contemplation. Aristotle further held that the good man in achieving virtue must experience pleasure (*ἡδονή*), which is, therefore, not the same as, but the sequel to or concomitant of eudaemonia. Subsequent thinkers have to a greater or less degree identified the two ideas, and much confusion has resulted. Among the ancients the Epicureans expressed all eudaemonia in terms of pleasure. On the other hand attempts have been made to separate hedonism, as the search for a continuous series of physical pleasures, from eudaemonism, a condition of enduring mental satisfaction. Such a distinction involves the assumptions that bodily pleasures are generically different from mental ones, and that there is in practice a clearly marked dividing line,—both of which hypotheses are frequently denied. Among modern writers, James Seth (*Ethical Princ.*, 1894) resumes Aristotle's position, and places Eudaemonism as the mean between the Ethics of Sensibility (hedonism) and the Ethics of Rationality, each of which overlooks the complex character of human life. The fundametal difficulty which confronts those who would distinguish between pleasure and eudaemonia is that all pleasure is ultimately a mental phenomenon, whether it be roused by food, music, doing a moral action or committing a theft. There is a marked disposition on the part of critics of hedonism to confuse "pleasure" with animal pleasure or "passion,"—in other words, with a pleasure phenomenon in which the predominant feature is entire lack of self-control, whereas the word "pleasure" has strictly no such connotation. Pleasure is strictly nothing more than the state of being pleased, and hedonism the theory that man's chief good consists in acting in such a way as to bring about a continuous succession of such states. That they are in some cases produced by physical or sensory stimuli does not constitute them irrational, and it is purely arbitrary to confine the word pleasure to those cases in which such stimuli are the proximate causes. The value of the term Eudaemonism as an antithesis to Hedonism is thus very questionable.

EUDOCIA AUGUSTA (*c.* 401–*c.* 460), the wife of Theodosius II., East Roman emperor, was born in Athens, the daughter of the sophist Leontius, from whom she received a thorough training in literature and rhetoric. Deprived of her small patrimony by her brothers' rapacity, she betook herself to Constantinople to obtain redress at court. Her accomplishments attracted Theodosius' sister Pulcheria, who took her into her retinue and destined her to be the emperor's wife. After receiving baptism and discarding her former name, Athenaïs, for that of Aelia Licinia Eudocia, she was married to Theodosius in 421; two years later, after the birth of a daughter, she received the title Augusta. The new empress repaid her brothers by making them consuls and prefects, and used her large influence at court to protect pagans and Jews. In 438–439 she made an ostentatious pilgrimage to Jerusalem, whence she brought back several precious relics; during her stay at Antioch she harangued the senate in Hellenic style and distributed funds for the repair of its buildings. On her return her position was undermined by the jealousy of Pulcheria and the groundless suspicion of an intrigue with her protégé Paulinus, the master of the offices. After the latter's execution (440) she retired to Jerusalem, where she was made responsible for the murder of an officer sent to kill two of her followers and stripped of her revenues. Nevertheless she retained great influence; although involved in the revolt of the Syrian monophysites (453), she was ultimately reconciled to Pulcheria and readmitted into the orthodox church. She died at Jerusalem about 460, after devoting her last years to literature. Among her works were a paraphrase of the Octateuch in hexameters, a paraphrase of the books of Daniel and Zechariah, a poem on St Cyprian and on her husband's Persian victories. A *Passion History* compiled out of Homeric verses, which Zonaras attributed to Eudocia, is perhaps of different authorship.

See W. Wiegand, *Eudokia* (Worms, 1871); F. Gregorovius, *Athenaïs* (Leipzig, 1892); C. Diehl, *Figures byzantines* (Paris, 1906), pp. 25-49; also Theodosius. On her works cf. A. Ludwich, *Eudociae Augustae carminum reliquiae* (Königsberg, 1893).

EUDOCIA MACREMBOLITISSA (*c.* 1021–1096), daughter of John Macrembolites, was the wife of the Byzantine emperor Constantine X., and after his death (1067) of Romanus IV. She had sworn to her first husband on his deathbed not to marry again, and had even imprisoned and exiled Romanus, who was suspected of aspiring to the throne. Perceiving, however, that she was not able unaided to avert the invasions which threatened the eastern frontier of the empire, she revoked her oath, married Romanus, and with his assistance dispelled the impending danger. She did not live very happily with her new husband, who was warlike and self-willed, and when he was taken prisoner by the Turks (1071) she was compelled to vacate the throne in favour of her son Michael and retire to a convent, where she died. The dictionary of mythology entitled *Ἰωνιά* ("Collection of Violets"), which formerly used to be ascribed to her, was not composed till 1543 (Constantine Palaeokappa).

See J. Flach, *Die Kaiserin Eudokia Makrembolitissa* (Tübingen, 1876); P. Pulch, *De Eudociae quod fertur Violario* (Strassburg, 1880); and in *Hermes*, xvii. (1882), p. 177 ff.

EUDOXIA LOPUKHINA (1669–1731), tsaritsa, first consort of Peter the Great, was the daughter of the boyarin Theodore Lopukhin. Peter, then a youth of seventeen, married her on the 27th of January 1689 at the command of his mother, who hoped to wean him from the wicked ways of the German suburb of Moscow by wedding him betimes to a lady who was as pious as she was beautiful. The marriage was in every way unfortunate. Accustomed from her infancy to the monastic seclusion of the *terem*, or women's quarter, Eudoxia's mental horizon did not extend much beyond her embroidery-frame or her illuminated service-book. From the first her society bored Peter unspeakably, and after the birth of their second, short-lived son Alexander, he practically deserted her. In 1698 she was unceremoniously sent off to the Pokrovsky monastery at Suzdal for refusing to consent to a divorce, though it was not till June 1699 that she disappeared from the world beneath the hood of sister Elena. In the monastery, however, she was held in high honour by the archimandrite; the nuns persisted in regarding her as the lawful empress; and she was permitted an extraordinary degree of latitude, unknown to Peter, who dragged her from her enforced retreat in 1718 on a charge of adultery. As the evidence was collected by Peter's creatures, it is very doubtful whether Eudoxia was guilty, though she was compelled to make a public confession. She was then divorced and consigned to the remote monastery of Ladoga. Here she remained for ten years till the accession of her grandson, Peter II., when the reactionaries proposed to appoint her regent. She was escorted with great ceremony to Moscow in 1728 and exhibited to the people attired in the splendid, old-fashioned robes of a tsaritsa; but years of rigid seclusion had dulled her wits, and her best friends soon convinced themselves that a convent was a much more suitable place for her than a throne. An allowance of 60,000 roubles a year was accordingly assigned to her, and she disappeared again in a monastery at Moscow, where she died in 1731.

See Robert Nisbet Bain, *Pupils of Peter the Great* (London, 1895), chaps. ii. and iv.; and *The First Romanovs* (London, 1905), chaps. viii. and xii. (R. N. B.)

EUDOXUS, of Cnidus, Greek savant, flourished about the middle of the 4th century B.C. It is chiefly as an astronomer that his name has come down to us (see ASTRONOMY and ZODIAC). From a life by Diogenes Laërtius, we learn that he studied at Athens under Plato, but, being dismissed, passed over into Egypt, where he remained for sixteen months with the priests of Heliopolis. He then taught physics in Cyzicus and the Propontis, and subsequently, accompanied by a number of pupils, went to Athens. Towards the end of his life he returned to his native place, where he died. Strabo states that he discovered that the solar year is longer than 365 days by 6 hours; Vitruvius that he invented a sun-dial. The *Phaenomena* of Aratus is a poetical account of the astronomical observations of Eudoxus. Several works have been attributed to him, but they are all lost; some fragments are preserved in the extant *Τῶν Ἀράτου καὶ Εὐδόξου φαινομένων ἐξηγήσεων βιβλία τρία* of the astronomer Hipparchus (ed. C. Manitius, 1894). According to Aristotle (*Ethics* x. 2), Eudoxus held that pleasure was the chief good, because (1) all beings sought it and endeavoured to escape its contrary, pain; (2) it is an end in itself, not a relative good. Aristotle, who speaks highly of the sincerity of Eudoxus's convictions, while giving a qualified approval to his arguments, considers him wrong in not distinguishing the different kinds of pleasure and in making pleasure the *summum bonum*.

See J. A. Letronne, *Sur les écrites et les travaux d'Eudoxe de Cnide, d'après L. Ideler* (1841); G. V. Schiaparelli, *Le Sfere omocentriche di Eudosso* (Milan, 1876); T. H. Martin in *Académie des inscriptions*, 3rd of October, 1879; article in Ersch and Gruber's *Allgemeine Encyklopädie*.

EUDOXUS, of Cyzicus, Greek navigator, flourished about 130 B.C. He was employed by Ptolemy Euergetes, who sent out a fleet under him to explore the Arabian Sea. After two successful voyages, Eudoxus left the Egyptian service, and proceeded to Cadiz with the object of fitting out an expedition for the purpose of African discovery; and we learn from Strabo, who utilized the results of his observations, that the veteran explorer made at least two voyages southward along the coast of Africa.

There is a good account of Eudoxus in E. H. Bunbury, *History of Ancient Geography*, ii. (1879); see also P. Gaffarel, *Eudoxe de Cyzique* (1873).

EUGENE OF SAVOY [FRANÇOIS EUGÈNE], PRINCE (1663–1736), fifth son of Prince Eugene Maurice of Savoy-Carignano, count of Soissons, and of Olympia Mancini, niece of Cardinal Mazarin, was born at Paris on the 18th of October 1663. Originally destined for the church, Eugene was known at court as the *petit abbé*, but his own predilection was strongly for the army. His mother, however, had fallen into disgrace at court, and his application for a commission, repeated more than once, was refused by Louis XIV. This, and the influence of his mother, produced in him a lifelong resentment against the king. Having quitted France in disgust, he proceeded to Vienna, where his relative the emperor Leopold I. received him kindly, and he served with the Austrian army during the campaign of 1683 against the Turks. He displayed his bravery in a cavalry fight at Petronell (7th July) and in the great battle for the relief of Vienna. The emperor now gave him the command of a regiment of dragoons. At the capture of Buda in 1686 he received a wound (3rd August), but he continued to serve up to the siege of Belgrade in 1688, in which he was dangerously wounded. At the instigation of Louvois, a decree of banishment from France was now issued against all Frenchmen who should continue to serve in foreign armies. "The king will see me again," was Eugene's reply when the news was communicated to him; he continued his career in foreign service.

Prince Eugene's next employment was in a service that required diplomatic as well as military skill (1689). He was sent by the emperor Leopold to Italy with the view of binding the duke of Savoy to the coalition against France and of co-operating with the Italian and Spanish troops. Later in 1689 he served on the Rhine and was again wounded. He returned to Italy in time to take part in the battle of Staffarda, which resulted in the defeat of the coalition at the hands of the French marshal Catinat; but in the spring of 1691 Prince Eugene, having secured reinforcements, caused the siege of Coni to be raised, took possession of Carmagnola, and in the end completely defeated Catinat. He followed up his success by entering Dauphiné, where he took possession of Embrun and Gap. After another campaign, which was uneventful, the further prosecution of the war was abandoned owing to the defection of the duke of Savoy from the coalition, and Prince Eugene returned to Vienna, where he soon afterwards received the command of the army in Hungary, on the recommendation of the veteran count Rüdiger von Starhemberg, the defender of Vienna in 1683. It was about this time that Louis XIV. secretly offered him the bâton of a marshal of France, with the government of Champagne which his father had held, and also a pension. But Eugene rejected these offers with indignation, and proceeded to operate against the Turks commanded by Kara Mustapha. After some skilful manœuvres, he surprised the enemy (September 11th, 1697) at Zenta, on the Theiss. His attack was vigorous and daring, and the victory was one of the most complete and important ever won by the Austrian arms. Formerly it was often stated that the battle of Zenta was fought against express orders from the court, that Eugene was placed under arrest for violating these orders, and that a proposal to bring him before a council of war was frustrated only by the threatening attitude of the citizens of Vienna. This story, minute in details as it is, is entirely without foundation. After a further period of manœuvres, peace was at length concluded at Karlowitz on the 26th of January 1699.

Two years later he was again in active service in the War of the Spanish Succession (*q.v.*). At the beginning of the year 1701 he was sent into Italy once more to oppose his old antagonist Catinat. He achieved a rapid success, crossing the mountains from Tirol into Italy in spite of almost insurmountable difficulties (*Journal d. militärwissensch. Verein*, No. 5, 1907), forcing the French army, after sustaining several checks, to retire behind the Oglio, where a series of reverses equally unexpected and severe led to the recall of Catinat in disgrace. The incapable duke of Villeroi, who succeeded to the command of which Catinat had been deprived, ventured to attack Eugene at Chiari, and was repulsed with great loss. And this was only the forerunner of more signal reverses; for, in a short time, Villeroi was forced to abandon the whole of the Mantuan territory and to take refuge in Cremona, where he seems to have considered himself secure. By means of a stratagem, however, Eugene penetrated into the city during the night, at the head of 2000 men, and, though he found it impossible to hold the town, succeeded in carrying off Villeroi as a prisoner. But as the duke of Vendôme, a much abler general, replaced the captive, the incursion, daring though it was, proved anything but advantageous to the Austrians. The generalship of his new opponent, and the fact that the French army had been largely reinforced, while reinforcements had not been sent from Vienna, forced Prince Eugene to confine himself to a war of observation. The campaign was terminated by the sanguinary battle of Luzzara, fought on the 1st of August 1702, in which each party claimed the victory. Both armies having gone into winter quarters, Eugene returned to Vienna, where he was appointed president of the council of war. He then set out for Hungary in order to combat the insurgents in that country; but his means proving insufficient, he effected nothing of importance. The collapse of the revolt, however, soon freed the prince for the more important campaign in Bavaria, where, in 1704, he made his first campaign along with Marlborough. Similarity of tastes, views and talents soon established between these two great men a friendship which is rarely to be found amongst military chiefs, and contributed in the fullest measure to the success which the allies obtained. The first and perhaps the most important of these successes was that of Hochstadt or Blenheim (*q.v.*) on the 3rd of August 1704, where the English and imperial troops triumphed over one of the finest armies that France had ever sent into Germany.

But since Prince Eugene had quitted Italy, Vendôme, who commanded the French army in that country, had obtained various successes against the duke of Savoy, who had once more joined Austria. The emperor deemed the crisis so serious that he recalled Eugene and sent him to Italy to the assistance of his ally. Vendôme at first opposed great obstacles to the plan which the prince had formed for carrying succours into Piedmont; but after a variety of marches and counter-marches, in which both commanders displayed signal ability, the two armies met at Cassano (August 16, 1705), where a deadly engagement ensued, and Prince Eugene received two severe wounds which forced him to quit the field. This accident decided the fate of the battle and for the time suspended the prince's march towards Piedmont. Vendôme, however, was recalled, and La Feuillade (who succeeded him) was incapable of long arresting the progress of such a commander as Eugene. After once more passing several rivers in presence of the French army, and executing one of the most skilful and daring marches he had ever performed, the latter appeared before the entrenched camp at Turin, which place the French were now besieging with an army eighty thousand strong. Prince Eugene had only thirty thousand men, but his antagonist the duke of Orleans, though full of zeal and courage, wanted experience, and Marshal Marsin, his *adlatus*, held powers from Louis XIV. which could not fail to produce dissensions in the French headquarters. With equal courage and address, Eugene profited by the misunderstandings between the French generals; and on the 7th of September 1706 he attacked the French army in its entrenchments and gained a victory which decided the fate of Italy. In the heat of the battle Eugene received a wound, and was thrown from his horse. His recompense for this important service was the government of the Milanese, of which he took possession with great pomp on the 16th of April 1707. He was also made lieutenant-general to the emperor Joseph I.

The attempt which he made against Toulon in the course of the same year failed completely, because the invasion of the kingdom of Naples retarded the march of the troops which were to have been employed in it, and this delay afforded Marshal de Tessé time to make good dispositions. Obliged to renounce his project, therefore, the prince went to Vienna, where he was received with great enthusiasm both by the people and by the court. "I am very well satisfied with you," said the emperor, "excepting on one point only, which is, that you expose yourself too much." This monarch immediately despatched Eugene to Holland, and to the different courts of Germany, in order to forward the necessary preparations for the campaign of the following year, 1708 (see Spanish Succession, War of the).

Early in the spring of 1708 the prince proceeded to Flanders, in order to assume the command of the German army which his diplomatic ability had been mainly instrumental in assembling, and to unite his forces with those of Marlborough. The campaign was opened by the victory of Oudenarde (*q.v.*), to which the perfect union of Marlborough and Eugene on the one hand, and the misunderstanding between Vendôme and the duke of Burgundy on the other, seem to have equally contributed. The French immediately abandoned the Low Countries, and, remaining in observation, made no attempt whatever to prevent Eugene's army, covered by that of Marlborough, making the siege of Lille. The French governor, Boufflers, made a glorious defence, and Eugene paid a flattering tribute to his valour in inviting him to prepare the articles of capitulation himself, with the words "I subscribe to everything beforehand, well persuaded that you will not insert anything unworthy of yourself or of me." After this important conquest, Eugene and Marlborough proceeded to the Hague, where they were received in the most flattering manner by the public, by the states-general, and above all, by their esteemed friend the pensionary Heinsius. Negotiations were then opened for peace, but proved fruitless. In 1709 France put forth a supreme effort, and placed Marshal Villars, her best living general, in command. The events of this year were very different to those of previous campaigns, and the bloody battle of Malplaquet (*q.v.*), though a victory for Marlborough and Eugene, led to little result, and this at the cost of enormous losses. The Dutch army, it is said, never recovered from the slaughter of Malplaquet; indeed, the success was so dearly bought that the allies found themselves soon afterwards out of all condition to undertake anything. Their army accordingly went into winter quarters, and Prince Eugene returned to Vienna, whence the emperor almost immediately despatched him to Berlin. From the king of Prussia the prince obtained everything which he had been instructed to require; and having thus fulfilled his mission, he returned into Flanders, where, excepting the capture of Douai, Bethune and Aire, the campaign of 1710 presented nothing remarkable. On the death of the emperor Joseph I. in April 1711, Prince Eugene, in concert with the empress, exerted his utmost endeavours to secure the crown to the archduke, who afterwards ascended the imperial throne under the name of Charles VI. In the same year the changes which had occurred in the policy, or rather the caprice, of Queen Anne, brought about an approximation between England and France, and put an end to the influence which Marlborough had hitherto possessed. When this political revolution became known, Prince Eugene immediately repaired to London, charged with a mission from the emperor to re-establish the credit of his illustrious companion in arms, as well as to re-attach England to the coalition. The mission having proved unsuccessful, the emperor found himself under the necessity of making the campaign of 1712 with the aid of the Dutch alone. The defection of the English, however, did not induce Prince Eugene to abandon his favourite plan of invading France. He resolved, at whatever cost, to penetrate into Champagne; and in order to support his operations by the possession of some important places, he began by making himself master of Quesnoy. But the Dutch, having been surprised and beaten in the lines of Denain, where Prince Eugene had placed them at too great a distance to receive timely support in case of an attack, he was obliged to raise the siege of Landrecies, and to abandon the project which he had so long cherished. This was the last campaign in which Austria acted in conjunction with her allies. Abandoned first by England and then by Holland, the emperor, notwithstanding these desertions, still wished to maintain the war in Germany; but Eugene was unable to relieve either Landau or Freiburg, which were successively obliged to capitulate; and seeing the Empire thus laid open to the armies of France, and even the Austrian hereditary states themselves exposed to invasion, the prince counselled his master to make peace. Sensible of the prudence of this advice, the emperor immediately entrusted Eugene with full powers to negotiate a treaty of peace, which was concluded at Rastadt on the 6th of March 1714. On his return to Vienna, Prince Eugene was employed for a time in political matters, and at this time he exchanged the government of the Milanese for that of the Austrian Netherlands.

It was not long, however, before he was again called on to assume the command of the army in the field. In the spring of 1716 the emperor, having concluded an offensive alliance with Venice against Turkey, appointed Eugene to command the army of Hungary; and at Peterwardein he gained (5th of August 1716) a signal victory over a Turkish army of more than twice his own strength. In recognition of this service to Christendom the pope sent to the victorious general the consecrated hat and sword which the court of Rome was accustomed to bestow upon those who had triumphed over the infidels. Eugene won another victory in this campaign at Temesvár. But the ensuing campaign, that of 1717, was still more remarkable on account of the battle of Belgrade. After having besieged the city for a month Eugene found himself in a most critical, if not hopeless situation. He had to deal not only with the garrison of 30,000 men, but with a relieving army of 200,000, and his own force was only about 40,000 strong. In these circumstances the only possible deliverance was by a bold and decided stroke. Accordingly on the morning of the 16th of August 1717 Prince Eugene ordered a general attack, which resulted in the total defeat of the enemy with an enormous loss, and in the capitulation of the city six days afterwards. The prince was wounded in the heat of the action, this being the thirteenth time that he had been hit upon the field of battle. On his return to Vienna he received, among other testimonies of gratitude, a sword valued at 80,000 florins from the emperor. The popular song "Prinz Eugen, der edle Ritter," commemorates the victory of Belgrade. In the following year, 1718, after some fruitless negotiations with a view to the conclusion of peace, he again took the field; but the treaty of Passarowitz (July 21, 1718) put an end to hostilities at the moment when the prince had well-founded hopes of obtaining still more important successes than those of the last campaign, and even of reaching Constantinople, and dictating a peace on the shores of the Bosporus.

As the government of the Netherlands, up to 1724 held by Eugene, had now for some reason been bestowed on a sister of the emperor, the prince was appointed vicar-general of Italy, with a pension of 300,000 florins. Though still retaining his official position and much of his influence at court, his personal relations with the emperor were not so cordial as before, and he suffered from the intrigues of the Spanish or anti-German party. The most remarkable of these political intrigues was the conspiracy of Tedeschi and Nimptsch against the prince in 1719. On discovering this the prince went to the emperor and threatened to lay down all his offices if the conspirators were not punished, and after some resistance he achieved his purpose. During the years of peace between the treaty of Passarowitz and the War of the Polish Succession, Eugene occupied himself with the arts and with literature, to which he had hitherto been able to devote little of his time. This new interest led him to correspond with many of the most eminent men in Europe. But the contest which arose out of the succession of Augustus II. to the throne of Poland having afforded Austria a pretext for attacking France, war was resolved on, contrary to the advice of Eugene (1734). In spite of this, however, he was appointed to command the army destined to act upon the Rhine, which from the commencement had very superior forces opposed to it; and if it could not prevent the capture of Philipsburg after a long siege, it at least prevented the enemy from entering Bavaria. Prince Eugene, having now attained his seventy-first year, no longer possessed the vigour and activity necessary for a general in the field, and he welcomed the peace which was concluded on the 3rd of October 1735. On his return to Vienna his health declined more and more, and he died in that capital on the 21st of April 1736, leaving an immense inheritance to his niece, the princess Victoria of Savoy.

Of a character cold and severe, Prince Eugene had almost no other passion than that of glory. He died unmarried, and seemed so little susceptible to female influence that he was styled a Mars without a Venus. That he was one of the great captains of history is universally admitted. He was strangely unlike the commanders of his time in many respects, though as a matter of course he was, when he saw fit to follow the accepted rules, equal to any in careful and methodical strategy. The special characteristics of his generalship were imagination, fiery energy, and a tactical resolution which was rare indeed in the 18th century. Despising the lives of his soldiers as much as he exposed his own, it was always by persevering efforts and great sacrifices that he obtained victory. His almost invariable success raised the reputation of the Austrian army to a point which it never reached either before or since his day. War was with him a passion. Always on the march, in camps, or on the field of battle during more than fifty years, and under the reigns of three emperors, he had scarcely passed two years together without fighting. Yet his political activity was not inconsiderable, and his advice was always sound and well-considered; while in his government of the Netherlands, which he exercised through the marquis de Prié, he set himself resolutely to oppose the many wild schemes, such as Law's Mississippi project, in which the times were so fertile. His interest in literature and art has been alluded to above. His palace in Vienna, and the Belvedere near that city, his library, and his collection of paintings, were renowned. Prince Eugene was a man of the middle size, but, upon the whole, well made; the cast of his visage was somewhat long, his mouth moderate and almost always open; his eyes were black and animated, and his complexion such as became a warrior.

See A. v. Arneth, *Prinz Eugen* (3 vols., Vienna, 1858; 2nd ed., 1864); H. v. Sybel, *Prinz Eugen von Savoyen* (Munich, 1868); Austrian official history, *Feldzüge des Prinzen Eugen von Savoyen* (Vienna, 1876); Malleson, *Prince Eugene* (London, 1888); Heller, *Militärische Korrespondenz des Prinzen Eugens* (Vienna, 1848); Keym, *Prinz Eugen* (Freiburg, 1899); *Österr. militärische Zeitschrift* ("Streffleur"); Ridler's *Österr. Archiv für Geschichte* (1831–1833); *Archivio storico Italico*, vol. 17; *Mitteil. des Instituts für österr. Geschichtsforschung*, vol. 13.

The political memoirs attributed to Prince Eugene (ed. Sartori, Tübingen, 1812) are spurious; see Böhm, *Die Sammlung der hinterlassenen politischen Schriften des Prinzen Eugens* (Freiburg, 1900).

EUGENE, a city and the county-seat of Lane county, Oregon, U.S.A., on the Willamette river, at the head of navigation, about 125 m. S. of Portland. Pop. (1900) 3236, of whom 237 were foreign-born; (1910 Federal census) 9009. Eugene is served by the Southern Pacific railroad and by interurban electric railway. It is situated on the edge of a broad and fertile prairie, at the foot of a ridge of low hills and within view of the peaks of the Coast Range; the streets are pleasantly shaded with Oregon maples. The city is most widely known as the seat of the University of Oregon. This institution, opened in 1876 and having 95 instructors and 734 students in 1907–1908, occupies eight buildings on a grassy slope along the river bank, and embraces a college of literature, science and the arts, a college of engineering, a graduate school, and (at Portland) a school of law and a school of medicine. In the city is the Eugene Divinity School of the Disciples of Christ, opened in 1895. Eugene is the commercial centre of an extensive agricultural district; does a large business in grain, fruit, hops, cattle, wool and lumber; and has various manufactures, including flour, lumber, woollen goods and canned fruit. Eugene was settled in 1854, and was first incorporated in 1864.

EUGENICS (from the Gr. *εὐγενής*, well born), the modern name given to the science which deals with the influences which improve the inborn qualities of a race, but more particularly with those which develop them to the utmost advantage, and which generally serves to disseminate knowledge and encourage action in the direction of perpetuating a higher racial standard. The founder of this science may be said to be Sir Francis Galton (*q.v.*), who has done much to further its study, not only by his writings, but by the establishment of a research fellowship and scholarship in eugenics in the university of London. The aim of the science as laid down by Galton is to bring as many influences as can reasonably be employed, to cause the useful classes in the community to contribute *more* than their proportion to the next generation. It can hardly be said that the science has advanced beyond the stage of disseminating a knowledge of the laws of heredity, so far as they are surely known, and endeavouring to promote their further study. Useful work has been done in the compilation of statistics of the various conditions affecting the science, such as the rates with which the various classes of society in ancient and modern nations have contributed in civic usefulness to the population at various times, the inheritance of ability, the influences which affect marriage, &c.

Works by Galton bearing on eugenics are: *Hereditary Genius* (2nd ed., 1892), *Human Faculty* (1883), *Natural Inheritance* (1889), *Huxley Lecture of the Anthropol. Inst. on the Possible Improvement of the Human Breed under the existing Conditions of Law and Sentiment* (1901); see also *Biometrika* (a journal for the statistical study of biological problems, of which the first volume was published in 1902).

EUGÉNIE [MARIE-EUGÉNIE-IGNACE-AUGUSTINE DE MONTIJO] (1826-   ), wife of Napoleon III., emperor of the French, daughter of Don Cipriano Guzman y Porto Carrero, count of Teba, subsequently count of Montijo and grandee of Spain, was born at Grenada on the 5th of May 1826. Her mother was a daughter of William Kirkpatrick, United States consul at Malaga, a Scotsman by birth and an American by nationality. Her childhood was spent in Madrid, but after 1834 she lived with her mother and sister chiefly in Paris, where she was educated, like so many French girls of good family, in the convent of the Sacré Cœur. When Louis Napoleon became president of the Republic she appeared frequently with her mother at the balls given by the prince president at the Elysée, and it was here that she made the acquaintance of her future husband. In November 1852 mother and daughter were invited to Fontainebleau, and in the picturesque hunting parties the beautiful young Spaniard, who showed herself an expert horsewoman, was greatly admired by all present and by the host in particular. Three weeks later, on the 2nd of December, the Empire was formally proclaimed, and during a series of fêtes at Compiègne, which lasted eleven days (19th to 30th December), the emperor became more and more fascinated. On New Year's Eve, at a ball at the Tuileries, Mdlle de Montijo, who had necessarily excited much jealousy and hostility in the female world, had reason to complain that she had been insulted by the wife of an official personage. On hearing of it the emperor said to her, "Je vous vengerai"; and within three days he made a formal proposal of marriage. In a speech from the throne on the 22nd of January he formally announced his engagement, and justified what some people considered a mésalliance. "I have preferred," he said, "a woman whom I love and respect to a woman unknown to me, with whom an alliance would have had advantages mixed with sacrifices." Of her whom he had chosen he ventured to make a prediction: "Endowed with all the qualities of the soul, she will be the ornament of the throne, and in the day of danger she will become one of its courageous supports." The marriage was celebrated with great pomp at Notre Dame on the 30th of January 1853. On the 16th of March 1856 the empress gave birth to a son, who received the title of Prince Imperial. The emperor's prediction regarding her was not belied by events. By her beauty, elegance and charm of manner she contributed largely to the brilliancy of the imperial régime, and when the end came, she was, as the official *Enquête* made by her enemies proved, one of the very few who showed calmness and courage in face of the rising tide of revolution. The empress acted three times as regent during the absence of the emperor,—in 1859, 1865 and 1870,—and she was generally consulted on important questions. When the emperor vacillated between two lines of policy she generally urged on him the bolder course; she deprecated everything tending to diminish the temporal power of the papacy, and she disapproved of the emperor's liberal policy at the close of his reign. On the collapse of the Empire she fled to England, and settled with the emperor and her son at Chislehurst. After the emperor's death she removed to Farnborough, where she built a mausoleum to his memory. In 1879 her son was killed in the Zulu War, and in the following year she visited the spot and brought back the body to be interred beside that of his father. At Farnborough, and in a villa she built at Cap Martin on the Riviera, she continued to live in retirement, following closely the course of events, but abstaining from all interference in French politics.

EUGENIUS, the name of four popes.

EUGENIUS I., pope from 654 to 657. Elected on the banishment of Martin I. by the emperor Constans II., and at the height of the Monothelite crisis, he showed greater deference than his predecessor to the emperor's wishes, and made no public stand against the patriarchs of Constantinople. He, however, held no communication with them, being closely watched in this respect by Roman opinion.

EUGENIUS II., pope, was a native of Rome, and was chosen to succeed Pascal I. in 824. His election did not take place without difficulty. Eugenius was the candidate of the nobles, and the clerical faction brought forward a competitor. But the monk Wala, the representative of the emperor Lothair, succeeded in arranging matters, and Eugenius was elected. Lothair, however, came to Rome in person, and took advantage of this opportunity to redress many abuses in the papal administration, to vest the election of the pope in the nobles, and to confirm the statute that no pope should be consecrated until his election had the approval of the emperor. A council which assembled at Rome during the reign of Eugenius passed several enactments for the restoration of church discipline, took measures for the foundation of schools and chapters, and decided against priests wearing a secular dress or engaging in secular occupations. Eugenius also adopted various provisions for the care of the poor and of widows and orphans. He died in 827. (L. D.*)

EUGENIUS III. (Bernardo Paganelli), pope from the 15th of February 1145 to the 8th of July 1153, a native of Pisa, was abbot of the Cistercian monastery of St Anastasius at Rome when suddenly elected to succeed Lucius II. His friend and instructor, Bernard of Clairvaux, the most influential ecclesiastic of the time, remonstrated against his election on account of his "innocence and simplicity," but Bernard soon acquiesced and continued to be the mainstay of the papacy throughout Eugenius's pontificate. It was to Eugenius that Bernard addressed his famous work *De consideratione*. Immediately after his election, the Roman senators demanded the pope's renunciation of temporal power. He refused and fled to Farfa, where he was consecrated on the 17th of February. By treaty of December 1145 he recognized the republic under his suzerainty, substituted a papal prefect for the "patrician" and returned to Rome. The celebrated schismatic, Arnold of Brescia, however, put himself again at the head of the party opposed to the temporal power of the papacy, re-established the patricianate, and forced the pope to leave Rome. Eugenius had already, on hearing of the fall of Edessa, addressed a letter to Louis VII. of France (December 1145), announcing the Second Crusade and granting plenary indulgence under the usual conditions to those who would take the cross; and in January 1147 he journeyed to France to further preparations for the holy war and to seek aid in the constant feuds at Rome. After holding synods at Paris, Reims and Trier, he returned to Italy in June 1148 and took up his residence at Viterbo. The following month he excommunicated Arnold of Brescia in a synod at Cremona, and thenceforth devoted most of his energies to the recovery of his see. As the result of negotiations between Frederick Barbarossa and the Romans, Eugenius was finally enabled to return to Rome in December 1152, but died in the following July. He was succeeded by Anastasius IV. Eugenius retained the stoic virtues of monasticism throughout his stormy career, and was deeply reverenced for his personal character. His tomb in St Peter's acquired fame for miraculous cures, and he was pronounced blessed by Pius IX. in 1872.

The chief sources for the career of Eugenius III. are his letters in J. P. Migne, *Patrol. Lat.*, vols. 106, 180, 182, and in *Bibliothèque de l'École des Chartes*, vol. 57 (Paris, 1896); the life by Cardinal Boso in J. M. Watterich, *Pontif. Roman. vitae*, vol. 2; and the life by John of Salisbury in *Monumenta Germaniae historica. Scriptores*, vol. 20.

See J. Langen, *Geschichte der römischen Kirche von Gregor VII. bis Innocenz III.* (Bonn, 1893); F. Gregorovius, *Rome in the Middle Ages*, vol. 4, trans. by Mrs G. W. Hamilton (London, 1900–1902); K. J. von Hefele, *Conciliengeschichte*, Bd. 5, 2nd ed.; Jaffé-Wattenbach, *Regesta pontif. Roman.* (1885–1888); M. Jocham, *Geschichte des Lebens u. der Verehrung des seligen Papstes Eugen III.* (Augsburg, 1873); G. Sainati, *Vita del beato Eugenio III* (Pisa, 1868); J. Jastrow and G. Winter, *Deutsche Geschichte im Zeitalter der Hohenstaufen*, i. (Stuttgart, 1897); C. Neumann, *Bernhard von Clairvaux u. die Anfänge der zweiten Kreuzzuges* (Heidelberg, 1882); B. Kugler, *Analekten zur Geschichte des zweiten Kreuzzugs* (Tübingen, 1878, 1883). (C. H. Ha.)

Eugenius IV. (Gabriel Condulmieri), pope from the 3rd of March 1431 to the 23rd of February 1447, was born at Venice of a merchant family in 1383. He entered the Celestine order and came into prominence during the pontificate of his uncle, Gregory XII., by whom he was appointed bishop of Siena, papal treasurer, protonotary, cardinal-priest of St Marco e St Clemente, and later cardinal-priest of Sta Maria in Trastevere. His violent measures, as pope, against the relations of his predecessor, Martin V., at once involved him in a serious contest with the powerful house of Colonna. But by far the most important feature of Eugenius's pontificate was the great struggle between pope and council. On the 23rd of July 1431 his legate opened the council of Basel which had been convoked by Martin, but, distrustful of its purposes and moved by the small attendance, the pope issued a bull on the 18th of December 1431, dissolving the council and calling a new one to meet in eighteen months at Bologna. The council refused to dissolve, renewed the revolutionary resolutions by which the council of Constance had been declared superior to the pope, and cited Eugenius to appear at Basel. A compromise was arranged by Sigismund, who had been crowned emperor at Rome on the 31st of May 1433, by which the pope recalled the bull of dissolution, and, reserving the rights of the Holy See, acknowledged the council as ecumenical (15th of December 1433). The establishment of an insurrectionary republic at Rome drove him into exile in May 1434, and, although the city was restored to obedience in the following October, he remained at Florence and Bologna. Meanwhile the struggle with the council broke out anew. Eugenius at length convened a rival council at Ferrara on the 8th of January 1438 and excommunicated the prelates assembled at Basel. The result was that the latter formally deposed him as a heretic on the 25th of June 1439, and in the following November elected the ambitious Amadeus VIII., duke of Savoy, antipope under the title of Felix V. The conduct of France and Germany seemed to warrant this action, for Charles VII. had introduced the decrees of the council of Basel, with slight changes, into the former country through the Pragmatic Sanction of Bourges (7th of July 1438), and the diet of Mainz had deprived the pope of most of his rights in the latter country (26th of March 1439). At Florence, whither the council of Ferrara had been transferred on account of an outbreak of the plague, was effected in July 1439 a union with the Greeks, which, as the result of political necessities, proved but temporary. This union was followed by others of even less stability. Eugenius signed an agreement with the Armenians on the 22nd of November 1439, and with a part of the Jacobites in 1443; and in 1445 he received the Nestorians and Maronites. He did his best to stem the Turkish advance, pledging one-fifth of the papal income to the crusade which set out in 1443, but which met with overwhelming defeat. His rival, Felix V., meanwhile obtained small recognition, and the latter's ablest adviser, Aeneas Sylvius Piccolomini, made peace with Eugenius in 1442. The pope's recognition of the claims to Naples of King Alphonso of Aragon withdrew the last important support from the council of Basel, and enabled him to make a victorious entry into Rome on the 28th of September 1443, after an exile of nearly ten years. His protests against the Pragmatic Sanction of Bourges were ineffectual, but by means of the Concordat of the Princes, negotiated by Piccolomini with the electors in February 1447, the whole of Germany declared against the antipope. Although his pontificate had been so stormy and unhappy that he is said to have regretted on his death-bed that he ever left his monastery, nevertheless Eugenius's victory over the council of Basel and his efforts in behalf of church unity contributed greatly to break down the conciliar movement and restore the papacy to the position it had held before the Great Schism. Eugenius was dignified in demeanour, but inexperienced and vacillating in action and excitable in temper. Bitter in his hatred of heresy, he yet displayed great kindness to the poor. He laboured to reform the monastic orders, especially the Franciscan, and was never guilty of nepotism. Although a type of the austere monk in his private life, he was a sincere friend of art and learning, and in 1431 re-established finally the university at Rome. He died on the 23rd of February 1447, and was succeeded by Nicholas V.

See L. Pastor, *History of the Popes*, vol. i., trans. by F. I. Antrobus (London, 1899); M. Creighton, *History of the Papacy*, vol. 3 (London, 1899); F. Gregorovius, *Rome in the Middle Ages*, vol. 7, trans. by Mrs G. W. Hamilton (London, 1900–1902); K. J. von Hefele, *Conciliengeschichte*, Bd. 7, 2nd ed.; H. H. Milman, *Latin Christianity*, vol. 8 (London, 1896); G. Voigt, *Enea Silvio de Piccolomini*, Bd. 1-3 (Berlin, 1856); *Aus den Annaten-Registern der Päpste Eugen IV., Pius II., Paul II. u. Sixtus IV.*, ed. by K. Hayn (Cologne, 1896). There is an admirable article by Tschackert in Hauck's *Realencyklopädie*, 3rd ed. vol. 5. (C. H. Ha.)

EUGENOL (*allyl guaiacol, eugenic acid*), $C_{10}H_{12}O_2$, an odoriferous principle; it is the chief constituent of oil of cloves, and occurs in many other essential oils. It can be synthetically prepared by the reduction of coniferyl alcohol, $(HO)(CH_3O)C_6H_3{\cdot}CH{:}CH{\cdot}CH_2OH$, which occurs in combination with glucose in the glucoside coniferin, $C_{16}H_{22}O_8$. It is a colourless oil boiling at 247° C., and having a spicy odour. On oxidation with potassium permanganate it gives homovanillin, vanillin, &c.; with chromic acid in acetic acid solution it is converted into carbon dioxide and acetic acid, whilst nitric acid oxidizes it to oxalic acid. By the action of alkalis it is converted into iso-eugenol, which on oxidation yields vanillin, the odorous principle of vanilla (*q.v.*). This transformation of allyl phenols into propenyl phenols is very general (see *Ber.*, 1889, 22, p. 2747; 1890, 23, p. 862). Alkali fusion of eugenol gives protocatechuic acid. The amount of eugenol in oil of cloves can be estimated by acetylation, in presence of pyridine (A. Verley and Fr. Baelsing, *Ber.*, 1901, 34, p. 3359). *Chavibetol*, an isomer of eugenol, occurs in the ethereal oil obtained from *Piper betle*.

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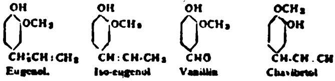

EUHEMERUS [Euemerus, Evemerus], Greek mythographer, born at Messana, in Sicily (others say at Chios, Tegea, or Messene in Peloponnese), flourished about 300 B.C., and lived at the court of Cassander. He is chiefly known by his *Sacred History* (Ἱερὰ ἀναγραφή), a philosophical romance, based upon archaic inscriptions which he claimed to have found during his travels in various parts of Greece. He particularly relies upon an account of early history which he discovered on a golden pillar in a temple on the island of Panchaea when on a voyage round the coast of Arabia, undertaken at the request of Cassander, his friend and patron. There is apparently no doubt that this island is imaginary. In this work he for the first time systematized an old Oriental (perhaps Phoenician) method of interpreting the popular myths, asserting that the gods who formed the chief objects of popular worship had been originally heroes and conquerors, who had thus earned a claim to the veneration of their subjects. This system spread widely, and the early Christians especially appealed to it as a confirmation of their belief that ancient mythology was merely an aggregate of fables of human invention. Euhemerus was a firm upholder of the Cyrenaic philosophy, and by many ancient writers he was regarded as an atheist. His work was translated by Ennius into Latin, but the work itself is lost, and of the translation only a few fragments, and these very short, have come down to us.

This rationalizing method of interpretation is known as Euhemerism. There is no doubt that it contains an element of truth; as among the Romans the gradual deification of ancestors and the apotheosis of emperors were prominent features of religious development, so among primitive peoples it is possible to trace the evolution of family and tribal gods from great chiefs and warriors. All theories of religion which give prominence to ancestor worship and the cult of the dead are to a certain extent Euhemeristic. But as the sole explanation of the origin of the idea of gods it is not accepted by students of comparative religion. It had, however, considerable vogue in France. In the 18th century the abbé Banier, in his *Mythologie et la fable expliquées par l'histoire*, was frankly Euhemeristic; other leading Euhemerists were Clavier, Sainte-Croix, Raoul Rochette, Em. Hoffmann and to a great extent Herbert Spencer.

See Raymond de Block, *Évhémère, son livre et sa doctrine* (Mons, 1876); G. N. Némethy, *Euhemeri relliquiae* (Budapest, 1889); Ganss, *Quaestiones Euhemereae* (Kempen, 1860); Otto Sieroka, *De Euhemero* (1869); Susemihl, *Geschichte der griechischen Litteratur in der Alexandrinerzeit*, vol. i. (Leipzig, 1891); and works on comparative religion and mythology.

EULENSPIEGEL [ULENSPIEGEL], **TILL**, the name of a German folk-hero, and the title of a popular German chapbook on the subject, of the beginning of the 16th century. The oldest existing German text of the book was printed at Strassburg in 1515 (*Ein kurtzweilig lesen von Dyl Vlenspiegel geboren vss dem land zu Brunsswick*), and again in 1519. This is not in the original dialect, which was undoubtedly Low Saxon, but in High German, the translation having been formerly ascribed—but on insufficient evidence—to the Catholic satirist Thomas Murner. Its hero, Till Eulenspiegel or Ulenspiegel, the son of a peasant, was born at Kneitlingen in Brunswick, at the end of the 13th or at the beginning of the 14th century. He died, according to tradition, at Mölln near Lübeck in 1350. The jests and practical jokes ascribed to him were collected—if we may believe a statement in one of the old prints—in 1483; but in any case the edition of 1515 was not even the oldest High German edition. Eulenspiegel himself is locally associated with the Low German area extending from Magdeburg to Hanover, and from Lüneburg to the Harz Mountains. He is the wily peasant who loves to exercise his wit and roguery on the tradespeople of the towns, above all, on the innkeepers; but priests, noblemen, even princes, are also among his victims. His victories are often pointless, more often brutal; he stoops without hesitation to scurrility and obscenity, while of the finer, sharper wit which the humanists and the Italians introduced into the anecdote, he has little or nothing. His jests are coarsely practical, and his satire turns on class distinctions. In fact, this chapbook might be described as the retaliation of the peasant on the townsman who in the 14th and 15th centuries had begun to look down upon the country boor as a natural inferior.

In spite of its essentially Low German character, *Eulenspiegel* was extremely popular in other lands, and, at an early date, was translated into Dutch, French, English, Latin, Danish, Swedish, Bohemian and Polish. In England, "Howleglas" (Scottish, *Holliglas*) was long a familiar figure; his jests were rapidly adapted to English conditions, and appropriated in the collections associated with Robin Goodfellow, Scogan and others. Ben Johnson refers to him as "Howleglass" and "Ulenspiegel" in his *Masque of the Fortunate Isles*, *Poetaster*, *Alchemist* and *Sad Shepherd*, and a verse by Taylor the "water poet" would seem to imply that the "Owliglasse" was a familiar popular type. Till Eulenspiegel's "merry pranks" have been made the subject of a well-known orchestral symphony by Richard Strauss. In France, it may be noted, the name has given rise to the words *espiègle* and *espièglerie*.

The Strassburg edition of 1515 (British Museum) has been reprinted by H. Knust in the *Neudrucke deutscher Literaturwerke des 16. und 17. Jahrh.* No. 55-56 (1885); that of 1519 by J. M. Lappenberg, *Dr Thomas Murners Ulenspiegel* (1854). W. Scherer ("Die Anfänge des Prosaromans in Deutschland," in *Quellen und Forschungen*, vol. xxi., 1877, pp. 28 ff. and 78 ff.) has shown that there must have been a still earlier High German edition. See also C. Walter in *Niederdeutsches Jahrbuch*, xix. (1894), pp. 1 ff. Further editions appeared at Cologne, printed by Servais Kruffter, undated (reproduced in photo-lithography from the two imperfect copies in Berlin and Vienna, 1865); Erfurt, 1532, 1533-1537 and 1538; Cologne, 1539; Strassburg, 1539; Augsburg, 1540 and 1541; Strassburg, 1543; Frankfort on the Main, 1545; Strassburg, 1551; Cologne, 1554, &c. Johann Fischart published an adaptation in verse, *Der Eulenspiegel Reimensweis* (Strassburg, 1571), K. Simrock a modernization in 1864 (2nd ed., 1878); there is also one by K. Pannier in Reclam's *Universalbibliothek* (1883). The earliest translation was that into Dutch, printed by Hoochstraten at Antwerp (Royal Lib., Copenhagen); it is undated, but may have appeared as early as 1512. See facsimile reprint by M. Nijhoff (the Hague, 1898). This served as the basis for the first French version: *Ulenspiegel, de sa vie, de ses œuvres et merveilleuses adventures par luy faictes . . . . nouuellement translate et corrige de Flamant en Francoys* (Paris, 1532). Reprint, edited by P. Jannet (1882). This was followed by upwards of twenty French editions down to the beginning of the 18th century. The latest translation is that by J. C. Delepierre (Bruges, 1835 and 1840). Cf. Prudentius van Duyse, *Étude littéraire sur Tiel l'Espiègle* (Ghent, 1858). The first complete English translation was also made from the Dutch, and bears the title: *Here beginneth a merye Jest of a man called Howleglas*, &c., printed by Copland in three editions, probably between 1548 and 1560. Reprint by F. Ouvry (1867). This, however, was itself merely a reprint of a still older English edition (1518?), of which the British Museum possesses fragments. Reprinted by F. Brie, *Eulenspiegel in England* (1903). In 1720 appeared *The German Rogue, or the Life and Merry Adventures of Tiel Eulenspiegel. Made English from the High-Dutch*; and an English illustrated edition, adapted by K. R. H. Mackenzie in 1880 (2nd ed., 1890). On Eulenspiegel in England, see especially C. H. Herford, *Studies in the Literary Relations of England and Germany in the Sixteenth Century* (1888), pp. 242 ff., and F. Brie's work already referred to. (J. G. R.)

EULER, LEONHARD (1707-1783), Swiss mathematician, was born at Basel on the 15th of April 1707, his father Paul Euler, who had considerable attainments as a mathematician, being Calvinistic pastor of the neighbouring village of Riechen. After receiving preliminary instructions in mathematics from his father, he was sent to the university of Basel, where geometry soon became his favourite study. His mathematical genius gained for him a high place in the esteem of Jean Bernoulli, who was at that time one of the first mathematicians in Europe, as well as of his sons Daniel and Nicolas Bernoulli. Having taken his degree as master of arts in 1723, Euler applied himself, at his father's desire, to the study of theology and the Oriental languages with the view of entering the church, but, with his father's consent, he soon returned to geometry as his principal pursuit. At the same time, by the advice of the younger Bernoullis, who had removed to St Petersburg in 1725, he applied himself to the study of physiology, to which he made a happy application of his mathematical knowledge; and he also attended the medical lectures at Basel. While he was engaged in physiological researches, he composed a dissertation on the nature and propagation of sound, and an answer to a prize question concerning the masting of ships, to which the French Academy of Sciences adjudged the second rank in the year 1727.

In 1727, on the invitation of Catherine I., Euler took up his residence in St Petersburg, and was made an associate of the Academy of Sciences. In 1730 he became professor of physics, and in 1733 he succeeded Daniel Bernoulli in the chair of mathematics. At the commencement of his new career he enriched the academical collection with many memoirs, which excited a noble emulation between him and the Bernoullis, though this did not in any way affect their friendship. It was at this time that he carried the integral calculus to a higher degree of perfection, invented the calculation of sines, reduced analytical operations to a greater simplicity, and threw new light on nearly all parts of pure mathematics. In 1735 a problem proposed by the academy, for the solution of which several eminent mathematicians had demanded the space of some months, was solved by Euler in three days, but the effort threw him into a fever which endangered his life and deprived him of the use of his right eye. The Academy of Sciences at Paris in 1738 adjudged the prize to his memoir on the nature and properties of fire, and in 1740 his treatise on the tides shared the prize with those of Colin Maclaurin and Daniel Bernoulli—a higher honour than if he had carried it away from inferior rivals.

In 1741 Euler accepted the invitation of Frederick the Great to Berlin, where he was made a member of the Academy of Sciences and professor of mathematics. He enriched the last volume of the *Mélanges* or Miscellanies of Berlin with five memoirs, and these were followed, with an astonishing rapidity, by a great number of important researches, which are scattered throughout the annual memoirs of the Prussian Academy. At the same time he continued his philosophical contributions to the Academy of St Petersburg, which granted him a pension in 1742. The respect in which he was held by the Russians was strikingly shown in 1760, when a farm he occupied near Charlottenburg happened to be pillaged by the invading Russian army. On its being ascertained that the farm belonged to Euler, the general immediately ordered compensation to be paid, and the empress Elizabeth sent an additional sum of four thousand crowns.

In 1766 Euler with difficulty obtained permission from the king of Prussia to return to St Petersburg, to which he had been originally invited by Catherine II. Soon after his return to St Petersburg a cataract formed in his left eye, which ultimately deprived him almost entirely of sight. It was in these circumstances that he dictated to his servant, a tailor's apprentice, who was absolutely devoid of mathematical knowledge, his *Anleitung zur Algebra* (1770), a work which, though purely elementary, displays the mathematical genius of its author, and is still reckoned one of the best works of its class. Another task to which he set himself immediately after his return to St Petersburg was the preparation of his *Lettres à une princesse d'Allemagne sur quelques sujets de physique et de philosophie* (3 vols., 1768–1772). They were written at the request of the princess of Anhalt-Dessau, and contain an admirably clear exposition of the principal facts of mechanics, optics, acoustics and physical astronomy. Theory, however, is frequently unsoundly applied in it, and it is to be observed generally that Euler's strength lay rather in pure than in applied mathematics.

In 1755 Euler had been elected a foreign member of the Academy of Sciences at Paris, and some time afterwards the academical prize was adjudged to three of his memoirs *Concerning the Inequalities in the Motions of the Planets.* The two prize-questions proposed by the same academy for 1770 and 1772 were designed to obtain a more perfect theory of the moon's motion. Euler, assisted by his eldest son Johann Albert, was a competitor for these prizes, and obtained both. In the second memoir he reserved for further consideration several inequalities of the moon's motion, which he could not determine in his first theory on account of the complicated calculations in which the method he then employed had engaged him. He afterwards reviewed his whole theory with the assistance of his son and W. L. Krafft and A. J. Lexell, and pursued his researches until he had constructed the new tables, which appeared in his *Theoria motuum lunae* (1772). Instead of confining himself, as before, to the fruitless integration of three differential equations of the second degree, which are furnished by mathematical principles, he reduced them to the three co-ordinates which determine the place of the moon; and he divided into classes all the inequalities of that planet, as far as they depend either on the elongation of the sun and moon, or upon the eccentricity, or the parallax, or the inclination of the lunar orbit. The inherent difficulties of this task were immensely enhanced by the fact that Euler was virtually blind, and had to carry all the elaborate computations it involved in his memory. A further difficulty arose from the burning of his house and the destruction of the greater part of his property in 1771. His manuscripts were fortunately preserved. His own life was only saved by the courage of a native of Basel, Peter Grimmon, who carried him out of the burning house.

Some time after this an operation restored Euler's sight; but a too harsh use of the recovered faculty, along with some carelessness on the part of the surgeons, brought about a relapse. With the assistance of his sons, and of Krafft and Lexell, however, he continued his labours, neither the loss of his sight nor the infirmities of an advanced age being sufficient to check his activity. Having engaged to furnish the Academy of St Petersburg with as many memoirs as would be sufficient to complete its *Acta* for twenty years after his death, he in seven years transmitted to the academy above seventy memoirs, and left above two hundred more, which were revised and completed by another hand.

Euler's knowledge was more general than might have been expected in one who had pursued with such unremitting ardour mathematics and astronomy as his favourite studies. He had made very considerable progress in medical, botanical and chemical science, and he was an excellent classical scholar, and extensively read in general literature. He was much indebted to an uncommon memory, which seemed to retain every idea that was conveyed to it, either from reading or meditation. He could repeat the *Aeneid* of Virgil from the beginning to the end without hesitation, and indicate the first and last line of every page of the edition which he used. Euler's constitution was uncommonly vigorous, and his general health was always good. He was enabled to continue his labours to the very close of his life. His last subject of investigation was the motion of balloons, and the last subject on which he conversed was the newly discovered planet Herschel (Uranus). He died of apoplexy on the 18th of September 1783, whilst he was amusing himself at tea with one of his grandchildren.

Euler's genius was great and his industry still greater. His works, if printed in their completeness, would occupy from 60 to 80 quarto volumes. He was simple and upright in his character, and had a strong religious faith. He was twice married, his second wife being a half-sister of his first, and he had a numerous family, several of whom attained to distinction. His *éloge* was written for the French Academy by the marquis de Condorcet, and an account of his life, with a list of his works, was written by Von Fuss, the secretary to the Imperial Academy of St Petersburg.

The works which Euler published separately are: *Dissertatio physica de sono* (Basel, 1727, in 4to); *Mechanica, sive motus scientia analytice exposita* (St Petersburg, 1736, in 2 vols. 4to); *Einleitung in die Arithmetik* (ibid., 1738, in 2 vols. 8vo), in German and Russian; *Tentamen novae theoriae musicae* (ibid. 1739, in 4to); *Methodus inveniendi lineas curvas, maximi minimive proprietate gaudentes* (Lausanne, 1744, in 4to); *Theoria motuum planetarum et cometarum* (Berlin, 1744, in 4to); *Beantwortung*, &c., or Answers to Different Questions respecting Comets (ibid., 1744, in 8vo); *Neue Grundsätze*, &c., or New Principles of Artillery, translated from the English of Benjamin Robins, with notes and illustrations (ibid., 1745, in 8vo); *Opuscula varii argumenti* (ibid., 1746–1751, in 3 vols. 4to); *Novae et correctae tabulae ad loca lunae computanda* (ibid., 1746, in 4to); *Tabulae astronomicae solis et lunae* (ibid., 4to); *Gedanken*, &c., or Thoughts on the Elements of Bodies (ibid. 4to); *Rettung der göttlichen Offenbarung*, &c., Defence of Divine Revelation against Freethinkers (ibid., 1747, in 4to); *Introductio in analysin infinitorum* (Lausanne, 1748, in 2 vols. 4to); *Scientia navalis, seu tractatus de construendis ac dirigendis navibus* (St Petersburg, 1749, in 2 vols. 4to); *Theoria motus lunae* (Berlin, 1753, in 4to); *Dissertatio de principio minimae actionis, una cum examine objectionum cl. prof. Koenigii* (ibid., 1753, in 8vo); *Institutiones calculi differentialis, cum ejus usu in analysi Infinitorum ac doctrina serierum* (ibid., 1755, in 4to); *Constructio lentium objectivarum*, &c. (St Petersburg, 1762, in 4to); *Theoria motus corporum solidorum seu rigidorum* (Rostock, 1765, in 4to); *Institutiones calculi integralis* (St Petersburg, 1768–1770, in 3 vols. 4to); *Lettres à une Princesse d'Allemagne sur quelques sujets de physique et de philosophie* (St Petersburg, 1768–1772, in 3 vols. 8vo); *Anleitung zur Algebra*, or Introduction to Algebra (ibid., 1770, in 8vo); *Dioptrica* (ibid., 1767–1771, in 3 vols. 4to); *Theoria motuum lunae nova methodo pertractata* (ibid., 1772, in 4to); *Novae tabulae lunares* (ibid., in 8vo); *Théorie complète de la construction et de la manœuvre des vaisseaux* (ibid., 1773, in 8vo); *Éclaircissements sur* *établissements en faveur tant des veuves que des morts*, without a date; *Opuscula analytica* (St Petersburg, 1783–1785, in 2 vols. 4to).

See Rudio, *Leonhard Euler* (Basel, 1884); M. Cantor, *Geschichte der Mathematik*.

EUMENES, the name of two rulers of Pergamum.

1. Eumenes I. succeeded his uncle Philetaerus in 263 B.C. The only important event in his reign was his victory near Sardis over Antiochus Soter, which enabled him to secure possession of the districts round his capital. (See PERGAMUM.)

2. Eumenes II., son of Attalus I., was king of Pergamum from 197–159 B.C. During the greater part of his reign he was a loyal ally of the Romans, who bestowed upon him signal marks of favour. He materially contributed to the defeat of Antiochus of Syria at the battle of Magnesia (190), and as a reward for his services the Thracian Chersonese and all Antiochus's possessions as far as the Taurus were bestowed upon him, including a protectorate of such Greek cities as had not been declared free. In his quarrels with his neighbours the Romans intervened on his behalf, and on the occasion of his visit to Rome to complain of the conduct of Perseus, king of Macedonia, he was received with the greatest distinction. On his return journey he narrowly escaped assassination by the emissaries of Perseus. Although he supported the Romans in the war against Macedonia, he displayed so little energy and interest (even recalling his auxiliaries) that he was suspected of intriguing with the enemy. According to Polybius there was some foundation for the suspicion, but Eumenes declared that he had merely been negotiating for an exchange of prisoners. Nothing, however, came of these negotiations, whatever may have been their real object; and Eumenes, in order to avert suspicion, sent his congratulations to Rome by his brother Attalus after the defeat of Perseus (168). Attalus was received courteously but coldly; and Eumenes in alarm set out to visit Rome in person, but on his arrival at Brundusium was ordered to leave Italy at once. Eumenes never regained the good graces of the Romans, who showed especial favour to Attalus on his second visit to Rome, probably with the object of setting him against Eumenes; but the ties of kinship proved too strong. The last years of his reign were disturbed by renewed hostilities against Prusias of Bithynia and the Celts of Galatia, and probably only his death prevented a war with Rome. Eumenes, although physically weak, was a shrewd and vigorous ruler and politician, who raised his little state from insignificance to a powerful monarchy. During his reign Pergamum became a flourishing city, where men of learning were always welcome, among them Crates of Mallus, the founder of the Pergamene school of criticism. Eumenes adorned the city with splendid buildings, amongst them the great altar with the frieze representing the Battle of the Giants; but the greatest monument of his liberality was the foundation of the library, which was second only to that of Alexandria.

See Livy xxxix. 51, xlii. 11-16; Polybius xxi.-xxxii.; Appian, *Syriaca*; Livy, *Epit.* 46; Cornelius Nepos, *Hannibal*, 10; A. G. van Cappelle, *Commentatio de regibus et antiquitatibus Pergamenis* (Amsterdam, 1841). For the altar of *Zeus*, see PERGAMUM; for treaty with Cretan cities (183 B.C.) see *Monumenti antichi*, xviii. 177.

EUMENES (*c.* 360–316 B.C.), Macedonian general, was a native of Cardia in the Thracian Chersonesus. At a very early age he was employed as private secretary by Philip II. of Macedon, and on the death of that prince, by Alexander, whom he accompanied into Asia. In the division of the empire on Alexander's death, Cappadocia and Paphlagonia were assigned to Eumenes; but as they were not yet subdued, Leonnatus and Antigonus were charged by Perdiccas to put him in possession. Antigonus, however, disregarded the order, and Leonnatus in vain attempted to induce Eumenes to accompany him to Europe and share in his far-reaching designs. Eumenes joined Perdiccas, who installed him in Cappadocia. When Craterus and Antipater, having reduced Greece, determined to pass into Asia and overthrow the power of Perdiccas, their first blow was aimed at Cappadocia. Craterus and Neoptolemus, satrap of Armenia, were completely defeated by Eumenes (321); Neoptolemus was killed, and Craterus died of his wounds. After the murder of Perdiccas in Egypt by his own soldiers, the Macedonian generals condemned Eumenes to death, and charged Antipater and Antigonus with the execution of their order. Eumenes, being defeated through the treachery of one of his officers, fled to Nora, a strong fortress on the confines of Cappadocia and Lycaonia, where he defended himself for more than a year. The death of Antipater (319) produced complications. He left the regency to his friend Polyperchon over the head of his son Cassander, who entered into an alliance with Antigonus and Ptolemy against Polyperchon, supported by Eumenes, who, having escaped from Nora, was threatening Syria and Phoenicia. In 318 Antigonus marched against him, and Eumenes withdrew east to join the satraps of the provinces beyond the Tigris. After two indecisive battles in Iran, Eumenes was betrayed by his own soldiers to Antigonus and put to death. He was an able soldier, who did his utmost to maintain the unity of Alexander's empire in Asia; but his efforts were frustrated by the generals and satraps, who hated and despised the "secretary" and "foreigner."

See Plutarch, *Eumenes*; Cornelius Nepos, *Eumenes*; Diod. Sic. xviii., xix.; Arrian, *Anabasis*, vii.; Quintus Curtius x. 4. 10; Justin xiii. 8; A. Vezin, *Eumenes von Kardia. Ein Beitrag zur Geschichte der Diadochenzeit* (Münster i. W., 1907). Also MACEDONIAN EMPIRE.

EUMENIDES (from Gr. εὐμενής, kindly; εὖ, well, and μένος, disposition), the "kindly ones," a euphemism for the Furies or Erinyes (*q.v.*). They give their name to a famous play by Aeschylus (*q.v.*), written in glorification of the old religion and aristocratic government of Athens, in opposition to the new democracy of the Periclean period.

EUMENIUS (*c.* A.D. 260–311), one of the Roman panegyrists, was born at Augustodunum (*Autun*) in Gallia Lugdunensis. He was of Greek descent; his grandfather, who had migrated from Athens to Rome, finally settled at Autun as a teacher of rhetoric. Eumenius probably took his place, for it was from Autun that he went to be *magister memoriae* (private secretary) to Constantius Chlorus, whom he accompanied on several of his campaigns. In 296 Chlorus determined to restore the famous schools (*scholae Maenianae*) of Autun, which had been greatly damaged by the inroads of the Bagaudae (peasant banditti), and appointed Eumenius to the management of them, allowing him to retain his offices at court and doubling his salary. Eumenius generously gave up a considerable portion of his emoluments to the improvement of the schools. There is no doubt that Eumenius was a heathen, not even a nominal follower of Christianity, like Ausonius and other writers from Gaul. Nothing is known of his later years; but he must have lived at least till 311, if the *Gratiarum Actio* to Constantine is by him. Of the twelve discourses included in the collection of *Panegyrici Latini* (ed. E. Bährens, 1874), the following are probably by Eumenius. (1) *Pro restaurandis* (or *instaurandis*) *scholis*, delivered (297) in the forum at Autun before the governor of the province. Its chief object is to set forth the steps necessary to restore the schools to their former state of efficiency, and the author lays stress upon the fact that he intends to assist the good work out of his own pocket. (2) An address (297) to the Caesar Constantius Chlorus, congratulating him on his victories over Allectus and Carausius in Britain, and containing information of some value as to the British methods of fighting. (3) A panegyric on Constantine (310). (4) An address of thanks (311) from the inhabitants of Autun (whose name had been changed from Augustodunum to Flavia) to Constantine for the remission of taxes and other benefits. (5) A festal address (307) on the marriage of Constantine and Fausta, the daughter of Maximian. All these speeches, with the exception of (1), were delivered at Augusta Trevirorum (Trèves), whose birthday is celebrated in (3). Eumenius is far the best of the orators of his time, and superior to the majority of the writers of imperial panegyrics. He shows greater self-restraint and moderation in his language, which is simple and pure, and on the whole is free from the gross flattery which characterizes such productions. This fault is most conspicuous in (3), which led Heyne (*Opuscula*, vi. 80) to deny the authorship of Eumenius on the ground that it was unworthy of him.

There are treatises on Eumenius by B. Kilian (Würzburg, 1869), S. Brandt (Freiburg im Breisgau, 1882), and H. Sachs (Halle, 1885); see also Gaston Boissier, "Les Rhéteurs gaulois du IVᵉ siècle," in *Journal des savants* (1884).

EUMOLPUS ("sweet singer"), in Greek mythology, son of Poseidon and Chione, the daughter of Boreas, legendary priest, poet and warrior. He finally settled in Thrace, where he became king. During a war between the Eleusinians and Athenians under Erechtheus, he went to the assistance of the former, who on a previous occasion had shown him hospitality, but was slain with his two sons, Phorbas and Immaradus. According to another tradition, Erechtheus and Immaradus lost their lives; the Eleusinians then submitted to Athens on condition that they alone should celebrate the mysteries, and that Eumolpus and the daughters of Celeus should perform the sacrifices. It is asserted by others that Eumolpus with a colony of Thracians laid claim to Attica as having belonged to his father Poseidon (Isocrates, *Panath.* 193). The Eleusinian mysteries were generally considered to have been founded by Eumolpus, the first priest of Demeter, but, according to some, by Eumolpus the son of Musaeus, Eumolpus the Thracian being the father of Keryx, the ancestor of the priestly family of the Kerykes. As priest, Eumolpus purifies Heracles from the murder of the Centaurs; as musician, he instructs him (as well as Linus and Orpheus) in playing the lyre, and is the reputed inventor of vocal accompaniments to the flute. Suidas reckons him one of the early poets and a writer of hymns of consecration, and Diodorus Siculus quotes a line from a Dionysiac hymn attributed to Eumolpus. He is also said to have been the first priest of Dionysus, and to have introduced the cultivation of the vine and fruit trees (Pliny, *Nat. Hist.* vii. 199). His grave was shown at Athens and Eleusis. His descendants, called Eumolpidae, together with the Kerykes, were the hereditary guardians of the mysteries (*q.v.*).

See Apollodorus ii. 5, iii. 15; Pausanias i. 38. 2; Hyginus, *Fab.* 273; Homeric *Hymn to Demeter*, 476; Strabo vii. p. 321; Diod. Sic. i. 11; article "Eumolpidai," by J. A. Hild in Daremberg and Saglio's *Dictionnaire des antiquités*.

EUNAPIUS, Greek sophist and historian, was born at Sardis, A.D. 347. In his native city he studied under his relative the sophist Chrysanthius, and while still a youth went to Athens, where he became a favourite pupil of Proaeresius the rhetorician. He possessed a considerable knowledge of medicine. In his later years he seems to have resided at Athens, teaching rhetoric. Initiated into the Eleusinian mysteries, he was admitted into the college of the Eumolpidae and became hierophant. There is evidence that he was still living in the reign of the younger Theodosius (408–450). Eunapius was the author of two works, one entitled *Lives of the Sophists* (Βίοι φιλοσόφων καὶ σοφιστῶν), and the other consisting of a continuation of the history of Dexippus (*q.v.*). The former work is still extant; of the latter only excerpts remain, but the facts are largely incorporated in the work of Zosimus. It embraced the history of events from A.D. 270–404. The *Lives of the Sophists*, which deals chiefly with the contemporaries of the author, is valuable as the only source for the history of the neo-Platonism of that period. The style of both works is bad, and they are marked by a spirit of bitter hostility to Christianity. Photius (cod. 77) had before him a "new edition" of the history in which the passages most offensive to the Christians were omitted.

Edition of the *Lives* by J. F. Boissonade (1822), with notes by D. Wyttenbach; history fragments in C. W. Müller, *Fragmenta Hist. Graecorum*, iv.; V. Cousin, *Fragments philosophiques* (1865).

EUNOMIUS (d. *c.* 393), one of the leaders of the extreme or "anomoean" Arians, who are sometimes accordingly called Eunomians, was born at Dacora in Cappadocia early in the 4th century. He studied theology at Alexandria under Aetius, and afterwards came under the influence of Eudoxius of Antioch, where he was ordained deacon. On the recommendation of Eudoxius he was appointed bishop of Cyzicus in 360. Here his free utterance of extreme Arian views led to popular complaints, and Eudoxius was compelled, by command of the emperor, Constantius II., to depose him from the bishopric within a year of his elevation to it. During the reigns of Julian and Jovian, Eunomius resided in Constantinople in close intercourse with Aetius, consolidating an heretical party and consecrating schismatical bishops. He then went to live at Chalcedon, whence in 367 he was banished to Mauretania for harbouring the rebel Procopius. He was recalled, however, before he reached his destination. In 383 the emperor Theodosius, who had demanded a declaration of faith from all party leaders, punished Eunomius for continuing to teach his distinctive doctrines, by banishing him to Halmyris in Moesia. He afterwards resided at Chalcedon and at Caesarea in Cappadocia, from which he was expelled by the inhabitants for writing against their bishop Basil. His last days were spent at Dacora his birthplace, where he died about 393. His writings were held in high reputation by his party, and their influence was so much dreaded by the orthodox, that more than one imperial edict was issued for their destruction (*Cod. Theod.* xvi. 34). Consequently his commentary on the epistle to the Romans, mentioned by the historian Socrates, and his epistles, mentioned by Philostorgius and Photius, are no longer extant. His first apologetical work (Ἀπολογητικός), written probably about 360 or 365, has been entirely recovered from the celebrated refutation of it by Basil, and may be found in J. A. Fabricius, *Bibl. Gr.* viii. pp. 262-305. A second apology, written before 379 (Ὑπὲρ ἀπολογίας ἀπολογία), exists only in the quotations given from it in a refutation by Gregory of Nyssa. The exposition of faith (Ἔκθεσις τῆς πίστεως), called forth by the demand of Theodosius, is still extant, and has been edited by Valesius in his notes to Socrates, and by Ch. H. G.. Rettberg in his *Marcelliana*.

The teaching of the Anomoean school, led by Aetius and Eunomius, starting from the conception of God as ὁ ἀγέννητος, argued that between the ἀγέννητος and γέννητος there could be no *essential*, but at best only a *moral*, resemblance. "As the Unbegotten, God is an absolutely simple being; an act of generation would involve a contradiction of His essence by introducing duality into the Godhead." According to Socrates (v. 24), Eunomius carried his views to a practical issue by altering the baptismal formula. Instead of baptizing in the name of the Trinity, he baptized in the name of the Creator and into the death of Christ. This alteration was regarded by the orthodox as so serious that Eunomians on returning to the church were rebaptized, though the Arians were not. The Eunomian heresy was formally condemned by the council of Constantinople in 381. The sect maintained a separate existence for some time, but gradually fell away owing to internal divisions.

See C. R. W. Klose, *Geschichte und Lehre des Eunomius* (Kiel, 1833); F. Loofs in Hauck-Herzog, *Realencyk. für prot. Theol.*; Whiston's *Eunomianismus redivivus* contains an English translation of the first apology. See also ARIUS.

EUNUCH (Gr. εὐνοῦχος), an emasculated male. From remote antiquity among the Orientals, as also at a later period in Greece, eunuchs were employed to take charge of the women, or generally as chamberlains—whence the name *οἱ τὴν εὐνὴν ἔχοντες*, *i.e.* those who have charge of the bed-chamber. Their confidential position in the harems of princes frequently enabled them to exercise an important influence over their royal masters, and even to raise themselves to stations of great trust and power (see HAREM). Hence the term eunuch came to be applied in Egypt to any court officer, whether a *castratus* or not. The common idea that eunuchs are necessarily deficient in courage and in intellectual vigour is amply refuted by history. We are told, for example, by Herodotus that in Persia they were especially prized for their fidelity; and they were frequently promoted to the highest offices. Narses, the famous general under Justinian, was a eunuch, as was also Hermias, governor of Atarnea in Mysia, to whose manes the great Aristotle offered sacrifices, besides celebrating the praises of his patron and friend in a poem (still extant) addressed to *Virtue* (see Lucian's dialogue entitled *Eunuchus*). The capacity of eunuchs for public affairs is strikingly illustrated by the histories of Persia, India and China; and considerable power was exercised by the eunuchs under the later Roman emperors. The hideous trade of castrating boys to be sold as eunuchs for Moslem harems has continued to modern times, the principal district whence they are taken being north-central Africa (Bagirmi, &c.). As the larger proportion of children die after the operation (generally total removal) owing to unskilful surgery, such as recover fetch at least three or four times the ordinary price of slaves. Even more vile, as being practised by a civilized European nation, was the Italian practice of castrating boys to prevent the natural development of the voice, in order to train them as adult soprano singers, such as might formerly be heard in the Sistine chapel. Though such mutilation is a crime punishable with severity, the supply of "soprani" never failed so long as their musical powers were in demand in high quarters. Driven long ago from the Italian stage by public opinion, they remained the musical glory and moral shame of the papal choir till the accession of Pope Leo XIII., one of whose first acts was to get rid of them. Mention must here also be made of the class of voluntary eunuchs, who have emasculated themselves, or caused the operation to be performed on them, for the avoidance of sexual sin or temptation. This unnatural development of asceticism appears in early Christian ages, its votaries acting on the texts Matt. xix. 12, v. 28-30. Origen's case is the most celebrated example, and by the 3rd century there had arisen a sect of eunuchs, of whom Augustine says (*De haeres.* c. 37), "Valesii et seipsos castrant et hospites suos, hoc modo existimantes Deo se debere servire" (see Neander, *History of Chr. Church*, vol. ii. p. 462; Bingham, *Antiq. Chr. Church*, book iv. chap. 3.) Such practices have been always opposed by the general body of the Christian churches, but have not even now ceased. A secret sect of the kind exists in Russia, whose practice of castration is expressed in their name of Skopzi. (E. B. T.)

EUNUCH FLUTE, or ONION FLUTE (Fr. *flûte eunuque*, *flûte à l'onion*, *mirliton*; Ger. *Zwiebelflöte*), a wind instrument in use during the 16th and 17th centuries, producing music akin to the comb-music of the nursery, and still manufactured as a toy (*mirliton*). The onion flute consists of a wooden tube widening out slightly to form a bell. The upper end of the tube is closed by means of a very fine membrane similar to an onion skin stretched across the aperture like the vellum of a drum. The mouthpiece, a simple round hole, is pierced a couple of inches below the membrane; into this hole the performer sings, his voice setting up vibrations in the membrane, which thus intensifies the sound and changes its timbre to a bleating quality. A movable cap fits over the membrane to protect it. Mersenne[1] has given a drawing of the eunuch flute together with a description; he states that the vibrations of the membrane improve the sound of the voice, and by reflecting it, give it an added charm. There were concerts of these flutes in four or five parts in France, adds Mersenne, and they had the advantage over other kinds of reproducing more nearly the sound of the voice.

EUONYMUS, in botany, a genus of deciduous or evergreen shrubs or small trees, widely distributed in the north temperate zone, and represented in Britain by *E. europaeus*, the spindle tree, so called from its hard tough wood being formerly used for spindles. It is a shrub or small tree growing in copses or hedges, with a grey smooth bark, four-angled green twigs, opposite leaves and loose clusters of small greenish-white flowers. The ripe fruit is a pale crimson colour and splits into four lobes exposing the bright orange-coloured seed. *E. japonicus* is a hardy evergreen shrub, often variegated and well known in gardens. The Greek name *εὐώνυμος*, of good name, lucky, is probably a euphemism; the flowering was said to foretell plague.

EUPALINUS, of Megara, a Greek architect, who constructed for the tyrant Polycrates of Samos a remarkable tunnel to bring water to the city, passing under a hill. This aqueduct still exists, and is one of the most remarkable constructions in Greece (see AQUEDUCT: *Greek*).

EUPATORIA (Russ. *Evpatoriya*; also known as *Kozlov* and to the Turks as *Gezlev*), a seaport of Russia, in the government of Taurida, on the W. coast of the Crimea, 20 m. N.W. of Simferopol, on a sandy promontory on the north of Kalamita Bay, in 45° 12′ N. and 33° 40′ E. Pop. (1871) 8294; (1897) 17,915. This number includes many Jews, the Karaite sect having here their principal synagogue. Here too resides the spiritual head (*gakham*) of the sect. Of its numerous ecclesiastical buildings three are of interest—the synagogue of the Karaite Jews; one of the mosques, which has fourteen cupolas and is built (1552) after the plan of St Sophia in Constantinople; and the Greek Catholic cathedral (1898). The port or rather roadstead has a sandy bottom, and is exposed to violent storms from the N.E. The trade is principally in cereals, skins, cow-hair, felt, tallow and salt. Eupatoria has some repute as a sea-bathing resort.

According to some authorities it was near this spot that a military post, *Eupatorium*, was established in the 1st century A.D. by Diophantus, the general of Mithradates the Great, king of Pontus. Towards the end of the 15th century the Turks built the fortress of Gezleveh on the present site, and it became the capital of a khanate. It was occupied by the Russians under Marshal Münnich in 1736, and in 1771 by Prince Dolgorukov. Its annexation to Russia took place in 1783. In 1854 the Anglo-French troops were landed in the neighbourhood of Eupatoria, and in February 1855 the town was occupied by the Turkish forces.

EUPATRIDAE (Gr. *εὖ*, well; *πατήρ*, father, *i.e.* "Sons of noble fathers"), the ancient nobility of Attica. Tradition ascribes to Theseus, whom it also regards as the author of the union (*synoecism*) of Attica round Athens as a political centre, the division of the Attic population into three classes, Eupatridae, Geomori and Demiurgi. The lexicographers mention as characteristics of the Eupatridae that they are the autochthonous population, the dwellers in the city, the descendants of the royal stock. It is probable that after the time of the *synoecism* the nobles who had hitherto governed the various independent communities were obliged to reside in Athens, now the seat of government; and at the beginning of Athenian history the noble clans form a class which has the monopoly of political privilege. It is possible that in very early times the Eupatridae were the only full citizens of Athens; for the evidence suggests that they alone belonged to the phratries, and the division into phratries must have covered the whole citizen body. It is indeed just possible that the term may originally have signified "true member of a clan," since membership of a phratry was a characteristic of each clan (*γένος*). It is not probable that the Eupatrid families were all autochthonous, even in the loose sense of that term. Some had no doubt immigrated to Attica when the rest had long been settled there. Traces of this union of immigrants with older inhabitants have been detected in the combination of Zeus Herkeios with Apollo Patroös as the ancient gods of the phratry.

The exact relation of the Eupatridae to the other two classes has been a matter of dispute. It seems probable that the Eupatridae were the governing class, the only recognized nobility, the Geomori the country inhabitants of all ranks, and the Demiurgi the commercial and artisan population. The division attributed to Theseus is always spoken of by ancient authorities as a division of the entire population; but Busolt has recently maintained the view that the three classes represent three elements in the Attic nobility, namely, the city nobility the landed nobility and the commercial nobility, and exclude altogether the mass of the population. At any rate it seems certain from the little we know of the early constitutional history of Athens, that the Eupatridae represent the only nobility that had any political recognition in early times. The political history of the Eupatridae is that of a gradual curtailment of privilege. They were at the height of their power in the period during the limitation of the monarchy. They alone held the two offices, those of polemarch and archon, which were instituted during the 8th century B.C. to restrict the powers of the kings. In 712 B.C. the office of king (*βασιλεύς*) was itself thrown open to all Eupatrids (see ARCHON). They thus had the entire control of the administration, and were the sole dispensers of justice in the state. At this latter privilege, which perhaps formed the strongest bulwark of the authority of the Eupatridae, a severe blow was struck (*c.* 621 B.C.) by the publication of a criminal code by Draco (*q.v.*), which was followed by the more detailed and permanent code of Solon (*c.* 594 B.C.), who further threw open the highest offices to any citizen possessed of a certain amount of landed property (see SOLON), thus putting the claims of the Eupatridae to political influence on a level with those of the wealthier citizens of all classes. The most highly coveted office at this time was not that of Βασιλεύς, which, like that of the *rex sacrorum* in Rome, had been stripped of all save its religious authority, but that of the Archon; soon after the legislation of Solon repeated struggles for this office between the Eupatridae and leading members of the other two classes resulted in a temporary change. Ten archons[1] were appointed, five of whom were to be Eupatridae, three Agroeci (*i.e.* Geomori), and two Demiurgi (Arist. *Ath. Pol.* xiii. 2). This arrangement, though short-lived, is significant of the decay of the political influence of the Eupatridae, and it is not likely that they recovered, even in practice, any real control of the government. By the middle of the 6th century the political influence of birth was at an end.

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[1] *L'Harmonie universelle* (Paris, 1636), livre v. prop. iv. pp. 228-229.

The name Eupatridae survived in historical times, but the Eupatridae were then excluded from the cult of the "Semnae" at Athens, and also held the hereditary office of "expounder of the law" (ἐξηγητής) in connexion with purification from the guilt of murder. The combination of these two characteristics suggests some connexion with the legend of Orestes. Again, Isocrates (xvi. 25) says of Alcibiades that his grandfather was a Eupatrid and his grandmother an Alcmaeonid, which suggests that in the 5th century the Eupatrids were a single clan, like the Alcmaeonids, and that the name had acquired a new signification. A pursuit of these two suggestions has established the probability that this "Eupatrid" clan traced its origin to Orestes, and derived its name from the hero, who was above all a benefactor of his father. The word will well bear this sense in the two passages in which Sophocles (*Electra*, 162, 859) applies it to Orestes; and it is likely enough that after the disappearance of the old Eupatridae as a political corporation, the name was adopted in a different sense, but not without a claim to the distinction inherent in the older sense, by one of the oldest of the clans.

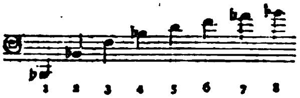
BIBLIOGRAPHY.—G. Busolt, *Die griechischen Staats- und Rechtsaltertümer* (Müller, *Handbuch der klassischen Altertumswissenschaft*, iv. 1), pp. 127 et seq., 155 et seq., 248 (Munich, 1892); G. Gilbert, *Greek Constitutional Antiquities*, p. 101 et seq. (Eng. trans., London, 1895); for Eupatridae in historical times, J. Töpffer, *Attische Genealogie*, p. 175 et seq. (Berlin, 1889). See also the articles AREOPAGUS, ARCHON.

(A. M. CL.)

EUPEN (Fr. *Néau*), a town of Germany, in the Prussian Rhine province, in a beautiful valley at the confluence of the Helle and Vesdre, 9 m. S. of Aix-la-Chapelle by rail. Pop. (1905) 14,297. It is a flourishing commercial place, and besides cloth and buckskin mills it has net and glove manufactories, soapworks, dyeworks, tanneries and breweries, and also carries on a considerable trade in cattle and dairy produce. It has a Protestant and four Roman Catholic churches, a Franciscan monastery, a progymnasium, an orphanage, a hospital, and a chamber of commerce. As part of the duchy of Limburg, Eupen was under the government of Austria until the peace of Lunéville in 1801, when it passed to France. In 1814 it came into the possession of Prussia.

EUPHEMISM (from Gr. εὔφημος, having a sound of good omen; εὖ, well, and φήμη, sound or voice), a figure of speech in which an unpleasant or coarse phrase is replaced by a softer or less offensive expression. A euphemism has sometimes a metaphorical sense, as in the substitution of the word "sleep" for "death."

EUPHONIUM (Fr. *baryton*; Ger. *Tenor Tube*), a modern brass wind instrument, known in military bands as euphonium and in the orchestra as tuba. The euphonium consists of a brass tube with a conical bore of wide calibre ending in a wide-mouthed bell; it is played by means of a cup-shaped mouthpiece. The sound is produced as in the bombardon, which is the bass of the euphonium, by the varied tension of the lips across the mouthpiece, whereby the natural open notes or harmonics, consisting of the series here shown, are obtained.



The intervening notes of the chromatic scale are obtained by means of valves or pistons usually four in number, which by opening a passage into additional lengths of tubing lower the pitch one, half, one-and-a-half, two-and-a-half tones (see BOMBARDON; TUBA; VALVES). The euphonium gives out the fundamental, or first note of the harmonic series, readily, but no harmonic above the eighth. Euphoniums are made in C and in B♭, the latter being more generally used. By means of all the valves used at once, the B♭, an octave below the fundamental, can be reached, giving a compass of four octaves, with chromatic intervals. The bass clef is used in notation. The euphonium is treated by French and German composers as a transposing instrument; in England the real notes are usually written, except when the treble clef is used. The quality of tone is rich and full, harmonizing well with that of the trombone. The euphonium speaks readily in the lower register, but slowly, of course, owing to the long dip of the pistons. Messrs Rudall Carte have removed this difficulty by their patent *short action* pistons, which have but half the dip of the old pistons. On these instruments it is easy to execute rapid passages.

The euphonium is frequently said to be a saxhorn, corresponding to the baryton member of that family, but the statement is misleading. The bombardon and euphonium, like the saxhorns, are the outcome of the application of valves to the bugle family, but there is a radical difference in construction; the tubas (bombardon and euphonium) have a conical bore of sufficiently wide calibre to allow of the production of the fundamental harmonic, which is absent in the saxhorns. The Germans classify brass wind instruments as *whole* and *half*[1] according to whether, having the wide bore of the bugle, the *whole* length of the tube is available and gives the fundamental proper to an organ pipe of the same length or whether by reason of the narrow bore in proportion to the length, only *half* the length of the instrument is of practical utility, the harmonic series beginning with the second harmonic. (See BOMBARDON.) (K. S.)

EUPHORBIA, in botany, a large genus of plants from which the order Euphorbiaceae takes its name. It includes more than 600 species and is of almost world-wide distribution. It is represented in Britain by the spurges—small, generally smooth, herbaceous plants with simple leaves and inconspicuous flowers arranged in small cup-like heads (*cyathia*). The cyathium is a characteristic feature of the genus, and consists of a number of male flowers, each reduced to a single stamen, surrounding a central female flower which consists only of a stalked pistil; the group of flowers is enveloped in a cup formed by the union of four or five bracts, the upper part of which bears thick, conspicuous, gland-like structures, which in exotic species are often brilliantly coloured, giving the cyathium the appearance of a single flower. Another characteristic is the presence of a milky juice, or latex, in the tissues of the plant. In one section of the genus the plants resemble cacti, having a thick succulent stem and branches with the leaves either very small or completely reduced to a small wart-like excrescence, with which is generally associated a tuft of spines (a reduced shoot). These occur in the warmer parts of the world as a type of dry country or desert vegetation. The only species of note are *E. fulgens* and *E. jacquiniaeflora*, for the warm greenhouse; *E. Cyparissias* (the Cypress spurge), *E. Wulfeni*, *E. Lathyris* and *E. Myrsinites*, for the open air.

EUPHORBIACEAE, in botany, a large natural order of flowering plants, containing more than 220 genera with about

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[1] For a discussion of this see ARCHON.

[1] See Dr Schafhäutl's article on "Musical Instruments" in sect. iv. of *Bericht der Beurtheilungs- Commission bei der Allg. deutschen Industrie Ausstellung* (Munich, 1854), pp. 169-170; also Fried. Zamminer, *Die Musik und die Musikinstrumente in ihrer Beziehung zu den Gesetzen der Akustik* (Giessen, 1855).

4000 species, chiefly tropical, but spreading over the whole earth with the exception of the arctic and cold alpine zones. They are represented in Britain by the spurges (*Euphorbia*, q.v.) (fig. 1) and dog's mercury (*Mercurialis*) (fig. 2), which are herbaceous plants, but the greater number are woody plants and often trees. The large genus *Euphorbia* shows great variety in habit; many species, like the English spurges, are annual herbs, others form bushes, while in the desert regions of tropical Africa and the Canary Islands species occur resembling cacti, having thick fleshy stems and leaves reduced to spines. Another large genus, *Phyllanthus*, contains small annual herbs as well as trees, while in some species the leaves are reduced to scales, and the branches are flattened, forming phylloclades. The leaves also show great variety in form and arrangement, being simple and entire as in the English spurges, or deeply cut as in *Ricinus* (castor-oil) (fig. 3), and *Manihot* or sometimes palmately compound (*Hevea*). The majority contain a milky juice or latex in their tissues which exudes on cutting or bruising. In *Hevea*, *Manihot* and others the latex yields caoutchouc. The flowers are unisexual; male and female flowers are borne on the same, as in the spurges (fig. 1), or on different plants, as in dog's mercury (fig. 2). Their arrangement shows considerable variation, but the flowers are generally grouped in crowded definite partial inflorescences, which are themselves arranged in spikes or stand in the axils of the upper leaves. These partial inflorescences are generally unisexual, the male often containing numerous flowers while the female flowers are solitary. The partial inflorescence (*cyathium*) of *Euphorbia* (fig. 1) resembles superficially a hermaphrodite flower. It contains a central terminal flower, consisting of a naked pistil; below this are borne four or five bracts which unite to form a cup-shaped involucre resembling a calyx; each of these bracts subtends a small cyme of male flowers each consisting only of one stamen. Between the segments of the cup are large oval or crescent-shaped glands which are often brightly coloured, forming petal-like structures.

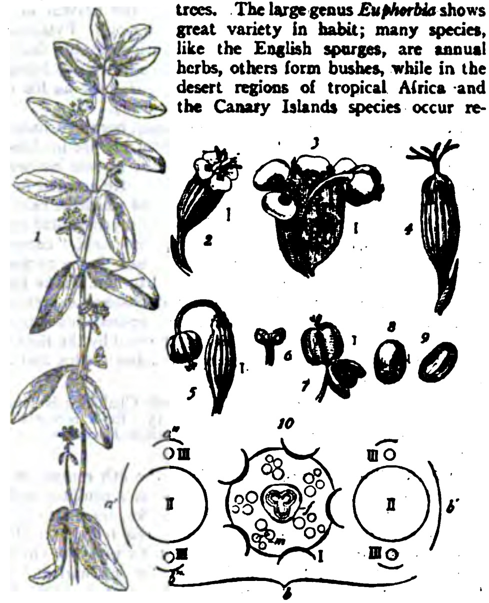


FIG. 1.

1. Shoot of *Euphorbia hypericifolia*. about ½ nat. size.
2. A partial inflorescence, *cyathium*, bearing the petaloid glands.
3. A similar one at a later stage, cut open to show the single-stamened (monandrous) male flowers and the central long-stalked female flower.
4. A cyathium without petaloid glandular appendages.
5. A similar one at a later stage with nearly ripe fruit.
6. An anther dehiscing.
7. Fruit dehiscing and exposing one of the three seeds.
8. Seed.
9. Seed cut lengthwise exposing the embryo.
10. Diagram of the inflorescence of *Euphorbia*, illustrating the dichasial cymose arrangement of the ultimate branches.

b, Bract subtending the central terminal cyathium I.

a'b', Bracteoles of the first order subtending the secondary cyathia II.

a''b''. Bracteoles of the second order subtending the tertiary cyathia III.

In the central cyathium I. are shown the details of the arrangement of the male flowers in monochasial cymes, *m*, and the central female flower, *f*.

The form of the flower shows great variety. The most complete type occurs in *Widandia*, a shrub from the Seychelles Islands, in which the flowers have their parts in fives, a calyx and corolla being succeeded in the male flower by 5 stamens, in the female by 5 carpels. Generally, however, only 3 carpels are present, as in *Euphorbia*; *Mercurialis* (fig. 2) has minute apetalous flowers with 3 sepals, followed in the male by 8 to 20 stamens, in the female by a bicarpellary pistil. In the large tropical genus *Croton* a pentamerous calyx and corolla are generally present, the stamens are often very numerous, and the female flower has three carpels. In *Manihot*, a large tropical American genus to which belongs the manioc or cassava (*M. utilissima*), the calyx is often large and petaloid. In a great many genera the corolla is absent. The most reduced type of flower is that described in EUPHORBIA, where the male consists of one stamen separated from its pedicel by a joint, and the female of a naked tricarpellary pistil. The stamens are sometimes more or less united (monadelphous), and in castor-oil (*Ricinus*) (fig. 3) are much branched. The ovary generally contains three chambers, and bears three simple or more often bipartite styles; each chamber contains one or two pendulous ovules, which generally

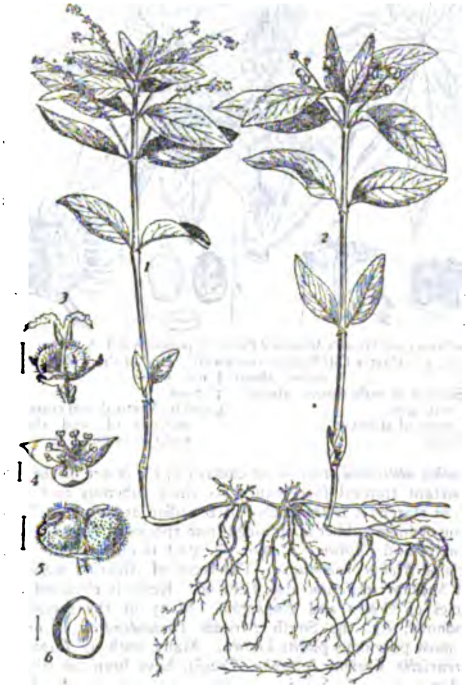


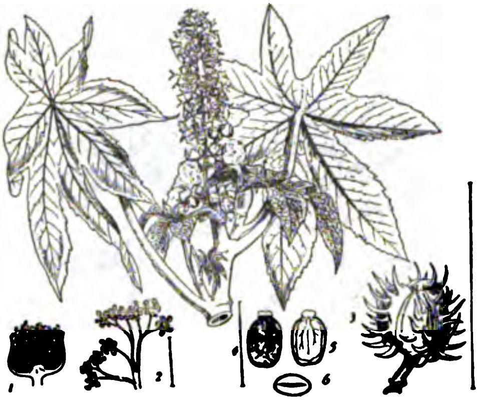
FIG. 2.—Dog's Mercury (*Mercurialis perennis*).

1. Male plant.
2. Female plant.
3. Female flower.
4. Male flower.
5. Fruit beginning to split open.
6. Seed cut lengthwise showing the embryo.

bear a cap-like outgrowth or *caruncle*, which persists in the seed (well shown in castor oil, fig. 3).

As the stamens and pistil are borne by different flowers, cross-fertilization is necessary. In *Mercurialis* and others with inconspicuous flowers pollination is effected by the wind, but in many cases insects are attracted to the flower by the highly-coloured bracts, as in many *Euphorbias* and *Dalechampia*, or by the coloured calyx as in *Manihot*; the presence of honey is also frequently an attraction, as in the honey-glands on the bracts of the cyathium of *Euphorbia*. The fruit is generally a capsule which splits into three divisions (*cocci*), separating from the central column, and splitting lengthwise into two valves. In the mancinil (*Hippomane mancinella*) of Central America the fruit is a drupe like a plum, and in some genera berries occur. In the sandbox tree (*Hura crepitans*) of tropical America the ovary consists of numerous carpels, and forms when mature a capsule which splits with great violence and a loud report into a number of woody cocci. The seeds contain abundant endosperm and a large straight or bent embryo.

Several members of the order are of economic importance.



From Bentley and Trimen's *Medicinal Plants*, by permission of J. & A. Churchill.

FIG. 3.—Castor Oil (*Ricinus communis*). End of shoot with flower-spike; about ⅓ nat. size.

1. Section of male flower, about nat. size.
2. Group of stamens
3. Fruit.
4. Seed.
5 and 6. Vertical and transverse sections of seed showing embryo in position.

Manihot utilissima, manioc or cassava (*q.v.*), is one of the most important tropical food-plants, its thick tuberous root being rich in starch; it is the source of Brazilian arrowroot. Caoutchouc or india-rubber is obtained from species of *Hevea*, *Mabea*, *Manihot* and *Sapium*. Castor oil (*q.v.*) is obtained from the seeds of *Ricinus communis*. The seeds of *Aleurites moluccana* and *Sapium sebiferum* also yield oil. Resin is obtained from species of *Croton* and *Euphorbia*. Many of the species are poisonous; *e.g.* the South African *Toxicodendron* is one of the most poisonous plants known. Many, such as *Euphorbia*, *Mercurialis*, *Croton*, *Jatropha*, *Tragia*, have been, or still are, used as medicines. Species of *Codiaeum* (*q.v.*), *Croton*, *Euphorbia*, *Phyllanthus*, *Jatropha* and others are used as ornamental plants in gardens.

The box (*Buxus*) and a few allied genera which were formerly included in Euphorbiaceae are now generally regarded as forming a distinct order—Buxaceae, differing from Euphorbiaceae in the position of the ovule in the ovary-chamber and in the manner of splitting of the fruit.

EUPHORBIUM, an acrid dull-yellow or brown resin, consisting of the concreted milky juice of several species of *Euphorbia*, cactus-like perennial plants indigenous to Morocco. It dissolves in alcohol, ether and turpentine; in water it is only slightly soluble. It consists of two or more resins and a substance euphorbone, $C_{20}H_{36}O$ or $C_{15}H_{24}O$. Pliny states that the name of the drug was given to it in honour of Euphorbus, the physician of Juba II., king of Mauretania. In former times euphorbium was valued in medicine for its drastic, purgative and emetic properties.

EUPHORBUS, son of Panthoüs, one of the bravest of the Trojan heroes, slain by Menelaus (*Iliad*, xvii. 1-60). Pythagoras, in support of his doctrine of the transmigration of souls, declared that he had once been this Euphorbus, whose shield, hung up in the temple of Argos by Menelaus, he claimed as his own (Horace, *Odes*, i. 28. 11; Diog. Laërt. viii. 1).

EUPHORION, Greek poet and grammarian, born at Chalcis in Euboea about 275 B.C. He spent much of his life in Athens, where he amassed great wealth. About 221 he was invited by Antiochus the Great to the court of Syria. He assisted in the formation of the royal library at Antioch, of which he held the post of librarian till his death. He wrote mythological epics, amatory elegies, epigrams and a satirical poem (Ἀραί, "curses") after the manner of the *Ibis* of Callimachus. Prose works on antiquities and history are also attributed to him. Like Lycophron, he was fond of using archaic and obsolete expressions, and the erudite character of his allusions rendered his language very obscure. His elegies were highly esteemed by the Romans they were imitated or translated by Cornelius Gallus and also by the emperor Tiberius.

Fragments in Meineke, "De Euphorionis Chalcidensis vita et scriptis," in his *Analecta Alexandrina* (1843); for a recently discovered fragment of about 30 lines see *Berliner Klassikertexte*, v. 1 (1907).

EUPHRANOR, of Corinth (middle of the 4th century B.C.), the only Greek artist who excelled both as a sculptor and as a painter. In Pliny we have lists of his works; among the paintings, a cavalry battle, a Theseus, and the feigned madness of Odysseus; among the statues, Paris, Leto with her children Apollo and Artemis, Philip and Alexander in chariots. Unfortunately we are unable among existing statues to identify any which are copies from works of Euphranor (but see a series of attributions by Six in *Jahrbuch*, 1909, 7 foll.). He appears to have resembled his contemporary Lysippus, notably in the attention he paid to symmetry, in his preference for bodily forms slighter than those usual in earlier art, and in his love of heroic subjects. He wrote a treatise on proportions.

EUPHRATES (Babylon. *Purattu*, Heb. *Perath*, Arab. *Frāt* or *Furāt*, Old Pers. *Ufratu*, Gr. Εὐφράτης), the largest river of western Asia. It may be divided into three divisions, upper, lower and middle, each of which is distinguished by special physical features, and has played a conspicuous part in the world's history, retaining to the present day monumental evidence of the races who have lined its banks.

Upper Division.—The upper Euphrates consists of two arms, which, rising on the Armenian plateau, and flowing west in long shallow valleys parallel to Mount Taurus, eventually unite and force their way southward through that range to the level of Mesopotamia. The northern or western and shorter arm, called by the Turks Kara Su, "black water," or Frāt Su (Armenian, *Ephrāt* or *Yephrāt*; Arab. *Nahr el-Furāt* or *Frāt*), well known to occidentalists as the Euphrates, from its having been the boundary of the Roman empire, is regarded also by Orientals as the main stream. It rises in the Dumlu Dagh, N.N.W. of Erzerum, in a large circular pool (altitude, 8625 ft.), which is venerated by Armenians and Moslems, and flows south-east to the plain of Erzerum (5750 ft.). Thence it continues through a narrow valley W.S.W. to Erzingan (3900 ft.), receiving on its way the Ovajik Su (right), the Tuzla Su (left), and the Merjan and Chanduklu (right). Below Erzingan the Frāt flows south-west through a rocky gorge to Kemakh (*Kamacha*; Armenian, *Gamukh*), where it is crossed by a bridge and receives the Kumur Su (right). At Avshin it enters a cañon, with walls over 1000 ft. high, which extends to the bridge at Pingan, and lower down it is joined from the west by the Chalta Irmak (*Lycus*; Arab. *Lūkiya*), on which stands Divrik (Tephrike). Then, entering a deep gorge with lofty rock walls and magnificent scenery, it runs south-east to its junction with the Murad Su. The Frât, separated by the easy pass of Deve-boyûn from the valley of the Araxes (Aras), marks the natural line of communication between northern Persia and the West—a route followed by the nomad Turks, Mongols and Tatars on their way to the rich lands of Asia Minor. It is a rapid river of considerable volume, and below Erzingan is navigable, down stream, for rafts. The southern or eastern and longer arm, called by the Turks Murad Su (*Arsanias Fl.*; Armenian, *Aradsani*; Arab. *Nahr Arsanas*), rises south-west of Diadin, in the northern flank of the Ala Dagh (11,500 ft.), and flows west to the Alashgerd plain. Here it is joined by the Sharian Su from the west, and the two valleys form a great trough through which the caravan road from Erzerum to Persia runs. The united stream breaks through the mountains to the south, and, receiving on its way the Patnotz Su (left) and the Khinis Su (right), flows south-west, west and south, through the rich plain of Bulanik to the plain of Mûsh. Here it is joined by the Kara Su (*Teleboas*), which, rising near Lake Van, runs past Mûsh and waters the plain. The river now runs W.S.W. through a deep rocky gorge, in which it receives the Gunig Su (right), to Palu (where there are cuneiform inscriptions); and continues through more open country to its junction with the Frât Su. About 10 m. E.N E. of Kharpût the Murad is joined by its principal tributary, the Peri Su, which drains the wild mountain district, Dersim, that lies in the loop between the two arms. The Murad Su is of greater volume than the Frât, but its valley below Mûsh is contracted and followed by no great road. Below the junction of the two arms the Euphrates flows south-west past the lead mines of Keban Maden, where it is 120 yds. wide, and is crossed by a ferry (altitude, 2425 ft.), on the Sivas-Kharpût road. It then runs west, south and east round the rock-mass of Musher Dagh, and receives (right) the Kuru Chai, down which the Sivas-Malatia road runs, and the Tokhma Su, from Gorun (*Gauraina*) and Darende. At the ferry on the Malatia-Kharpût road (cuneiform inscription) it flows eastwards in a valley about a quarter of a mile wide, but soon afterwards enters a remarkable gorge, and forces its way through Mount Taurus in a succession of rapids and cataracts. After running south-east through the grandest scenery, and closely approaching the source of the western Tigris, it turns south-west and leaves the mountains a few miles above Samsât (*Samosata*; altitude, 1500 ft.). The general direction of the great gorges of the Euphrates, Pyramus (Jihun) and Sarus (Sihun) seems to indicate that their formation was primarily due to the same terrestrial movements that produced the Jordan-'Araba depression to the south. The length of the Frât is about 275 m.; of the Murad, 415 m.; and of the Euphrates from the junction to Samsât, 115 m.

Middle Division.—The middle division, which extends from Samsât to Hit, is about 720 m. long. In this part of its course the Euphrates runs through an open, treeless and sparsely peopled country, in a valley a few miles wide, which it has eroded in the rocky surface. The valley bed is more or less covered with alluvial soil, and cultivated in places by artificial irrigation. The method of this irrigation is peculiar. Three or four piers or sometimes bridges of masonry are run out into the bed of the river, frequently from both sides at once, raising the level of the stream and thus giving a water power sufficient to turn the gigantic wheel or wheels, sometimes almost 40 ft. in diameter, which lift the water to a trough at the top of the dam, whence it is distributed among the gardens and melon patches, rice, cotton, tobacco, liquorice and durra fields, between the immediate bed of the river and the rocky banks which shut it out from the desert. The wheels, called *naoura*, are of the most primitive construction, made of rough branches of trees, with palm leaf paddles, rude clay vessels being slung on the outer edge to catch the water, of which they raise a prodigious amount, only a comparatively small part of which, however, is poured into the aqueducts on top of the dams. These latter are exceedingly picturesque, often consisting of a series of well-built Gothic arches, and give a peculiar character to the scenery; but they are also great impediments to navigation. In some parts of the river 300 *naouras* have been counted within a space of 130 m., but of late years many have fallen into decay. By far the larger part of the valley is quite uncultivated, and much of it is occupied by tamarisk jungles, the home of countless wild pigs. Where the valley is still cultivated, the *jerd*, a skin raised by oxen, is gradually being substituted for the *naoura*, no more of the latter being constructed to take the place of those which fall into decay.

In this part of its course the rocky sides of the valley, which sometimes closely approach the river, are composed of marls and gypsum, with occasional selenite, overlaid with sandstone, with a topping of breccia or conglomerate, and rise at places to a height of 200 ft. or more. At one point, however, 26 m. above Deir, where lie the ruins of Halebiya, the river breaks through a basaltic dike, el-Ḥamme, some 300 to 500 ft. high. On either side of the river valley a steppe-like desert, covered in the spring with verdure, the rest of the year barren and brown, stretches away as far as the eye can see. Anciently the country on both sides of the Euphrates was habitable as far as the river Khabur; at the present time it is all desert from Birejik downward, the camping ground of Bedouin Arabs, the great tribe of Anazeh occupying *esh-Shâm*, the right bank, and the Shammar the left bank, Mesopotamia of the Romans, now called el-Jezîreh or the island. To these the semi-sedentary Arabs who sparsely cultivate the river valley, dwelling sometimes in huts, sometimes in caves, pay a tribute, called *kubbe*, or brotherhood, as do also the riverain towns and villages, except perhaps the very largest. The Turkish government also levies taxes on the inhabitants of the river valley, and for this purpose, and to maintain a caravan route from the Mediterranean coast to Bagdad, maintains stations of a few *zaptiehs* or *gens d'armes*, at intervals of about 8 hours (caravan time), occupying in general the stations of the old Persian post road. The only riverain towns of any importance on this stretch of the river to-day are Samsât, Birejik, Deir, 'Ana and Hit.

In early times the Euphrates was important as a boundary. It was the theoretical eastern limit of the Jewish kingdom; for a long time it separated Assyria from the Khita or Hittites; it divided the eastern from the western satrapies of Persia (Ezra iv. 17; Neh. ii. 7); and it was at several periods the boundary of the Roman empire. Until the advent of the nomads from central Asia, and the devastation of Mesopotamia and the opposite Syrian shore of the river, there were many flourishing cities along its course, the ruins of which, representing all periods, still dot its banks. Samsât itself represents the ancient Samosata, the capital of the Seleucid kings of Commagene (*Kumukh* of the Assyrian inscriptions), and here the Persian Royal Road from Sardis to Susa is supposed to have crossed the river. Below Samsât the river runs S.W. to Rum-Kaleh, or "castle of the Romans" (Armenian, *Hrhomgla*). At this point was another passage of the river, defended by the castle which gives its name to the spot, and which stands on a high hill overhanging the right bank, its base washed by an abundant stream, the Sanjeh (Gr. Σίγγας), which enters the Euphrates on the west. From this point the river runs rather east of south for about 25 m. past Khalfat (ferry) to Birejik or Bir, the ancient Birtha, where it is only 110 m. from the Mediterranean, the bed of the river being 628½ ft. above that sea. This was the Apamea-Zeugma, where the high road from east to west crossed the river, and it is still one of the most frequented of all the passages into Mesopotamia, being the regular caravan route from Iskanderun and Aleppo to Urfa, Diarbekr and Mosul. From Birejik the river runs sluggishly, first a little to the east, then a little to the west of south, over a sandy or pebbly bed, past Jerablus (? *Europus*, *Carchemish*, the ancient Hittite capital), near which the Sajur (*Sagura*; *Sangar* of the Assyrian inscriptions) enters from the west, to Meskene, 2 m. southward of which are the ruins of Barbalissus (Arab. *Balis*), the former port of Aleppo, now, owing to changes in the bed, some distance from the water. Six miles below this the ruins of Kal'at Dibse mark the site of the ancient Thapsacus (*Tiphsah* of 1 Kings iv. 24), the most important passage of the middle Euphrates, where both Cyrus, on his expedition against his brother, and Alexander the Great crossed that river, and the ancient port of Syria. Here the river turns quite sharply eastward. A day's journey beyond Meskene are the remains of Siffin (Roman *Sephe*), where Moawiya defeated the caliph Ali in 657 (see CALIPHATE), and opposite this, on the west bank, a picturesque ruin called Kal'at Ja'ber (*Dausara*). A day's journey beyond this, on the Syrian side, stand the remains of ancient Sura, a frontier fortress of the Romans against the Parthians; 20 m. S. of which, inland, lie the well-preserved ruins of Reseph (Assyrian, *Resafa* or *Rosafa*). Half a day's journey beyond Sura, on the Mesopotamian side of the river, are the extensive ruins of Haragla (*Heraclea*) and Rakka, once the capital of Harun al-Rashid (*Nicephorium* of Alexander; *Callinicus* of the Seleucids and Romans). Here the Belikh (*Bilechas*) joins the Euphrates, flowing southward through the biblical Aram Naharaim from Urfa (*Edessa*) and Harran (*Carrhae*); and from this point to el-Kaim four days' below Deir, the course of the river is south-easterly. Two days' journey beyond Rakka, where the Euphrates breaks through the basalt dike of el-Hamme, are two admirably preserved ruins, built of gypsum and basalt, that on the Mesopotamian side called Zelebiya (Chanuga), and that on the Syrian, much the finer of the two, Halebiya or Zenobiya, the ancient Zenobia. Twenty-six miles farther down lies the town of Deir (*q.v.*), where the river divides into two channels and the river valley opens out into quite extensive plains. Here the roads from Damascus, by way of Palmyra, and from Mosul, by way of the Khabur, reach the Euphrates, and here there must always have been a town of considerable commercial and strategic importance. The region is to-day covered with ruins and ruin mounds. A little below Deir the river is joined by the Khabur (*Khcboras*, Biblical *Khabor*), the frontier of the Roman empire from Diocletian's time, which rises in the Karaja Dagh, and, with its tributary, the Jaghijagh (*Mygdonius*; Arab. *Hirmas*) flows south through the land of Gozan in which Sargon settled the deported Israelites in 721 B.C. At the mouth of the Khabur stood the Roman frontier fortress of *Circesium* (Assyrian, *Sirki*; Arab. *Kirkessie*) now el-Buseira. The corresponding border town on the Syrian side is represented by the picturesque and finely preserved ruins called Salahiya, the Ad-dalie or Dalie (*Adalia*) of Arabic times, two days below Deir, whose more ancient name is as yet unknown. Between Salahiya and Deir, on an old canal, known in Arabic times as Said, leaving the Euphrates a little below Deir and rejoining it above Salahiya, stand the almost more picturesque ruins of the once important Arabic fortress of Raḥba.

As far as the Khabur Mesopotamia seems to have been a well-inhabited country from at least the 15th century B.C., when it constituted the Hittite kingdom of Mitanni, down to about the 12th century A.D., and the same is true of the country on the Syrian side of the Euphrates as far as the eastern limit of the Palmyrene. Below this point the back country on the Syrian side has always been a complete desert. On the Mesopotamian side there would seem, from the accounts of Xenophon and Ptolemy, to have been an affluent which joined the Euphrates between Deir and 'Ana, called Araxes by the former, Saocoras by the latter; but no trace of such a stream has been found by modern explorers and the country in general has always been uninhabited. Below Salahiya the river-bed narrows and becomes more rocky. A day's journey beyond Salahiya, on a bluff on the Mesopotamian side of the river, are the conspicuous ruins of el-'Irsi (*Corsote?*). Half a day's journey beyond, at a point where two great wadis enter the Euphrates, on the Syrian side, stands Jabriya, an unidentified ruined town of Babylonian type, with walls of unbaked brick, instead of the stone heretofore encountered. At this point the river turns sharply a little north of east, continuing on that course somewhat over 40 m. to 'Ana, where it bends again to the south-east. Just above 'Ana are rapids, and from this point to Hit the river is full of islands, while the bed is for the most part narrow, leaving little cultivable land between it and the bluffs. 'Ana itself, a very ancient town, of Babylonian origin, once sacred probably to the goddess of the same name, lay originally on several islands in the stream, where ruins, principally of the Arabic and late Persian period, are visible. Here palm trees, which had begun to appear singly at Deir, grow in large groves, the olive disappears entirely, and we have definitely passed over from the Syrian to the Babylonian flora and climate. Between 'Ana and Hit there were anciently at least four island cities or fortresses, and at the present time three such towns, insignificant relics of former greatness, Haditha, Alus or el-'Uzz and Jibba still occupy the old sites. Of these Alus is evidently the ancient Auzara or Uzzanesopolis, the city of the old Arabic goddess 'Uzza; Haditha, an important town under the Abbasids, was earlier known as Baia Malcha; while Jibba has not been identified. The fourth city, Thilutha or Olabus, once occupied the present deserted island of Telbeis, half a day's journey below 'Ana. About half-way between 'Ana and Hit, in the neighbourhood of Haditha, the river has a breadth of 300 yds., with a depth of 18 ft., and a flood speed of 4 knots. At this point we begin to encounter sulphur springs and bitter streams redolent with bitumen, a formation which reaches its climax at Hit (*q.v.*), where a small stream (the "river of Ahava" of Ezra viii. 21) enters the Euphrates from the Syrian side, on which, about 8 m. from its mouth, stands the small town of Kubeitha.

The middle Euphrates, from Samsāt to Hit, is to-day an avenue of ruins, of which only the more conspicuous or important have been indicated here. It was from a remote period, antedating certainly 3000 B.C., the highway of empire and of commerce between east and west, more specifically between Babylonia or Irak and Syria, and numerous empires, peoples and civilizations have left their records on its shores. Its time of greatest prosperity and importance was the period of the Abbasid caliphate, and Arabic geographers as late as A.D. 1200 mention an astonishingly large number of important cities situated on its shores or islands. The Mongol invasion, in the latter part of that century, wrought their ruin, however, and from that time to the present there has been a steady decline in the commercial importance of the Euphrates route, and consequently also of the towns along its course, until at the present time it is only an avenue of ruins.

Lower Division.—Hit stands almost at the head of the alluvial deposit, about 550 m. from the Persian Gulf, separated from it by a couple of small spurs of the Syrian plateau, and may be said to mark the beginning of the lower Euphrates. Thence the river flows S.E. and S.S.E. to its junction with the Tigris below Korna, through an unbroken plain, with no natural hills, except a few sand (or sandstone ?) hills in the neighbourhood of Warka, and no trace of rock, except at el-Haswa, above Hillah. At Hit the river is from 30 to 35 ft. in depth, with a breadth of 250 yds., and a current of 4 m. an hour, but from this point it diminishes in volume, receiving no new affluents but dissipating itself in canals and lagoons. At Feluja, in the latitude of Bagdad, the Euphrates and Tigris closely approach each other, and then, widening out, enclose the plain of Babylonia (Arab. *Sawād*). Through this part of its course the current of the river, except where restricted by floating bridges—at Feluja, Mussaib, Hillah, Diwanich and Samawa—does not normally exceed a mile an hour, and both on the main stream and on its canals the *jerd* or ox-bucket takes the place of the *naoura* or water-wheel for purposes of irrigation.

In early times irrigating canals distributed the waters over the plain, and made it one of the richest countries of the East, so that historians report three crops of wheat to have been raised in Babylonia annually. As main arteries for this circulation of water through its system great canals, constituting in reality so many branches of the river, connected all parts of Babylonia, and formed a natural means both of defence and also of transportation from one part of the country to another. The first of these canals, taken off on the right bank of the river a little below Hit, followed the extreme skirt of the alluvium the whole way to the Persian Gulf near Basra, and thus formed an outer barrier, strengthened at intervals with watch-towers and fortified posts, to protect the cultivated land of the *Sawād* against the incursions of the desert Arabs. This gigantic work, the line of which may still be traced throughout its course, was formerly called the *Khandak Sobūr* or "Sapor's trench," being ascribed to the Sassanian king, Shapur I. Dholahtaf, but is now known as the Cherra-Saadeh, and is in the popular tradition said to have been excavated by a man from Basra at the behest of a woman of Hit whom he desired to make his wife. How early this work was begun is not clear, but it would appear to have been at least largely reconstructed in the time of the great Nebuchadrezzar. The next important canal, the Dujayl (Dojail), left the Euphrates on the left, about a league above Ramadiya (*Ar-Rabb*), and flowed into the Tigris between Ukbara and Bagdad. The 'Isa, which is largely identical with the modern Sakhlawiya, left the Euphrates a little below Anbar (*Perisabora*) and joined the Tigris at Bagdad. This canal still carries water and was navigable for steamboats until about 1875. Sarsar, the modern Abu-Ghurayb, leaves the Euphrates three leagues lower down and enters the Tigris between Bagdad and Ctesiphon. The Nahr Malk or royal river, modern Radhwaniya, leaves the Euphrates five leagues below this and joins the Tigris three leagues below Ctesiphon; while the Kutha, modern Habl-Ibrahim, leaving the Euphrates three leagues below the Malk joins the Tigris ten leagues below Ctesiphon. In the time of the Arabs these were the chief canals, and the cuts from the main channels of the Nahr 'Isa, Nahr Sarsar, Nahr Malk (or Nahr Malcha), and Nahr Kutha, reticulating the entire country between the rivers, converted it into a continuous and luxuriant garden.

Just below Mussaïb there has been for all ages a great bifurcation of the river. The right arm was the original bed, and the left arm, on which Babylon was built, the artificial deviation, as is clear from the cuneiform inscriptions. In the time of Alexander the nomenclature was reversed, the right arm being known as Pallacopas. Under the Arabs the old designation again prevailed and the Euphrates is always described by the Arabian geographers as the river which flows direct to Kufa, while the present stream, passing along the ruins of Babylon to Hillah and Diwanieh, has been universally known as the Nahr Sura. Occidental geographers, however, have followed the Greek use, and so to-day we call the river of Babylon or Nahr Sura the Euphrates and the older westerly channel the Hindieh canal. At the present time the preservation of the embankments about the point of bifurcation demands the constant care of the Bagdad government. The object is to allow sufficient water to drain off to the westward for the due irrigation of the land, while the Hillah bed still retains the main volume of the stream, and is navigable to the sea. But it frequently happens that the dam at the head of the Hindieh is carried away, and, a free channel being thus opened for the waters of the river to the westward, the Hillah bed shoals to 2 or 3 ft., or even dries up altogether, while the country to the west of the river is turned into lakes and swamps. Below the bifurcation the river of Babylon was again divided into several streams, and indeed the most famous of all the ancient canals was the Arakhat (*Archous* of the Greeks and *Serrāt* and *Nil* of the Arabs), which left that river just above Babylon and ran due east to the Tigris, irrigating all the central part of the Jezireh, and sending down a branch through Nippur and Erech to rejoin the Euphrates a little above the modern Nasrieh. The Narss, also, the modern Daghara, which is still navigable to Nippur and beyond, left the Sura a little below Hillah; and at the present day another large canal, the Kehr, branches off near Diwanieh. It is easy to distinguish the great primitive watercourses from the lateral ducts which they fed, the latter being almost without banks and merely traceable by the winding curves of the layers of alluvium in the bed, while the former are hedged in by high banks of mud, heaped up during centuries of dredging.

Not a hundredth part of the old irrigation system is now in working order. A few of the mouths of the smaller canals are kept open so as to receive a limited supply of water at the rise of the river in May, which then distributes itself over the lower lying lands in the interior, almost without labour on the part of the cultivators, giving birth in such localities to the most abundant crops, but by far the larger portion of the region between the rivers is at present an arid howling wilderness dotted with *tels* or ruin-heaps, strewn in the most part with broken pottery, the evidence of former habitation, and bearing nothing but the camel-thorn, the wild caper, the colocynth-apple, wormwood and other weeds of the desert. The swamps are full of huge reeds, bordered with tamarisk jungles, and in its lower reaches, where the water stretches out into great marshes, the river is clogged with a growth of agrostis. To obtain a correct idea of this region it must be borne in mind also that the course of the river and the features of the country on both banks are subject to constant fluctuation. The Hindieh canal and the main stream, the ancient Sura, rejoin one another at Samawa. Down to this point, the bed of the Euphrates being higher than that of the Tigris, the canals run from the former to the latter, but below this the situation is reversed. At Nasrieh the Shatt-el-Hai, at one time the bed of the Tigris, and still navigable during the greater part of the year, joins the Euphrates. From this point downward, and to some extent above this as far as Samawa, the river forms a succession of reedy lagoons of the most hopeless character, the Paludes Chaldaici of antiquity, el Batihāt of the Arabs. Along this part of its course the river is apt to be choked with reeds and, except where bordered by lines of palm trees, the channel loses itself in lakes and swamps. The inhabitants of this region are wild and inhospitable and utterly beyond the control of the Turkish authorities, and navigation of the river between Korna and Suk-esh-Sheiukh is unsafe owing to the attacks of armed pirates. From Garmat Ali, where the Tigris and Euphrates at present unite,[1] under the title of Shatt-el-Arab, the river sweeps on to Basra, 1000 yds. in width and from 3 to 5 fathoms deep, navigable for steamers of good size. From Korna to Basra the banks of the river are well cultivated and the date groves almost continuous; indeed this is the greatest date-producing region of the world. Twenty-five miles below Basra the river Karun from Shushter and Dizful throws off an arm, which seems to be artificial, into the Euphrates. This arm is named the Haffār, and at the confluence is situated the Persian town of Muhamrah, a place most conveniently located for trade. In this vicinity was situated, at the time of the Christian era, the Parthian city of Spasini-Charax, which was succeeded by Bahman Ardashir (*Bamishir*) under the Sassanians, and by Moharzi under the Arabs. The left bank of the river from this point belongs to Persia. It consists of an island named Abbadan, about 45 m. long, formed by alluvial deposits during the last fifteen centuries. (For the character of this alluvium and its rate of deposit see IRAK.)

Even more than the upper and middle Euphrates the lower Euphrates, from Hit downward, abounds in ruins of ancient towns and cities, from the earliest prehistoric period onward to the close of the Caliphate (see IRAK). The fact also that many of the most ancient of these ruins, like Ur, Lagash (Sirpurla), Larsa, Erech, Nippur, Sippara and Babylon, were situated on the banks of the great canals would indicate that the control of the waters of the rivers by a system of canalization and irrigation was one of the first achievements of civilization. This ancient system of canalization was inherited from the Persians (who, in turn, inherited it from their predecessors), by the Arabs, who long maintained it in working order, and the astonishing fertility and consequent prosperity of the country watered by the Euphrates, its tributaries and its canals, is noticed by all ancient writers. The land itself, an alluvial deposit, is very fruitful. Wheat and the date palm seem to have been indigenous, and the latter is still one of the chief productions of the country, but in later years rice has taken the place of wheat as the staff of life. The decline of the country dates from the appearance of Turkish nomads in the 11th century; its ruin was completed by the Shammar Arabs in the 17th century; but, if the ancient system of irrigation were restored, sufficient grain could be grown to alter the conditions of the wheat supply of the world. At the present time, instead of the innumerable cities of former days, there is a succession of small towns along the course of the river—Ramadiya, Feluja, Mussaib, Hillah, Diwanieh, Samawa, el-Khudr (an ancient daphne or sacred grove, 31° 11′ 58″ N., 76° 6′ 9″ E., the only one anywhere which preserves to this day its ancient charter of the inviolability of all life within its precincts), Nasrieh and Suk-esh-Sheiukh—by means of which the Turkish government controls the river and levies taxes on a small part of the adjacent territory. At such settlements the river is lined with gardens and plantations of palms. The greater part of the region, however, even along the river shores, is inhabited only by roaming Bedouin or half-savage Ma‘dan Arabs (see IRAK).

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[1] The confluence for about 500 years was at Korna, over 30 m. higher up. Sir W. Willcocks discovered (1909) that from Suk-esh-Sheiukh the Euphrates had formed a new channel through the marshes. (See *Geog. Journal*, Jan. 1910).

Navigation.—The length of the Euphrates from its source at Diadin to the sea is about 1800 m., and its fall during the last 1200 m. about 10 ins. per mile. The river begins to rise in the end of March and attains its greatest height between the 21st and the 28th of May. It is lowest in November, and rocks, shallows, and the remains of old dams then render it almost unnavigable. In antiquity, however, it was evidently in use for the transportation of merchandise and even of armies. Boats built in Syrian ports were placed on the Euphrates by Sennacherib and Alexander, and Herodotus states (i. 185) that in his day the river was a frequented route followed by merchants on their way from the Mediterranean to Babylon. As the most direct line of transit between the Mediterranean and the Persian Gulf, offering an alternative means of communication with India not greatly inferior to the Egyptian route, the Euphrates route early attracted the attention of the British government. During the Napoleonic wars, indeed, and up to the time when the introduction of steam navigation rendered the Red Sea accessible at all seasons of the year, the political correspondence of the home and Indian governments usually passed by the Euphrates route. Various plans were suggested for the development of this route as a means of goods as well as postal conveyance, and in 1835 Colonel F. R. Chesney was sent out at the head of an expedition with instructions to transport two steamers from the Mediterranean to the Euphrates, and, after putting them together at Birejik, to attempt the descent of the river to the sea. One of these steamers was lost in a squall during the passage down the river near el-'Irsi, but the other performed the voyage in safety and thus demonstrated the practicability of the downward navigation. Following on this first experiment, the East India Company, in 1841, proposed to maintain a permanent flotilla on the Tigris and Euphrates, and set two vessels, the "Nitocris" and the "Nimrod," under the command of Captain Campbell of the Indian navy, to attempt the ascent of the latter river. The experiment was so far successful that, with incredible difficulty, the two vessels did actually reach Meskene, but the result of the expedition was to show that practically the river could not be used as a high-road of commerce, the continuous rapids and falls during the low season, caused mainly by the artificial obstructions of the irrigating dams, being insurmountable by ordinary steam power, and the aid of hundreds of hands being thus required to drag the vessels up the stream at those points by main force. Under Midhat Pasha, governor-general of Bagdad from 1866 to 1871, an attempt was made by the Turkish authorities to establish regular steam navigation on the Euphrates. Midhat caused many of the dams to be destroyed and for some years occasional steamers were run between Meskene and Hillah in flood time, from April to August. But with the transfer of Midhat this feeble attempt at navigation was abandoned. At the present time the river is navigated by sailing craft of some size from Hit downward. Above that point there is no navigation except by the native rafts (*kellek*), which descend the river and are broken up on arrival at their point of destination. There is, however, little travel of this sort on the Euphrates in comparison with the amount on the Tigris.

When it became evident that, under present conditions at least, the navigation of the middle Euphrates was impracticable, attention was turned, owing to the peculiarly advantageous geographical position of its valley, to schemes for connecting the Mediterranean and Persian Gulf by railway as an alternative means of communication with India, and various surveys were made for this purpose and various routes laid out. All these schemes, however, fell through either on the financial question, or on the unwillingness of the Turkish government to sanction any line not connected directly with Constantinople. With the acquisition of the Suez Canal, moreover, the value of this route from the British standpoint was so greatly diminished that the scheme, so far as England was concerned, was quite abandoned. (For further notice of the railway question see BAGDAD.)

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EUPHRONIUS, the most noted of the group of great vase-painters, who lived in Athens in the time of the Persian wars, and worked upon red-figured vases (see GREEK ART and CERAMICS). There is a monograph by W. Klein dealing with the artist. As all the great paintings of Greece have disappeared, we are obliged to trust to the designs on vases for our knowledge of Greek drawing and composition. Euphronius is stiff and archaic in style, but his subjects are varied, his groupings original and striking, and his mastery of the line decided. In their way, the vases which he painted will hold their own in comparison with those of any nation; for simplicity, truthfulness and charm they can scarcely be matched.

EUPHROSYNE, the name of two Byzantine empresses.

1. EUPHROSYNE, a daughter of Constantine VI. Although she had taken a monastic vow she became the second wife of Michael II. (*q.v.*), a marriage which was practically forced upon her by Michael, who was anxious to strengthen his claims to the throne by an alliance with the last representative of the Isaurian dynasty, and secured the compliance of senate and patriarch with his desire. No issue was born of this union, and after the death of her husband and accession of her stepson Theophilus Euphrosyne again retired into a convent.

2. EUPHROSYNE, the wife of Alexius III. (*q.v.*). After securing the election of her husband to the throne by wholesale bribery she virtually took the government into her hands and restored the waning influence of the monarchy over the nobles. In spite of her talent for government she went far to hasten the empire's downfall by her unbounded extravagance, and made the dynasty unpopular by her open profligacy, which went unpunished but for one short term of banishment. She followed her husband into exile in 1203 and died seven years later in Epirus.

EUPHUISM, the peculiar mode of speaking and writing brought into fashion in England towards the end of the reign of Elizabeth by the vogue of the fashionable romance of *Euphues*, published in 1578 by John Lyly. As early as 1570 Ascham in his *Schoolmaster* had said that "Euphues" (that is, a man well-endowed by nature, from the Gr. εὖ, φυή, well, growth) is "he that is apt by goodness of wit, and appliable by readiness of will, to learning, having all other qualities of the mind and parts of the body that must another day serve learning." Lyly adopted this word as the name of the hero of his romance, and it is with him that the vogue of Euphuism began. John Lyly, "always averse to the crabbed studies of logic and philosophy, and his genie being naturally bent to the pleasant paths of poetry," devoted himself exclusively to the service of the ladies, a thing absolutely unprecedented in English literature. He addressed himself to "the gentlewomen of England," and he had the audacity, in that grave age, to say that he would rather see his books "lie shut in a lady's casket than open in a scholar's study." In order to attain this object, he set himself to create a superfine style in writing, and to illustrate this in his compositions. He undertook to produce a pleasurable literature for the boudoir and the bower. Lyly was twenty-six when he published in 1579 the first part of *Euphues: the Anatomy of Wit*: a second part, entitled *Euphues and his England*, appeared in 1580. His object was diametrically opposed to that of writers who had striven to instruct, reprove or edify their contemporaries. Lyly, assuming that women only will read his book, says:—"After dinner, you may overlook it to keep you from sleep, or if you be heavy to bring you asleep, for to work upon a full stomach is against physic, and therefore better were it to hold *Euphues* in your hands, though you let him fall when you be willing to wink, than to sew in a closet and prick your fingers when you begin to read."

For a comprehension of the nature of Euphuism it is necessary to remember that the object of its invention was to attract and to disarm the ladies by means of an ingenious and playful style, of high artificiality, which should give them the idea that they were being entertained by an enthusiastic adorer, not instructed by a solemn pedagogue. For fifty years the romance of *Euphues* retained its astonishing popularity. As late as 1632 the publisher Edward Blount (1560?–1632), recalling the earliest enthusiasm of the public, wrote of John Lyly, "Oblivion shall not so trample on a son of the Muses, and such a son as they called their darling. Our nation are in his debt for a new English which he taught them. *Euphues and his England* began first that language. All our ladies were then his scholars, and that beauty in Court, which could not parley Euphuism, was as little regarded, as she which, now there, speaks not French." Among those who applied themselves to this "new English," one of the most ardent was Queen Elizabeth herself, who has been styled by J. R. Green "the most affected and destestable of euphuists." At the height of the popularity of this strange dialect, it was said by William Webbe, in his *Discourse of English Poetry* (1586), to consist in a combination of "singular eloquence and brave composition of apt words and sentences, in fit phrases, in pithy sentences, in gallant tropes, in flowing speech," while a French poet of the same age calls Lyly a "raffineur" of the English speech; another panegyrist describes him as "*alter Tullius*," meaning that, in inventing Euphuism, he had introduced into English the refinements of a Ciceronian style.

When we put aside these excessive compliments, and no less the attacks from which the style suffered as soon as it began to go out of fashion, we are able to observe merits as well as faults in this very curious experiment. Euphuism did not attempt to render the simplicity of nature. On the contrary, in order to secure refinement, it sought to be as affected, as artificial, as high-pitched as possible. Its most prominent feature was an incessant balancing of phrases in chains of antitheses, thus:—"Though the tears of the hart be salt, yet the tears of the boar be sweet, and though the tears of some women be counterfeit to deceive, yet the tears of many be current to try their love"; or this:—"Reject it not because it proceedeth from one which hath been lewd, no more than ye would neglect the gold because it lieth in the dirty earth, or the pure wine for that it cometh out of a homely presse, or the precious stone *aetites* which is found in the filthy nests of the eagle, or the precious gem *draconites*, that is ever taken out of the poisoned dragon." This second excerpt, moreover, suggests another of the main characteristics of Euphuism, the incessant use, for purposes of ornament, of similes taken from fabulous records of zoology, or relating to mythical birds, fishes or minerals. This was a feature of the "new English" which was excessively admired, and copied with a senseless extravagance. Instances of it are found on every page of Lyly's books, thus:—"Although the worm entereth almost into every wood, yet he eateth not the cedar-tree; though the stone *cylindrus* at every thunder-clap roll from the hill, yet the pure sleek stone mounteth at the noise; though the rust fret the hardest steel, yet doth it not eat into the emerald; though polypus change his hue, yet the salamander keepeth his colour"; and so on, *ad infinitum*. That lady was considered most proficient in euphuism who could keep up longest these chains of similes taken out of fabulous natural history. Alliteration was also a particular ornament of the euphuistic style, as: "The bavin, though it burn bright, is but a blaze," but the use of this artifice by Lyly himself was rarely exaggerated; for instances of its excess we have rather to turn to his imitators. In the following passage the typical forms of Euphuism, in its pure and original conditions, are so combined and illustrated as to require no further commentary: "Do we not commonly see that in painted pots is hidden the deadliest poison? that in the greenest grass is the greatest serpent? in the clearest water the ugliest toad? Doth not experience teach us that in the most curious sepulchre are enclosed rotten bones? that the cypress tree beareth a fair leaf, but no fruit? that the ostrich carrieth fair feathers, but rank flesh?"—and so forth. It will be noticed that these characteristics differ in many respects from the specimens of euphuism which are most familiar to a modern reader, namely the extravagant speech placed in the mouth of Sir Piercie Shafton in Sir Walter Scott's romance of *The Monastery*. Scott modelled this character on what he called that "forgotten and obsolete model of folly, once fashionable," Lyly's novel of *Euphues*, but he had not studied the original to sufficient purpose, and the bombastic ravings of Sir Piercie, who simply talks like a lunatic, have deceived many readers as to the real characteristics of Euphuism. Scott betrays his own error when he says that "the extravagance of Euphuism . . . predominates in the romances of Calprenède and Scuderi," in which it is true that a tone of preposterous gallantry finds a language of its own, but that is not the language of Euphues. What Sir Piercie Shafton talks is a mixture of the style of these French romances, with the ostentation of Sir Fopling Flutter and the extravagances of the Scotch translator of Rabelais. But these various sorts of pretentious eloquence have little or nothing in common with the balanced and conceited style of Euphues.

We find that the genuine sort of this kind of superfine conversation was originally called "Euphues," simply, as Overbury speaks of a man "who speaks Euphues, not so gracefully as heartily." The earliest instance of the word "Euphuism" which has been traced occurs in a letter, written by Gabriel Harvey in 1592, when he speaks of a man, who would be smart, as talking "a little Euphuism." Dekker, in the *Gull's Hornbook* of 1609, uses the word as an adjective, and denounces "Euphuised gentlewomen." When the practice was going out of fashion we find it thus severely stigmatized by Michael Drayton, a poet who had little sympathy with the artificial refinement of Lyly. In an elegy, printed in 1627, Drayton refers to the merit of Sir Philip Sidney, who recalled English prose to sanity, and

"did first reduce
Our tongue from Lyly's writings then in use,
Talking of stones, stars, plants, of fishes, flies,
Playing with words and idle similes,
As th' English apes and very zanies be
Of everything that they do hear and see,
So imitating his ridiculous tricks
They spake and writ, all like mere lunatics."

This severe censure of Euphuism may serve to remind us that hasty critics have committed an error in supposing the *Arcadia* of Sidney to be composed in the fashionable jargon. That was certainly not the intention of the author, and in fact the publication of the *Arcadia*, eleven years after that of *Euphues*, marks the beginning of the downfall of the popularity of the latter. Sidney's prose, it is true, was extremely ornamented, but it was instinct with romantic fancy, and it affected a chivalrous and florid fulness which was artificial enough, but wholly distinct from the more homely elegance of Euphuism as we have defined it. The publication of the *Arcadia* was a severe blow to the Euphuists. Immediately the ladies began to desert their former favourite, and the object at court became, as Ben Jonson noted, to "observe as pure a phrase and use as choice figures in ordinary conference as any be in the *Arcadia*." But, in the meantime, Lyly had found in Greene, Lodge, Dickenson, Nicholas Breton and others enthusiastic disciples who had learned all the formulas of Euphuism, and could bring them forth as fluently and elegantly as he could himself. Nevertheless the trick wore out, with the taste that it had created, and by the close of the reign of James I. Euphuism had become a dead language.

Critics have not failed to insist, on the other hand, that a species of Euphuism existed before Euphues was thought of. It has been supposed that a translation of the familiar epistles, or, as they were called, the "Golden Letters," of a Spanish monk, Antonio de Guevara, led Lyly to conceive the extraordinary style which bears the name of his hero. Between 1574 and 1578 Edward Hellowes (fl. 1550–1600) translated into a very extravagant English prose three of the works of Guevara. Earlier than this, in 1557, Sir Thomas North had published a version of the same Spanish writer's *Reloj de Principes* (The Dial of Princes), a moral and philosophical romance which is not without a certain likeness in plan and language to *Euphues*. It is extremely difficult to know to what extent these translations, which were not strikingly unlike many other specimens of the ornamented English prose of their period, can be said to be responsible for the production of Euphuism. At all events no one can doubt that it was Lyly who concentrated the peculiarities of mannerism, and who gave to it the stamp of his own remarkable talent.

See Landmann, *Der Euphuismus* (1881); Arber's edition of *Euphues* (1869); R. W. Bond's *Complete Works of Lyly* (1902); Hallam, Jusserand, S. Lee, *passim*. (E. G.)

EUPION (Gr. εὖ, well, πίων, fat), a hydrocarbon of the paraffin series, probably a pentane, C_5H_{12}, discovered by K. Reichenbach in wood-tar. It is also formed in the destructive distillation of many substances, as wood, coal, caoutchouc, bones, resin and the fixed oils. It is a colourless highly volatile and inflammable liquid, having at 20° C. a specific gravity of 0·65.

EUPOLIS (*c.* 446–411 B.C.), Athenian poet of the Old Comedy, flourished in the time of the Peloponnesian War. Nothing whatever is known of his personal history. With regard to his death, he is said to have been thrown into the sea by Alcibiades, whom he had attacked in one of his plays, but it is more likely that he died fighting for his country. He is ranked by Horace (*Sat.* i. 4, 1), along with Cratinus and Aristophanes, as the greatest writer of his school. With a lively and fertile fancy Eupolis combined a sound practical judgment; he was reputed to equal Aristophanes in the elegance and purity of his diction, and Cratinus in his command of irony and sarcasm. Although he was at first on good terms with Aristophanes, their relations subsequently became strained, and they accused each other, in most virulent terms, of imitation and plagiarism. Of the 17 plays attributed to Eupolis, with which he obtained the first prize seven times, only fragments remain. Of these the best known were: the *Kolakes*, in which he pilloried the spendthrift Callias, who wasted his substance on sophists and parasites; *Maricas*, an attack on Hyperbolus, the successor of Cleon, under a fictitious name; the *Baptae*, against Alcibiades and his clubs, at which profligate foreign rites were practised. Other objects of his attack were Socrates and Cimon. The *Demoi* and *Poleis* were political, dealing with the desperate condition of the state and with the allied (or tributary) cities.

Fragments in T. Kock, *Comicorum Atticorum fragmenta*, i. (1880).

EUPOMPUS, the founder of the great school of painting which flourished in the 4th century at Sicyon in Greece. He was eclipsed by his successors, and is chiefly remembered for the advice which he is said to have given to Lysippus to follow nature rather than any master.

EURASIAN, a term originally confined to India, where for upwards of half a century it was used to denote children born of Hindu mothers and European (especially Portuguese) fathers. Following the geographical employment of the word *Eurasia* to describe the whole of the great land mass which is divided into the continents of Europe and Asia, Eurasian has come to be descriptive of any half-castes born of parents representing the races of the two continents. It has further an ethnological sense, A. H. Keane (*Ethnology*, 1896) proposing to find in the Eurasian Steppe the true home of the primitive Aryan groups. Joseph Deniker (*Anthropology*, 1900) makes a Eurasian group to include such peoples (Ugrians, Turko-Tatars, &c.) as are represented in both continents. Giuseppe Sergi, in his *Mediterranean Race* (London, 1901), uses Eurasiatic to denote that variety of man which "brought with it into Europe (from Asia in the later Neolithic period) flexional languages of Aryan or Indo-European type."

EURE, a department of north-western France, formed in 1790 from a portion of the old province of Normandy, together with the countship of Évreux and part of Perche. Pop. (1906) 330,140. Area, 2330 sq. m. It is bounded N. by the department of Seine Inférieure, W. by Calvados, S.W. by Orne, S. by Eure-et-Loir, and E. by Seine-et-Oise and Oise. The territory of Eure, which nowhere exceeds 800 ft. in altitude, is broken up by its rivers into well-wooded plateaus with a general inclination from south to north. Forests cover about one-fifth of the department. The Seine flows from S.E. to N.W. through the E. of the department, and after touching the frontier at two or three points forms near its mouth part of the northern boundary. All the rivers of the department flow into the Seine,—on the right bank the Andelle and the Epte, and on the left the Eure with its tributaries the Avre and the Iton, and the Risle with its tributary the Charentonne. The Eure, from which the department takes its name, rises in Orne, and flowing through Eure-et-Loir, falls into the Seine above Pont de l'Arche, after a course of 44 m. in the department. The Risle likewise rises in Orne, and flows generally northward to its mouth in the estuary of the Seine. The climate is mild, but moist and variable. The soil is for the most part clayey, resting on a bed of chalk, and is, in general, fertile and well tilled. The chief cereal cultivated is wheat; oats, colza, flax and beetroot are also grown. There is a wide extent of pasturage, on which are reared a considerable number of cattle and sheep, and especially those horses of pure Norman breed for which the department has long been celebrated. Fruit is very abundant, especially apples and pears, from which much cider and perry are made. The mineral products of Eure include freestone, marl, lime and brick-clay. The chief industries are the spinning of cotton and wool, and the weaving, dyeing and printing of fabrics of different kinds. Brewing, flour-milling, distilling, turnery, cotton-bleaching, cider-making, metal-founding, tanning, and the manufacture of glass, paper, iron ware, nails, pins, wind-instruments, bricks and sugar are also carried on. Coal and raw materials for its industries are the chief imports of Eure; its exports include cattle, poultry, eggs, butter, grain and manufactured goods. The department is served chiefly by the Western railway; the Seine, Eure and Risle provide 87 m. of navigable waterway. Eure is divided into the following arrondissements (containing 36 cantons, 700 communes):—Évreux, Louviers, Les Andelys, Bernay, and Pont-Audemer. Its capital is Évreux, which is the seat of a bishopric of the ecclesiastical province of Rouen. The department belongs to the III. Army Corps and to the académie (educational division) of Caen. Its court of appeal is at Rouen.

Évreux, Les Andelys, Bernay, Louviers, Pont-Audemer, Verneuil, Vernon and Gisors are the principal towns of the department. At Gaillon there are remains of a celebrated château of the archbishops of Rouen (see LOUVIERS). Pont de l'Arche has a fine Gothic church, with stained-glass windows of the 16th and 17th centuries; the church of Tillières-sur-Arvre is a graceful specimen of the Renaissance style. The churches of Conches (15th or 16th century) and of Rugles (13th, 15th and 16th centuries), and the château of Beaumesnil (16th century) are also of architectural interest.

EURE-ET-LOIR, an inland department of north-western France, formed in 1790 of portions of Orléanais and Normandy. Pop. (1906) 273,823. Area, 2293 sq. m. It is bounded N. by the department of Eure, W. by Orne and Sarthe, S. by Loir-et-Cher, S.E. by Loiret, and E. by Seine-et-Oise. The Perche in the south-west and the Thimerais in the north-west are districts of hills and valleys, woods, lakes and streams. The region of the east and south is a level and uniform expanse, consisting for the most part of the riverless but fertile plain of Beauce, sometimes called the "granary of France." The northern part of Eure-et-Loir is watered by the Eure, with its tributaries the Vègre, Blaise and Avre, a small western portion by the Huisne, and the south by the Loir with its tributaries the Conie and the Ozanne. The air is pure, the climate mild, dry and not subject to sudden changes. The soil consists, for the most part, either of clay intermixed with sand or of calcareous earth, and is on the whole fruitful. Agriculture is better conducted than in most of the departments of France, and the average yield per acre is greater. Cereals occupy half the surface, wheat and oats being chiefly cultivated. Among the other agricultural products are barley, hemp, flax and various vegetables, including good asparagus. Wine is not extensively produced, nor is it of the best quality; but in some parts, especially in the Perche, there is an abundant supply of apples, from which cider is made as the common drink of the inhabitants. The extensive meadows supply pasturage for a large number of cattle and sheep, and the horses raised in the Perche have a wide reputation as draught animals. Bee-farming is commonly prosecuted. The department produces lime, grindstones and brick-clay. The manufactures are not extensive; but there are flour- and saw-mills, tanneries and leather-works, copper and iron foundries, starch-works, dye-works, distilleries, breweries and potteries; and agricultural implements, cotton and woollen goods, and yarn, hosiery, boots and shoes, sugar, felt hats and paper are made. Eure-et-Loir exports the products of its soil and live-stock; its imports include coal, wine and wearing apparel. It is served by the railways of the Western and the Orléans Companies and by those of the state, but it has no navigable waterways. The department has Chartres for its capital, and is divided into the arrondissements of Chartres, Châteaudun, Dreux and Nogent-le-Rotrou (24 cantons and 426 communes). It forms the diocese of Chartres (province of Paris), and belongs to the académie (educational division) of Paris and the region of the IV. Army Corps. Its court of appeal is at Paris.

Chartres, Dreux, Châteaudun, Nogent-le-Rotrou and Anet are the more noteworthy places in the department (*q.v.*). At Bonneval the lunatic asylum occupies the 18th-century buildings of a former Benedictine abbey. The abbey church belonged to the 13th century, but only a gateway flanked by two massive towers is left. The château of Maintenon dating from the 16th and 17th centuries was presented by Louis XIV. to Madame de Maintenon, by whom additions were made; the aqueduct (17th century) in the park was designed to carry the water of the Eure to Versailles, but was not completed. There is a fine château of the late 15th century, restored in modern times, at Montigny-le-Gannelon, and another of the 15th, 16th and 17th centuries, at one time the property of Sully, at Villebon. St Lubin-des-Joncherets has a handsome church of the 11th century, in which there are stained-glass windows dating from the 16th century.

EUREKA, a city, port of entry, and the county seat of Humboldt county, California, U.S.A., on the E. shore of Humboldt Bay. Pop. (1880) 2639; (1890) 4858; (1900) 7327 (2035 foreign-born); (1910) 11,845. It has a good harbour, greatly improved by the National government, and is connected with San Francisco, Portland and other coast ports by steamship lines. In 1909 a railway (the Northwestern Pacific), to connect Eureka with San Francisco, was under construction. The district owes its reputation as a health resort to its equable climate and to the protection afforded by the wide coast timber belt. Eureka is the principal point for the shipment of redwood lumber, and saw-milling is carried on here on an enormous scale. Several short railways run from Eureka and Arcata (pop. in 1900, 952) across the bay, into the forests, and bring lumber to the mills, most of which are in or near Eureka. Humboldt county was organized in 1853. Eureka was then already the centre of an important lumber trade, principally in spars. It was incorporated in 1856, displacing Union (now Arcata) as the county-seat in the same year.

EUREKA SPRINGS, a city and health resort, one of the county-seats—Berryville being the other—of Carroll county, in the extreme north-western part of Arkansas, U.S.A., in the Ozark uplift, 1800 ft. above the sea-level. Pop. (1890) 3706; (1900) 3572 (142 of negro descent); (1910) 3228. There is a transient population of thousands of visitors during the year. The city is built picturesquely on the sides of a gulch, down which runs the Missouri & North Arkansas railway. A creek running through the city empties into the White river, only a few miles distant. The surrounding country varies in character from mountains to rolling prairie. The encircling hills are laden with a covering of pine. The normal mean temperature for the year is about 59° F. (42° F. in winter, 61° F. in spring, 75° F. in summer, and 58° F. in autumn); the average rainfall, about 33 in. The atmosphere is dry and clear. Apart from its share in the agricultural interests of the surrounding region,—devoted mainly to Indian corn, small grains and fruits,—the entire economy of Eureka Springs centres in its medicinal springs, more than forty of which, lying within the corporate limits, are held in trust by the city for the free use of the public. The temperature of the springs varies from about 57° F. to 64° F. Each gallon of their waters contains about 28·5 cub. in. of gaseous matter and from 6 to 9 grains of solids held in solution. The city waterworks are owned by the municipality. The springs have been exploited since 1879, when the first settlement was made. The city was chartered in 1880.

EURIPIDES (480–406 B.C.), the great Greek dramatic poet, was born in 480 B.C., on the very day, according to the legend, of the Greek victory at Salamis, where his Athenian parents had taken refuge; and a whimsical fancy has even suggested that his name—*son of Euripus*—was meant to commemorate the first check of the Persian fleet at Artemisium. His father Mnesarchus was at least able to give him a liberal education; it was a favourite taunt with the comic poets that his mother Clito had been a herb-seller—a quaint instance of the tone which public satire could then adopt with plausible effect. At first he was intended, we are told, for the profession of an athlete,—a calling of which he has recorded his opinion with something like the courage of Xenophanes. He seems also to have essayed painting; but at five-and-twenty he brought out his first play, the *Peliades*, and thenceforth he was a tragic poet. At thirty-nine he gained the first prize, and in his career of about fifty years he gained it only five times in all. This fact is perfectly consistent with his unquestionably great and growing popularity in his own day. Throughout life he had to compete with Sophocles, and with other poets who represented tragedy of the type consecrated by tradition. The hostile criticism of Aristophanes was witty; and, moreover, it was true, granting the premise from which Aristophanes starts, that the tragedy of Aeschylus and Sophocles is the only right model. Its unfairness, often extreme, consists in ignoring the changing conditions of public feeling and taste, and the possibilities, changed accordingly, of an art which could exist only by continuing to please large audiences. It has usually been supposed that the unsparing derision of the comic poets contributed not a little to make the life of Euripides at Athens uncomfortable; and there is certainly one passage in a fragment of the *Melanippe* (Nauck, *Frag.*, 495), which would apply well enough to his persecutors:—

ἀνδρῶν δὲ πολλοὶ τοῦ γέλωτος οὕνεκα
ἀσκοῦσι χάριτας κερτόμους· ἐγὼ δέ πως
μισῶ γελοίους, οἵτινες σοφῶν πέρι
ἀχάλιν' ἔχουσι στόματα.

(To raise vain laughter, many exercise
The arts of satire; but my spirit loathes
These mockers whose unbridled mockery
Invades grave themes.)

The infidelity of two wives in succession is alleged to explain the poet's tone in reference to the majority of their sex, and to complete the picture of an uneasy private life. He appears to have been repelled by the Athenian democracy, as it tended to become less the rule of the people than of the mob. Thoroughly the son of his day in intellectual matters, he shrank from the coarser aspects of its political and social life. His best word is for the small farmer (αὐτουργός), who does not often come to town, or soil his rustic honesty by contact with the crowd of the market-place.

About 409 B.C. Euripides left Athens, and after a residence in the Thessalian Magnesia repaired, on the invitation of King Archelaus, to the Macedonian court, where Greeks of distinction were always welcome. In his *Archelaus* Euripides celebrated that legendary son of Temenus, and head of the Temenid dynasty, who had founded Aegae; and in one of the meagre fragments he evidently alludes to the beneficent energy of his royal host in opening up the wild land of the North. It was at Pella, too, that Euripides composed or completed, and perhaps produced, the *Bacchae*. Jealous courtiers, we are told, contrived to have him attacked and killed by savage dogs. It is odd that the fate of Actaeon should be ascribed, by legend, to two distinguished Greek writers, Euripides and Lucian; though in the former case at least the fate has not such appropriateness as the Byzantine biographer discovers in the latter, on the ground that its victim "had waxed rabid against the truth." The death of Euripides, whatever its manner, occurred in 406 B.C., when he was seventy-four. Sophocles followed him in a few months, but not before he had been able to honour the memory of his younger rival by causing his actors to appear with less than the full costume of the Dionysiac festival. Soon afterwards, in the *Frogs*, Aristophanes pronounced the epitaph of Attic comedy on Attic tragedy.

The historical interest of such a life as that of Euripides consists in the very fact that its external record is so scanty—that, unlike Aeschylus or Sophocles, he had no place in the public action of his time, but dwelt apart as a student and a thinker. He has made his Medea speak of those who, through following quiet paths, have incurred the reproach of apathy (*ῥᾳθυμίαν*). Undoubtedly enough of the old feeling for civic life remained to create a prejudice against one who held aloof from the affairs of the city. Quietness (*ἀπραγμοσύνη*), in this sense, was still regarded as akin to indolence (*ἀργία*). Yet here we see how truly Euripides was the precursor of that near future which, at Athens, saw the more complete divergence of society from the state.

In an age which is not yet ripe for reflection or for the subtle analysis of character, people are content to express in general types those primary facts of human nature which strike every one. Achilles will stand well enough for the young chivalrous warrior, Odysseus for the man of resource and endurance. In the case of the Greeks, these types had not merely an artistic and a moral interest; they had, further, a religious interest, because the Greeks believed that the epic heroes, sprung from the gods, were their own ancestors. Greek tragedy arose when the choral worship of Dionysus, the god of physical rapture, had engrafted upon it a dialogue between actors who represented some persons of the legends consecrated by this faith. The dramatist was accordingly obliged to refrain from multiplying those minute touches which, by individualizing the characters too highly, would detract from their general value as types in which all Hellenic humanity could recognize its own image glorified and raised a step nearer to the immortal gods. This necessity was further enforced by the existence of the chorus, the original element of the drama, and the very essence of its nature as an act of Dionysiac worship. Those utterances of the chorus, which to the modern sense are so often platitudes, were not so to the Greeks, just because the moral issues of tragedy were felt to have the same typical generality as these comments themselves.

An unerring instinct keeps both Aeschylus and Sophocles within the limits imposed by this law. Euripides was only fifteen years younger than Sophocles. But, when Euripides began to write, it must have been clear to any man of his genius and culture that, though an established prestige might be maintained, a new poet who sought to construct tragedy on the old basis would be building on sand. For, first, the popular religion itself—the very foundation of tragedy—had been undermined. Secondly, scepticism had begun to be busy with the legends which that religion consecrated. Neither gods nor heroes commanded all the old unquestioning faith. Lastly, an increasing number of the audience in the theatre began to be destitute of the training, musical and poetical, which had prepared an earlier generation to enjoy the chaste and placid grandeur of ideal tragedy.

Euripides made a splendid effort to maintain the place of tragedy in the spiritual life of Athens by modifying its interests in the sense which his own generation required. Could not the heroic persons still excite interest if they were made more real,—if, in them, the passions and sorrows of every-day life were portrayed with greater vividness and directness? And might not the less cultivated part of the audience at least enjoy a thrilling plot, especially if taken from the home-legends of Attica? Euripides became the virtual founder of the romantic drama. In so far as his work fails, the failure is one which probably no artistic tact could then have wholly avoided. The frame within which he had to work was one which could not be stretched to his plan. The chorus, the masks, the narrow stage, the conventional costumes, the slender opportunities for change of scenery, were so many fixed obstacles to the free development of tragedy in the new direction. But no man of his time could have broken free from these traditions; in attempting to do so he must have wrecked either his fame or his art. It is not the fault of Euripides if in so much of his work we feel the want of harmony between matter and form. Art abhors compromise; and it was the misfortune of Attic tragedy in his generation that nothing but a compromise could save it. Two devices have become common phrases of reproach against him—the prologue and the *deus ex machina*. Doubtless the prologue is a slipshod and sometimes ludicrous expedient. But the audiences of his days were far from being so well versed as their fathers in the mythic lore, and, on the other hand, a dramatist who wished to avoid trite themes had now to go into the byways of mythology. A prologue was often perhaps desirable or necessary for the instruction of the audience. As regards the *deus ex machina*, a distinction should be observed between those cases in which the solution is really mechanical, as in the *Andromache* and perhaps the *Orestes*, and those in which it is warranted or required by the plot, as in the *Hippolytus* and the *Bacchae*. The choral songs in Euripides, it may be granted, have often nothing to do with the action. But the chorus was the greatest of difficulties for a poet who was seeking to present drama of romantic tendency in the plastic form consecrated by tradition. So far from censuring Euripides on this score, we should be disposed to regard his management of the chorus as a signal proof of his genius, originality and skill.

Works.

Euripides is said to have written 92 dramas, including 8 satyr-plays. The best critics of antiquity allowed 75 as genuine. Nauck has collected 1117 Euripidean fragments. Among these, numbers 1092-1117 are doubtful or spurious; numbers 842-1091 are from plays of uncertain title; numbers 1-841 represent fifty-five lost pieces, among which some of the best known are the *Andromeda*, *Antiope*,[1] *Bellerophon*, *Cresphontes*, *Erechtheus*, *Oedipus*, *Phaëthon*, and *Telephus*.

1. The *Alcestis*, as the didascaliae tell us, was brought out in Ol. 85. 2, *i.e.* at the Dionysia in the spring of 438 B.C., as the fourth play of a tetralogy comprising the *Cretan Women*, the *Alcmaeon at Psophis*, and the *Telephus*. The *Alcestis* is altogether removed from the character, essentially grotesque, of a mere satyric drama. On the other hand, it has features which distinctly separate it from a Greek tragedy of the normal type. First, the subject belongs to none of the great cycles, but to a byway of mythology, and involves such strange elements as the servitude of Apollo in a mortal household, the decree of the fates that Admetus must die on a fixed day, and the restoration of the dead Alcestis to life. Secondly, the treatment of the subject is romantic and even fantastic,—strikingly so in the passage where Apollo is directly confronted with the daemonic figure of Thanatos. Lastly, the boisterous, remorseful, and generous Heracles makes, not, indeed, a satyric drama, but a distinctly satyric scene—a scene which, in the frank original, hardly bears the subtle interpretation which in *Balaustion* is hinted by the genius of Browning, that Heracles got drunk in order to keep up other people's spirits. When the happy ending is taken into account, it is not surprising that some should have called the *Alcestis* a tragi-comedy. But we cannot so regard it. The slight and purely incidental strain of comedy is but a moment of relief between the tragic sorrow and

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[1] A considerable fragment of the *Antiope* was discovered in Egypt in the latter part of the 19th century; ed. J. P. Mahaffy in vol. viii. of the *Cunningham Memoirs* (Dublin, 1891); and quite recently fragments, probably from the *Hypsipyle*, the *Phaëthon*, and the *Cretans* (see *Berliner Klassikertexte*, v. 2, 1907).

terror of the opening and the joy, no less solemn, of the conclusion. In this respect the *Alcestis* might more truly be compared to such a drama as the *Winter's Tale*; the loss and recovery of Hermione by Leontes do not form a tragi-comedy because we are amused betweenwhiles by Autolycus and the clown. It does not seem improbable that the *Alcestis*—the earliest of the extant plays—may represent an attempt to substitute for the old satyric drama an after-piece of a kind which, while preserving a satyric element, should stand nearer to tragedy. The taste and manners of the day were perhaps tiring of the merely grotesque entertainment that old usage appended to the tragedies; just as, in the sphere of comedy, we know from Aristophanes that they were tiring of broad buffoonery. An original dramatist may have seen an opportunity here. However that may be, the *Alcestis* has a peculiar interest for the history of the drama. It marks in the most signal manner, and perhaps at the earliest moment, that great movement which began with Euripides,—the movement of transition from the purely Hellenic drama to the romantic.

2. The *Medea* was brought out in 431 B.C. with the *Philoctetes*, the *Dictys*, and a lost satyr-play called the *Reapers* (*Theristae*). Euripides gained the third prize, the first falling to Euphorion, the son of Aeschylus, and the second to Sophocles. If it is true that Euripides modelled his *Medea* on the work of an obscure predecessor, Neophron, at least he made the subject thoroughly his own. Hardly any play was more popular in antiquity with readers and spectators, with actors, or with sculptors. Ennius is said to have translated and adopted it. We do not know how far it may have been used by Ovid in his lost tragedy of the same name; but it certainly inspired the rhetorical performance of Seneca, which may be regarded as bridging the interval between Euripides and modern adaptations. We may grant at once that the *Medea* of Euripides is not a faultless play; that the dialogue between the heroine and Aegeus is not happily conceived; that the murder of the children lacks an adequate dramatic motive; that there is something of a moral anti-climax in the arrangements of Medea, before the deed, for her personal safety. But the *Medea* remains a tragedy of first-rate power. It is admirable for the splendid force with which the character of the strange and strong-hearted woman, a barbarian friendless among Hellenes, is thrown out against the background of Hellenic life in Corinth.

3. The extant *Hippolytus* (429 B.C.)—sometimes called *Stephanephoros*, the "wreath-bearer," from the garland of flowers which, in the opening scene, the hero offers to Artemis—was not the first drama of Euripides on this theme. In an earlier play of the same name, we are told, he had shocked both the moral and the aesthetic sense of Athens. In this earlier *Hippolytus*, Phaedra herself had confessed her love to her step-son, and, when repulsed, had falsely accused him to Theseus, who doomed him to death; at the sight of the corpse, she had been moved to confess her crime, and had atoned for it by a voluntary death. This first *Hippolytus* is cited as *Hippolytus the Veiled* (καλυπτόμενος), either, as Toup and Welcker thought, from Hippolytus covering his face in horror, or, as Bentley with more likelihood suggested, because the youth's shrouded corpse was brought upon the scene. It can scarcely be doubted that the chief dramatic defect of our *Hippolytus* is connected with the unfavourable reception of its predecessor. Euripides had been warned that limits must be observed in the dramatic portrayal of a morally repulsive theme. In the later play, accordingly, the whole action is made to turn on the jealous feud between Aphrodite, the goddess of love, and Artemis, the goddess of chastity. Phaedra not only shrinks from breathing her secret to Hippolytus, but destroys herself when she learns that she is rejected. But the natural agency of human passion is now replaced by a supernatural machinery; the slain son and the bereaved father are no longer the martyrs of sin, the tragic witnesses of an inexorable law; rather they and Phaedra are alike the puppets of a divine caprice, the scapegoats of an Olympian quarrel in which they have no concern. But if the dramatic effect of the whole is thus weakened, the character of Phaedra is a fine psychological study; and, as regards form, the play is one of the most brilliant. Boeckh (*De tragoediae Graecae principiis*, p. 180 f.) is perhaps too ingenious in finding an allusion to the plague at Athens (430 B.C.) in the *ὦ κακὰ θνητῶν στυγεραί τε νόσοι* of v. 177, and in v. 209 f.; but it can scarcely be doubted that he is right in suggesting that the closing words of Theseus (v. 1460)

> *ὦ κλειν᾽ Ἀθηνῶν Παλλάδος θ᾽ ὁρίσματα, οἵου στερήσεσθ᾽ ἀνδρός,*

and the reply of the chorus, *κοινὸν τόδ᾽ ἄχος*, &c., contain a reference to the recent death of Pericles (429 B.C.).

4. The *Hecuba* may be placed about 425 B.C. Thucydides (iii. 104) notices the purification of Delos by the Athenians, and the restoration of the Panionic festival there, in 426 B.C.—an event to which the choral passage, v. 462 f., probably refers. It appears more hazardous to take v. 650 f. as an allusion to the Spartan mishap at Pylos. The subject of the play is the revenge of Hecuba, the widowed queen of Priam, on Polymestor, king of Thrace, who had murdered her youngest son Polydorus, after her daughter Polyzena had already been sacrificed by the Greeks to the shade of Achilles. The two calamities which befall Hecuba have no direct connexion with each other. In this sense the play lacks unity of design. On the other hand, both events serve the same end—viz. to heighten the tragic pathos with which the poet seeks to surround the central figure of Hecuba. The drama illustrates the skill with which Euripides, while failing to satisfy the requirements of artistic drama, could sustain interest by an ingeniously woven plot. It is a representative *Intriguenstück*, and well exemplifies the peculiar power which recommended Euripides to the poets of the New Comedy.

5. The *Andromache*, according to a notice in the *scholia Veneta* (446), was not acted at Athens, at least in the author's life-time; though some take the words in the Greek argument (*τὸ δρᾶμα τῶν δευτέρων*) to mean that it was among those which gained a second prize. The invective on the Spartan character which is put into the mouth of Andromache contains the words, *ἀδίκως εὐτυχεῖτ᾽ ἀν᾽ Ἑλλάδα*, and this, with other indications, points to the Peloponnesian successes of the years 424–422 B.C. Andromache, the widow of Hector, has become the captive and concubine of Neoptolemus, son of Achilles. During his absence, her son Molossus is taken from her, with the aid of Menelaus, by her jealous rival Hermione. Mother and son are rescued from death by Peleus; but meanwhile Neoptolemus is slain at Delphi through the intrigues of Orestes. The goddess Thetis now appears, ordains that Andromache shall marry Helenus, and declares that Molossus shall found a line of Epirote kings, while Peleus shall become immortal among the gods of the sea. The *Andromache* is a poor play. The contrasts, though striking, are harsh and coarse, and the compensations dealt out by the *deus ex machina* leave the moral sense wholly unsatisfied. Technically the piece is noteworthy as bringing on the scene four characters at once—Andromache, Molossus, Peleus and Menelaus (v. 545 f.).

6. The *Ion* is an admirable drama, the finest of those plays which deal with legends specially illustrating the traditional glories of Attica. It is also the most perfect example of the poet's skill in the structure of dramatic intrigue. For its place in the chronological order there are no data except those of style and metre. Judging by these, Hermann would place it "neither after Ol. 89, nor much before"—*i.e.* somewhere between 424 and 421 B.C.; and this may be taken as approximately correct. The scene is laid throughout at the temple of Delphi. The young Ion is a priest in the temple of Delphi when Xuthus and his wife Creusa, daughter of Erechtheus, come to inquire of the god concerning their childlessness; and it is discovered that Ion is the son of Creusa by the god Apollo. Athena herself appears, and commands that Ion shall be placed on the throne of Athens, foretelling that from him shall spring the four Attic tribes, the Teleontes (priests), Hopletes (fighting-men), Argadeis (husbandmen) and Aigikoreis (herdsmen). The play must have been peculiarly effective on the Athenian stage, not only by its situations, but through its appeal to Attic sympathies.

7. The *Suppliants* who give their name to the play are Argive women, the mothers of Argive warriors slain before the walls of Thebes, who, led by Adrastus, king of Argos, come as suppliants to the altar of Demeter at Eleusis. Creon, king of Thebes, has refused burial to their dead sons. The Athenian king Theseus demands of Creon that he shall grant the funeral rites; the refusal is followed by a battle in which the Thebans are vanquished, and the bodies of the Argive dead are then brought to Eleusis. At the close the goddess Athena appears, and ordains that a close alliance shall be formed between Athens and Argos. Some refer the play to 417 B.C., when the democratic party at Athens rose against the oligarchs. But a more probable date is 420 B.C., when, through the agency of Alcibiades, Athens and Argos concluded a defensive alliance. The play has a strongly marked rhetorical character, and is, in fact, a panegyric, with an immediate political aim, on Athens as the champion of humanity against Thebes.

8. The *Heracleidae*—a companion piece to the *Suppliants*, and of the same period—is decidedly inferior in merit. Here, too, there are direct references to contemporary history. The defeat of Argos by the Spartans in 418 B.C. strengthened the Argive party who were in favour of discarding the Athenian for the Spartan alliance (Thuc. v. 76). In the *Heracleidae*, the sons of the dead Heracles, persecuted by the Argive Eurystheus, are received and sheltered at Athens. Thus, while Athens is glorified, Sparta, whose kings are descendants of the Heracleidae, is reminded how unnatural would be an alliance between herself and Argos.

9. The *Heracles Mainomenos*[1] (*Hercules Furens*), which, on grounds of style, can scarcely be put later than 420–417 B.C., shares with the two last plays the purpose of exalting Athens in the person of Theseus. Heracles returns from Hades—whither, at the command of Eurystheus, he went to bring back Cerberus—just in time to save his wife Megara and his children from being put to death by Lycus of Thebes, whom he slays. As he is offering lustral sacrifice after the deed, he is suddenly stricken with madness by Lyssa (Fury), the daemonic agent of his enemy the goddess Hera, and in his frenzy he slays his wife and children. Theseus finds him, in his agony of despair, about to kill himself, and persuades him to come to Athens, there to seek grace and pardon from the gods. The unity of the plot may be partly vindicated by observing that the slaughter of Lycus entitled Heracles to the gratitude of Thebes, whereas the slaughter of his own kinsfolk made it unlawful that he should remain there; thus, having found a refuge only to lose it, Heracles has no hope left but in Athens, whose praise is the true theme of the entire drama.

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[1] (Originally simply *Heracles*, the addition *Mainomenos* being due to the Aldine ed.)

10. *Iphigenia among the Tauri*, which metre and diction mark as one of the later plays, is also one of the best—excellent both in the management of a romantic plot and in the delineation of character. The scene is laid at the temple of Artemis in the Tauric Chersonese (the Crimea)—on the site of the modern Balaklava. Iphigenia, who had been doomed to die at Aulis for the Greeks, had been snatched from that death by Artemis, and had become priestess of the goddess at the Tauric shrine, where human victims were immolated. Two strangers, who had landed among the Tauri, have been sentenced to die at the altar. She discovers in them her brother Orestes and his friend Pylades. They plan an escape, are recaptured, and are finally delivered by the goddess Athena, who commands Thoas, king of the land, to permit their departure. Iphigenia, Orestes and Pylades return to Greece, and establish the worship of the Tauric Artemis at Brauron and Halae in Attica. The drama of Euripides necessarily suggests a comparison with that of Goethe; and many readers will probably also feel that, while Goethe is certainly not inferior in fineness of ethical portraiture, he has the advantage in his management of the catastrophe. But it is only just to Euripides to remember that, while his competitor had free scope of treatment, he, a Greek dramatist, was bound to the motive of the Greek legend, and was obliged to conclude with the foundation of the Attic worship.

11. The *Troades* appeared in 415 B.C. along with the *Alexander*, the *Palamedes*, and a satyr-play, the *Sisyphus*. It is a picture of the miseries endured by noble Trojan dames—Hecuba, Andromache, Cassandra—immediately after the capture of Troy. There is hardly a plot in the proper sense—only an accumulation of sorrows on the heads of the passive sufferers. The piece is less a drama than a pathetic spectacle, closing with the crash of the Trojan towers in flame and ruin. The *Troades* is indeed remarkable among Greek tragedies for its near approach to the character of melodrama. It must be observed that there is no ground for the inference—sometimes made an accusation against the poet—that the choral passage, v. 794 f., was intended to encourage the Sicilian expedition, sent forth in the same year (415 B.C.). The mention of the "land of Aetna over against Carthage" (v. 220) speaks of it as "renowned for the trophies of prowess"—a topic, surely, not of encouragement but of warning.

12. The *Helena*—produced, as we learn from the Aristophanic scholia, in 412 B.C., the year of the lost *Andromeda*—is not one of its author's happier efforts. It is founded on a strange variation of the Trojan myth, first adopted by Stesichorus in his Palinode—that only a wraith of Helen passed to Troy, while the real Helen was detained in Egypt. In this play she is rescued from the Egyptian king, Theoclymenus, by a ruse of her husband Menelaus, who brings her safely back to Greece. The romantic element thus engrafted on the Greek myth is more than fantastic: it is well-nigh grotesque. The comic poets—notably Aristophanes in the *Thesmophoriazusae*—felt this; nor can we blame them if they ridiculed a piece in which the mode of treatment was so discordant with the spirit of Greek tradition, and so irreconcilable with all that constituted the higher meaning of Greek tragedy.

13. The *Phoenissae* was brought out, with the *Oenomaus* and the *Chrysippus*, in 411 B.C., the year in which the recall of Alcibiades was decreed by the army at Samos, and, after the fall of the Four Hundred, ratified by the Assembly at Athens (Thuc. viii. 81, 97). The dialogue between Iocaste and Polynices on the griefs of banishment (τί τὸ στέρεσθαι πατρίδος, v. 388 f.) has a certain emphasis which certainly looks like an allusion to the pardon of the famous exile. The subject of the play is the same as that of the Aeschylean *Seven against Thebes*—the war of succession in which Argos supported Polynices against his brother Eteocles. The Phoenician maidens who form the chorus are imagined to have been on their way from Tyre to Delphi, where they were destined for service in the temple, when they were detained at Thebes by the outbreak of the war—a device which affords a contrast to the Aeschylean chorus of Theban elders, and which has also a certain fitness in view of the legends connecting Thebes with Phoenicia. But Euripides has hardly been successful in the rivalry—which he has even pointed by direct allusions—with Aeschylus. The *Phoenissae* is full of brilliant passages, but it is rather a series of effective scenes than an impressive drama.

14. Plutarch (*Lys.* 15) says that, when Athens had surrendered to Lysander (404 B.C.) and when the fate of the city was doubtful, a Phocian officer happened to sing at a banquet of the leaders the first song of the chorus in the *Electra* of Euripides—

> Ἀγαμέμνονος ὦ κόρα,
> ἤλυθον, Ἠλέκτρα, ποτὶ σὰν ἀγρότειραν αὐλάν,

and that "when they heard it, all were touched, so that it seemed a cruel deed to destroy for ever the city so famous once, the mother of such men." The character of the *Electra*, in metre and in diction, seems to show that it belongs to the poet's latest years. If Müller were right in referring to the Sicilian expedition the closing passage in which the Dioscuri declare that they haste "to the Sicilian sea, to save ships upon the deep" (v. 1347), then the play could not be later than 413 B.C. But it may with more probability be placed shortly before the *Orestes*, which in some respects it much resembles: perhaps in or about the year 410 B.C. No play of Euripides has been more severely criticised. The reason is evident. The *Choephori* of Aeschylus and the *Electra* of Sophocles appear to invite a direct comparison with this drama. But, as R. C. Jebb suggested,[1] such criticism as that of Schlegel should remember that works of art are proper subjects of direct comparison only when the theories of art which they represent have a common basis. It is surely unmeaning to contrast the elaborate homeliness of the Euripidean *Electra* with the severe grandeur of its rivals. Aeschylus and Sophocles, as different exponents of an artistic conception which is fundamentally the same, may be profitably compared; Euripides interprets another conception, and must be tried by other principles. His *Electra* is, in truth, a daring experiment—daring, because the theme is one which the elder school had made peculiarly its own.

15. The *Orestes*, acted in 408, bears the mark of the age in the prominence which Euripides gives to the assembly of Argos—which has to decide the fate of Orestes and Electra—and to rhetorical pleading. The plot proceeds with sufficient clearness to the point at which Orestes and Electra have been condemned to death. But the later portion of the play, containing the intrigues for their rescue and the final achievement of their deliverance, is both too involved and too inconsequent for a really tragic effect. Just as in the *Electra*, the heroic persons of the drama are reduced to the level of commonplace. There is not a little which borders on the ludicrous, and it can be seen how easy would have been the passage from such tragedy as this to the restrained parody in which the Middle Comedy delighted. It is, however, inconceivable that, as some have supposed, the *Orestes* can have been a deliberate compromise between tragedy and farce. It cannot have been meant to be played, as a fourth piece, instead of a regular satyric drama. Rather it indicates the level to which the heroic tragedy itself had descended under the treatment of a school which was at least logical. The celebrity of the play in the ancient world—as Paley observes, there are more ancient quotations from the *Orestes* than from all the extant plays of Aeschylus and Sophocles together—is perhaps partly explained by the unusually frequent combination in this piece of striking sentiment with effective situation.

16. The *Iphigenia at Aulis*, like the *Bacchae*, was brought out only after the death of Euripides. It is a very brilliant and beautiful play,—probably left by the author in an unfinished state,—and has suffered from interpolation more largely, perhaps, than any other of his works. As regards its subject, it forms a prelude to the *Iphigenia in Tauris*. Iphigenia has been doomed by her father Agamemnon to die at Aulis, as Calchas declares that Artemis claims such a sacrifice before the adverse winds can fall.

The genuine play, as we have it, breaks off at v. 1508, when Iphigenia has been led to the sacrificial altar. A spurious epilogue, of wretched workmanship (v. 1509-1628), relates, in the speech of a messenger, how Artemis saved the maiden.

17. The *Bacchae*, unlike the preceding play, appears to have been finished by its author, although it is said not to have been acted, on the Athenian stage at least, till after his death. It was composed, or completed, during the residence of Euripides with Archelaus, and in all probability was originally designed for representation in Macedonia—a region with whose traditions of orgiastic worship the Dionysus myth was so congenial. The play is sometimes quoted as the *Pentheus*. It has been justly observed that Euripides seldom named a piece from the chorus, unless the chorus bore an important part in the action or the leading action was divided between several persons. Possibly, however, in this instance he may designedly have chosen a title which would at once interest the Macedonian public. *Pentheus* would suggest a Greek legend about which they might know or care little. The *Bacchae* would at once announce a theme connected with rites familiar to the northern land.

It is a magnificent play, alone among extant Greek tragedies in picturesque splendour, and in that sustained glow of Dionysiac enthusiasm to which the keen irony lends the strength of contrast. If Euripides had left nothing else, the *Bacchae* would place him in the first rank of poets, and would prove his possession of a sense rarely manifested by Greek poets,—perhaps by no one of his own contemporaries in equal measure except Aristophanes,—a feeling for natural beauty lit up by the play of fancy. R. Y. Tyrrell, in his edition of the *Bacchae*, has given the true answer to the theory that the *Bacchae* is a recantation. Euripides had never rejected the facts which formed the basis of the popular religion. He had rather sought to interpret them in a manner consistent with belief in a benevolent Providence. The really striking thing in the *Bacchae* is the spirit of contentment and of composure which it breathes,—as if the poet had ceased to be vexed by the seeming contradictions which had troubled him before. Nor should it be forgotten that, for the Greek mind of his age, the victory of Dionysus in the *Bacchae* carried a moral even more direct than the victory of Aphrodite in the *Hippolytus*. The great nature-powers who give refreshment to mortals cannot be robbed of their due tribute without provoking a nemesis. The refusal of such a homage is not, so the Greeks deemed, a virtue in itself: in the sight of the gods it may be only a cold form of ὕβρις, overweening self-reliance—the quality personified in Pentheus.

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[1] Introduction to the *Electra* of Sophocles, p. xiii., in *Catena Classicorum*, 2nd ed.

The *Bacchae* was always an exceptionally popular play—partly because its opportunities as a spectacle fitted it for gorgeous representation, and so recommended it for performance at courts and on great public occasions. "Demetrius the Cynic" (says Lucian, *Adv. Indoctum*, 19) "saw an illiterate person at Corinth reading a very beautiful poem—the *Bacchae* of Euripides, I think it was; he was at the place where the messenger narrates the doom of Pentheus and the deed of Agave. Demetrius snatched the book from him and tore it up, saying, 'It is better for Pentheus to be torn up at once by me than to be mangled over and over again by you.'"

18. The *Cyclops*, of uncertain date, is the only extant example of a satyric drama. The plot is taken mainly from the story of Odysseus and Polyphemus in the 9th book of the *Odyssey*. In order to be really successful in farce of this kind, a poet should have a fresh feeling for the nature of the art parodied. It is because Euripides was not in accord with the spirit of the heroic myths that he is not strong in mythic travesty. His own tragedies—such as the *Helen*, the *Electra* and the *Orestes*—had, in their several ways, contributed to destroy the meaning of satyric drama. They had done gravely very much what satyric drama aimed at doing grotesquely. They had made the heroic persons act and talk like ordinary men and women. The finer side of such parody had lost its edge; only broad comedy remained.

19. The *Rhesus* is still held by some to be what the didascaliae and the grammarians call it—a work of Euripides; and Paley has ably supported this view. But the scepticism first declared by Valcknaer has gained ground, and the *Rhesus* is now almost universally recognized as spurious. The art and the style, still more evidently the feeling and the mind, of Euripides are absent. If it cannot be ascribed to a disciple of his matured school, it is still less like the work of an Alexandrian. The most probable view seems to be that which assigns it to a versifier of small dramatic power in the latest days of Attic tragedy. It has this literary interest, that it is the only extant play of which the subject is directly taken from our *Iliad*, of which the tenth book—the Δολώνεια—has been followed by the playwright with a closeness which is sometimes mechanical.

Literary history of Euripides.

When the first protests of the comic poets were over, Euripides was secure of a wide and lasting renown. As the old life of Athens passed away, as the old faiths lost their meaning and the peculiarly Greek instincts in art lost their truth and freshness, Aeschylus and Sophocles might cease to be fully enjoyed save by a few; but Euripides could still charm by qualities more readily and more universally recognized. The comparative nearness of his diction to the idiom of ordinary life rendered him less attractive to the grammarians of Alexandria than authors whose erudite form afforded a better scope for the display of learning or the exercise of ingenuity. But there were two aspects in which he engaged their attention. They loved to trace the variations which he had introduced into the standard legends. And they sought to free his text from the numerous interpolations which even then had resulted from his popularity on the stage. Philochorus (about 306–260 B.C.), best known for his *Atthis*, dealt, in his treatise on Euripides, especially with the mythology of the plays. From 300 B.C. to the age of Augustus a long series of critics busied themselves with this poet. The first systematic arrangement of his reputed works is ascribed to Dicaearchus and Callimachus in the early part of the 3rd century B.C. Among those who furthered the exact study of his text, and of whose work some traces remain in the extant scholia, were Aristophanes of Byzantium, Callistratus, Apollodorus of Tarsus, Timachidas, and pre-eminently Didymus; probably also Crates of Pergamum and Aristarchus. At Rome Euripides was early made known through the translations of Ennius and the freer adaptations of Pacuvius. When Hellenic civilization was spread through the East, the mixed populations of the new settlements welcomed a dramatic poet whose taste and whose sentiment were not too severely or exclusively Attic. The Parthian Orodes and his court were witnessing the *Bacchae* of Euripides when the Agave of the hour was suddenly enabled to lend a ghastly reality to the terrible scene of frenzied triumph by displaying the gory head of the Roman Crassus. Mommsen has noted the moment as one in which the power of Rome and the genius of Greece were simultaneously abased in the presence of sultanism. So far as Euripides is concerned, the incident may suggest another and a more pleasing reflection; it may remind us how the charm of his humane genius had penetrated the recesses of the barbarian East, and had brought to rude and fierce peoples at least some dim and distant apprehension of that gracious world in which the great spirits of ancient Hellas had moved. A quaintly significant testimony to the popularity of Euripides is afforded by the Byzantine *Χριστὸς πάσχων*. This drama, narrating the events which preceded and attended the Passion, is a cento of no less than 2610 verses, taken from the plays of Euripides, principally from the *Bacchae*, the *Troades* and the *Rhesus*. The traditional ascription of the authorship to Gregory of Nazianzus is now generally rejected; another conjecture assigns it to Apollinaris of Laodicea, and places the date of composition at about A.D. 330.[1] Although the text used by the author of the cento may not have been a good one, the value of the piece for the diplomatic criticism of Euripides is necessarily very considerable; and it was diligently used both by Valcknaer and by Porson.

Dante, who does not mention Aeschylus or Sophocles, places Euripides, with the tragic poets Antiphon and Agathon, and the lyrist Simonides, in the first circle of Purgatory (xxii. 106), among those

> 'più
> Greci, che già di lauro ornar la fronte."

Casaubon, in a letter to Scaliger, salutes that scholar as worthy to have lived at Athens with Aristophanes and Euripides—a compliment which certainly implies respect for his correspondent's powers as a peacemaker. In popular literature, too, where Aeschylus and Sophocles were as yet little known, the 16th and 17th centuries testify to the favour bestowed upon Euripides. G. Gascoigne's and Francis Kinwelmersh's *Jocasta*, played at Gray's Inn in 1566, is a literal translation of Lodovico Dolce's *Giocasta*, which derives from the *Phoenissae*, probably through the Latin translation of R. Winter (Basel, 1541). Among early French translations from Euripides may be mentioned the version of the *Iphigenia in Tauris* by Thomas Sibilet in 1549, and that of the *Hecuba* by Bouchetel in 1550. About a century later Racine gave the world his *Andromaque*, his *Iphigénie* and his *Phèdre*; and many have held that, at least in the last-named of these, "the disciple of Euripides" has excelled his master. Bernhardy notices that the performance of the *Hippolytus* at Berlin in 1851 seemed to show that, for the modern stage, the *Phèdre* has the advantage of its Greek original. Racine's great English contemporary seems to have known and to have liked Euripides better than the other Greek tragedians. In the *Reason of Church Government* Milton certainly speaks of "those dramatic constitutions in which Sophocles and Euripides reign"; in the preface to his own drama, again, he joins the names of Aeschylus, Sophocles and Euripides,—"the three tragic poets unequalled yet by any." But the *Samson Agonistes* itself clearly shows that Milton's chief model in this kind was the dramatist whom he himself has called—as if to suggest the skill of Euripides in the delineation of pathetic women—"sad Electra's poet"; and the work bears a special mark of this preference in the use of Euripidean monodies. In the second half of the 18th century such men as J. J. Winckelmann (1717–1768) and G. E. Lessing (1729–1781) gave a new life to the study of the antique. Hitherto the art of the old world had been better known through Roman than through Greek interpreters. The basis of the revived classical taste had been Latin. But now men gained a finer perception of those characteristics which belong to the Greek work of the great time, a fuller sense of the difference between the Greek and the Roman genius where each is at its best, and generally a clearer recognition of the qualities which distinguish ancient art in its highest purity from modern romantic types. Euripides now became the object of criticism from a new point of view. He was compared with Aeschylus and Sophocles as representatives of that ideal Greek tragedy which ranges with the purest type of sculpture. Thus tried, he was found wanting: and he was condemned with all the rigour of a newly illuminated zeal. B. G. Niebuhr (1776–1831) judged him harshly; but no critic approached A. W. Schlegel (1767–1845) in severity of one-sided censure. Schlegel, in fact, will scarcely allow that Euripides is tolerable except by comparison with Racine. L. Tieck (1773–1853) showed truer appreciation for a brother artist when he

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[1] (According to Karl Krumbacher, *Gesch. der byz. Lit.*, it is an 11th-century production of unknown authorship.)

3,988,500 sq. m. The same, with Iceland, Novaya Zemlya, Spitsbergen and Bear Island, 4,093,000 sq. m. In all these calculations the islands in the Sea of Marmora, the Canary Islands, Madeira, and even the Azores, are excluded, but all the Greek islands of the Aegean Sea and the Turkish islands of Thasos, Lemnos, Samothrace, Imbros, Hagiostrati or Bozbaba, and even Tenedos, are included.

Extreme points.

The most northern point of the mainland area is Cape Nordkyn in Norway, 71° 6′ N.; its most southern, Cape Tarifa in Spain, in 36° 0′ N.; its most western, Cape da Roca in Portugal, 9° 27′ W.; and its most eastern, a spot near the north end of the Ural Mountains, in 66° 20′ E. A line drawn from Cape St Vincent in Portugal to the Ural Mountains near Ekaterinburg has a length of 3293 m., and finds its centre in the W. of Russian Poland. From the mouth of the Kara to the mouth of the Ural river the direct distance is 1600 m., but the boundary line has a length of 2400 m.

Coast-line.

Two of the most striking features in the general conformation of Europe are the great number of its primary and secondary peninsulas, and the consequent exceptional development of its coast-line—an irregularity and development which have been one of the most potent of the physical factors of its history. The total length of coast-line was estimated by Reuschle in 1869 at 19,820 m., of which about 3600 were counted as belonging to the Arctic Ocean, 8390 to the Atlantic, and 7830 to the Black Sea and Mediterranean. This estimate, however, does not take into account minor indentations. Reclus's estimate, including the more important indentations, brings the coast-line up to 26,700 m., and that of Strelbitsky up to 47,790 m. (smaller islands not included), or 1 m. of coast for about 75 sq. m. of area. Rohrbach[1] calculated the mean distance of all points in the interior of Europe from the sea at 209 m. as compared with 292 m. in the case of North America, the continent which ranks next in this respect. It must be pointed out, however, that such calculations are apt to be very misleading, inasmuch as the commercial value of the relations thus determined depends not merely on the existence of natural harbours or the presence of facilities for the construction of artificial harbours, but also on the presence of natural facilities for communication between such harbours and a productive interior.

Changes of coast-line.

The consideration just mentioned gives great significance to the fact that while the coast-line of Europe is in its general features very much the same as it was at the beginning of the true historic period, it has undergone a number of important local changes, some at least of which are due to causes that are at work over very extensive areas. These changes may be conveniently classified under four heads: the formation of deltas by the alluvium of rivers; the increase of the land-surface due to upheaval; the advance of the sea by reason of its own erosive activity; and the advance of the sea through the subsidence of the land. The actual form of the coast, however, is frequently due to the simultaneous or successive action of several of the causes—sea and river and subterranean forces helping or resisting each other. That changes in the coast-line on the shores of the Gulf of Bothnia have taken place within historical times through elevation of the land seems now to be generally admitted. The commune of Hvittisbofjärd north of Björneborg on the Finland side of that gulf gained about 2½ sq. m. between 1784 and 1894, an amount greater than could be accounted for by the most liberal estimates of alluvial deposit, and the most careful investigation seems to show that on the Swedish coast of that gulf a rise has taken place in recent years on the east coast of Sweden from about 57° 20′ N. increasing in amount towards the north up to 62° 20′ N., where it reaches an average of about two-fifths of an inch annually.[2] Our information is naturally most complete in regard to the Mediterranean coasts, as these were the best known to the first book-writing nations. There we find that all the great rivers have been successfully at work—more especially the Rhone, the Ebro and the Po. The activity of the Rhone, indeed, as a maker of new land, is astonishing. The tower of St Louis, erected on the coast in 1737, is now upwards of four miles inland; the city of Arles is said to be nearly twice as far from the sea as it was in the Roman period. The present St Gilles was probably a harbour when the Greeks founded Marseilles, and Aigues Mortes, which took its place in the middle ages, was no longer on the coast in the time of St Louis (13th century), but Narbonne continued to be a seaport till the 14th century. At the mouth of the Herault, according to Fischer,[3] the coast advances at least two metres or about 7 ft. annually; and it requires great labour to keep the harbour of Cette from being silted up. The Po is even more efficient than the Rhone, if the size of its basin be taken into account. Ravenna, which was at one time an insular city like Venice, has now a wide stretch of downs partly covered with pine forest between it and the sea. Aquileia, one of the greatest seaports of the Mediterranean in the early centuries of the Christian era, is now 7 m. from the coast, and Adria, which gives its name to the sea, is 13. The islands on which Venice is built have sunk about 3 ft. since the 16th century: the pavement of the square of St Mark's has frequently required to be raised, and the boring of a well has shown that a layer of vegetable remains, indicating a flora identical with that observed at present on the neighbouring mainland, exists at a depth of 400 ft. below the alluvial deposits. A little to the south of Rovigno on the Istrian coast on the opposite side of the Adriatic a diver found at the depth of about 85 ft. the remains of a town, which has been identified with the island town of Cissa, of which nothing had been known after the year 679.[4] At Zara ancient pavements and mosaics are found below the sea-level, and the district at the mouth of the Narenta has been changed into a swamp by the advance of the sea. A process of elevation, on the other hand, is indicated along nearly all the coasts of Sicily, at the southern end of Sardinia, the east of Corsica, and perhaps in the neighbourhood of Nice, while the west coast of Italy from the latitude of Rome to the southern shores of the Gulf of Salerno has undergone considerable oscillations of level within historical times. About the time of the settlement of the Greeks the coast stood at least 20 ft. above the level of the present day. Depression began in Roman times, though then the land was still 16 ft. higher than now. A more rapid depression began in the middle ages, so that the sea-level rose from 18 to 20 ft. above the present zero, and the coast began gradually to rise again at the close of the 15th century.[5] Passing eastward to the Balkan peninsula, we find considerable changes on the coast-line of Greece; but as they are only repetitions on a smaller scale of the phenomena already described, it is sufficient to indicate the Gulf of Arta and the mouth of the Spercheios as two of the more important localities. The latter especially is interesting to the historian as well as to the geologist, as the river has greatly altered the physical features of one of the world's most famous scenes—the battlefield of Thermopylae.

If we proceed to the Atlantic seaboard we observe, as we might expect, great modifications in the embouchures of the Garonne and the Loire, but by far the most remarkable variations of sea and land have taken place in the region extending from the south of Belgium in the neighbourhood of the Straits of Dover to the mouth of the Elbe and the west coast of Schleswig-Holstein. Here there has been a prolonged struggle between man and nature, in which on the whole nature has hitherto had the best of the battle. While, as is well known, much land below sea-level in the Low Countries has been protected against the sea by dikes and reclaimed, and the coast-line has been, on the whole, advanced between the Elbe and the Eider,[6] there has been a great loss of land in the interior of Holland since the beginning of the Christian era, and on the balance a large loss of land north of the Eider since the first half of the 13th century.[7] In the 1st century A.D. the Zuider Zee appears to have been represented only by a comparatively small inland lake, the dimensions of which were increasod by different inroads of the sea, the last and greatest of which occurred in 1395. Among the local changes of European significance within this area may be mentioned the silting up towards the end of the 15th century of the channel known as the Zwin running north-eastwards from Bruges, which through that cause lost its shipping and in the end all its former renown as a seat of commerce.

The Baltic shores of Germany display the same phenomena of local gain and loss. In the western section inroads of the sea have been extensive: the island of Rügen would no longer serve for the disembarkation of an army like that of Gustavus Adolphus; Wollin and Usedom are growing gradually less; large stretches of the mainland are fringed with submerged forests; and at intervals the sites of well-known villages are occupied by the sea. Towards the east the great rivers are successfully working in the opposite direction. In the Gulf of Danzig the alluvial deposits of the Vistula cover an area of 615 sq. m.; in the 13th century the knights of Marienburg enclosed with dikes about 350 sq. m.; and an area of about 70 sq. m. was added in the course of the 14th. The Memel is silting up the Kurisches Haff, which, like the Frisches Haff, is separated from the open sea by a line of dunes comparable with those of the Landes in France. The so-called strand or coast-lines at various altitudes round the Scandinavian peninsula, though belonging for the most part to glacial times, speak also of relative changes of level in the post-glacial period.

Volcanoes and earthquakes.

The changes briefly indicated above take place so gradually for the most part that it requires careful observation and comparison of data to establish their reality. It is very different with those changes which we usually ascribe to volcanic agency. Besides the great outlying "hearth" of Iceland, there are four centres of volcanic activity in Europe—all of them, however, situated in the Mediterranean. Vesuvius on the western coast of Italy, Etna in the island of Sicily, and Stromboli

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[1] *Petermanns Mitteilungen* (1890), p. 91.

[2] See Supan's *Physische Erdkunde*, 4th ed., pp. 376-377, and the authorities there quoted.

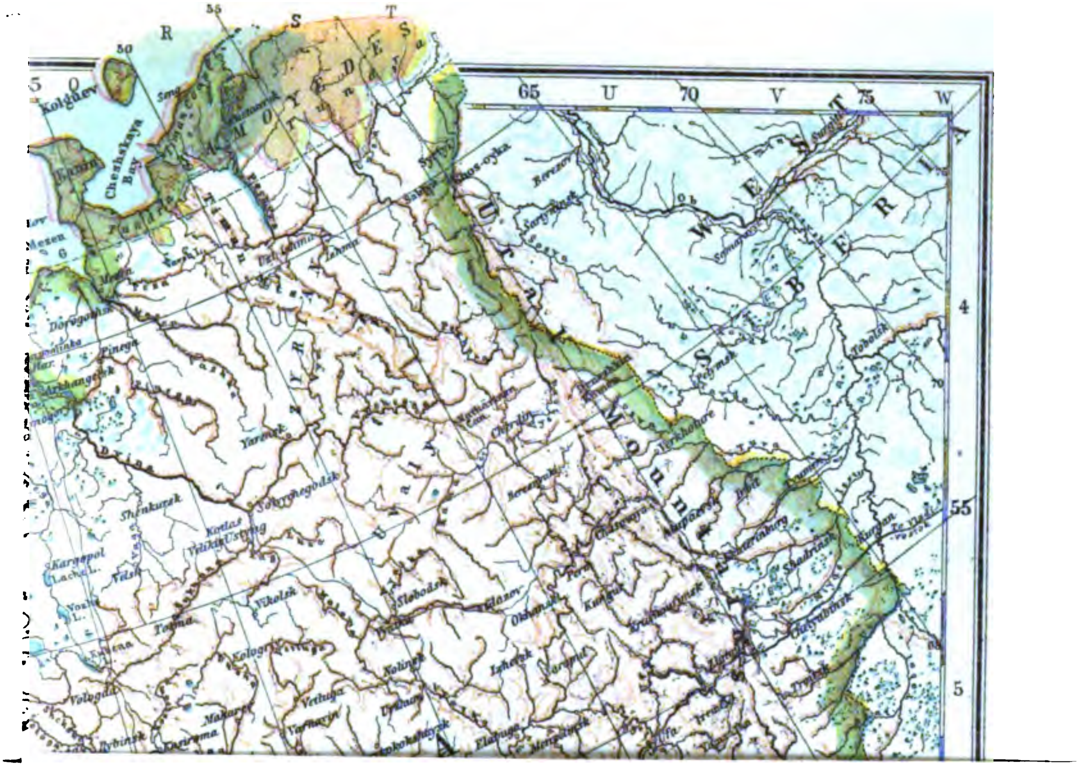
[3] "Küstenveränderungen im Mittelmeergebiet," in *Ztschr. der Ges. für Erdkunde zu Berlin* (1878).

[4] See *Mitteil. der Wiener Geog. Gesellschaft* (1890), p. 333.

[5] See R. T. Günther, *Contributions to the Study of Earth-Movements in the Bay of Naples* (Oxford, 1903), and "Earth-Movements in the Bay of Naples," in the *Geog. Journ.* vol. xxii. pp. 121-149, 269-285.

[6] See *Petermanns Mitteil.* (1891), Pl. 8.

[7] *Ib.* (1893), Pl. 12.



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Kolguev
Cheshskaya Bay
Kanin
SAMOYEDES
Tundra
Mezen
Dorogorsk
Pinega
Arkhangelsk
Onega
Dvina
Shenkursk
Kargopol
Lache L.
Vozhe L.
Velsk
Kotlas
Velikii Ustyug
Solvychegodsk
Yarensk
Ust Tsilma
Izhma
Pechora
Sosva
URAL MOUNTAINS
Tcherdyn
Solikamsk
Berezniki
Perm
Kungur
Krasnoufimsk
Okhansk
Sarapul
Izhevsk
Glazov
Slobodsk
Vyatka
Nolinsk
Urzhum
Yelabuga
Menzelinsk
Ufa
Sterlitamak
Zlatoust
Troitsk
Chelyabinsk
Yekaterinburg
Shadrinsk
Kurgan
Irbit
Verkhoturye
Turinsk
Tura
Tobolsk
Pelym
Berezov
Sartynsk
Samarovo
Surgut
Ob
WEST SIBERIA
Tyumen
Nikolsk
Totma
Kologriv
Vologda
Vetluga
Yaransk
Makariev
Kostroma
Rybinsk
Kadnikov
Sukhona
Kama
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in the Lipari group, have been familiarly known from the earliest historic times; but the fourth has only attracted particular attention since the 18th century. It lies in the Archipelago, on the southern edge of the Cyclades, near the little group of islets called Santorin. The region was evidently highly volcanic at an earlier period, for Milo, one of the nearest of the islands, is simply a ruined crater still presenting smoking solfataras and other traces of former activity. The devastations produced by the eruptions of the European volcanoes are usually confined within very narrow limits; and it is only at long intervals that any part of the continent is visited by a really formidable earthquake. The only part of Europe, however, for which there are no recorded earthquakes is central and northern Russia; and the Alps and Carpathians, especially the intra-Carpathian area of depression, Greece, Italy, especially Calabria and the adjoining part of Sicily, the Sierra Nevada and the Pyrenees, the Lisbon district and the rift valley of the upper Rhine (between the Vosges and the Black Forest) are all regions specially liable to earthquake shocks and occasionally to shocks of considerable intensity. One well-marked seismic line extends along the south side of the Alps from Lake Garda by Udine and Görz to Fiume, and another forms a curve convex towards the south-east passing first through Calabria, then through the north-east of Sicily to the south of the Pelontan Mountains.[1] Of all European earthquakes in modern times, the most destructive are that of Lisbon in 1755, and that of Calabria in 1783; the devastation produced by the former has become a classical instance of such disasters in popular literature, and by the latter 100,000 people are said to have lost their lives. Calabria again suffered severely in 1865, 1870, 1894, 1905 and 1908.

Relief.

If the European mountains are arranged according to their greatest elevations, they rank as follows:—(1) the Swiss Alps, with their highest peaks above 15,000 ft.; (2) the Sierra Nevada, the Pyrenees, and Etna, about 11,000 ft.; (3) the Apennines, the Corsican Mountains, the Carpathians, the Balkans, and the Despoto Dagh, from 8000 to 9000; (4) the Guadarrama, the Scandinavian Alps, the Dinaric Alps, the Greek Mountains, and the Cevennes, between 6000 and 8000; (5) the mountains of Auvergne, the Jura, the Riesengebirge, the mountains of Sardinia, Majorca, Minorca, and the Crimea, the Black Forest, the Vosges, and the Scottish Highlands, from 4000 to 6000.

The following estimates are based on those contained in the fifth edition, by Dr Hermann Wagner, of Guthe's *Lehrbuch der Geographie*. In the original the figures are given in German sq. m. and in sq. kilometres in round numbers, and the equivalents here given in English sq. m. are similarly treated:—

	Sq. m.
The great European plain in its widest sense	2,660,000
The same exclusive of inland seas	2,300,000
The same exclusive of the Scandinavian and British lowlands	2,125,000
All other European lowlands	385,000
The Hungarian plain	38,000
The Po plain	21,000
The Scandinavian highlands	190,000
The Ural Mountains	127,000
The Alps	85,000
The Carpathians	72,000
The Apennines	42,500
The Pyrenees	21,500

Several estimates have been made of the average elevation of the continent, but it is enough to give here the main results. In the following list, where a conversion from metres into feet has been necessary, the nearest multiple of 5 ft. has been given:—Humboldt, 675 ft.; Leipoldt,[2] 975 ft.; De Lapparent,[3] 960 ft.; Murray,[4] 939 ft.; Supan,[5] 950 ft.; von Tillo,[6] 1040 ft.; Heiderich,[7] 1230 ft.; Penck,[8] 1085 ft. The exceptionally high estimate of Heiderich is due to the fact that by him Transcaucasia and the islands of Novaya Zemlya, Spitsbergen and Iceland are reckoned as included in Europe.

Arrangement of the highlands.

Of more geographical significance than these estimates are the facts with regard to the arrangement of the highlands of the continent. It is indeed this arrangement combined with the form of the coast-line which has indirectly given to Europe its individuality. Three points have to be noted under this head:—(1) the fact that the highlands of Europe are so distributed as to allow of the penetration of westerly winds far to the east; (2) the fact that the principal series of highlands has a direction from east to west, Europe in this point resembling Asia but differing from North America; and (3) that in Europe the mountain systems belonging to the series of highlands

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[1] See Ed. Suess, *The Face of the Earth*, translated by H. B. C. Sollas, vol. i. (Oxford, 1904); J. Milne, *Seismology* (London, 1886); R. Hörnes, *Erdbebenkunde* (Leipzig, 1893).

[2] *Die mittlere Höhe Europas* (Plauen, 1874).

[3] *Traité de géologie* (Paris, 1883). [4] *Scot. Geog. Mag.* (1888), p. 23.

[5] *Petermanns Mitteilungen* (1889), p. 17.

[6] *Trans.* (*Izvestiya*) *Imp. Rus. Geog. Soc.* (1889), p. 113.

[7] *Die mittleren Erhebungsverhältnisse der Erdoberfläche*, pt. i., in Penck's *Geographische Abhandlungen*, vol. v. (Vienna, 1891).

[8] *Morphologie der Erdoberfläche*, vol. i.

Name of River.	Length in English Miles.		Area of Basi in sq. m.
	Strelbitsky.	Other Authorities.	Strelbitsky.
Volga	1977[1]	2107[2]	563,300
Danube	1644	..	315,435
Ural	1446	1477[2]	96,350
Dnieper (Dnyepr)	1064	1328[2]	203,460
Kama	984	1115[2]	202,615
Don (Russia)	980	1123[2]	166,125
Pechora	915	1024[2]	127,225
Rhine	709	..	63,265
Oka	706	914[2]	93,205
Dniester (Dnyestr)	646	835[2]	29,675
Elbe	612	..	55,340
Vistula	596	646[2]	73,905
Vyatka	596	680[2]	50,555
Tagus	566	..	31,865[3]
Theiss (Tisza)	550	..	59,350
Loire	543	..	46,755
Save	535	..	37,595
Meuse	530	..	12,740
Mezen	496	507[2]	30,410
Donets	487	613[2]	37,890
Douro	485	..	36,705
Düna (S. Dvina)	470	576[2]	32,975
Ebro	470	..	38,580[3]
Rhone	447	..	38,180
Desna	438	590[2]	33,535
Niemen (Nyeman)	437	537[2]	34,965
Drave	434	..	15,745
Bug (Southern)	428	477[2]	26,225
Seine	425	..	30,030
Oder	424	..	17,150
Kuban	405	509[2]	21,490
Khoper	387	563[2]	23,120
Maros	390	..	16,975
Pripet	378	404[2]	46,805
Guadalquivir	374	..	21,580[3]
Pruth (Prutŭ)	368	503[2]	10,330
Northern Dvina	358	447[2]	141,075
Weser-Werra	355	..	19,925
Po	354	..	28,920[3]
Garonne-Gironde	342	..	32,745
Vetluga	328	464[2]	14,325
Pinega	328	407[2]	17,425
Glommen	326	352[4]	15,930
Bug (Western)	318	450[2]	22,460
Guadiana	316	..	25,300[3]
Aluta (Alt, Oltŭ)	308	..	9,095
Mosel	300	..	10,950
Main	300	..	10,600
Maritsa	272	..	20,790
Jucar	270	..	7,620[3]
Mologa	268	338[2]	15,005
Tornea	268	..	13,045
Inn	268	..	9,825
Saône	268	..	8,295
Moldau	255	267[4]	10,860
Moksha	249	371[2]	19,090
Ljusna	243	..	7,700
Mur	242	..	5,200
Morava, Servian	235	..	15,715
Klar	224	..	4,520
Voronezh	218	305[2]	7,760
Berezina	218	285[2]	9,295
Saale	215	..	8,970
Onega	212	245[2]	22,910
Vág (Waag)	212	..	6,245
Dema	209	275[2]	4,830
San	203	444[2]	6,135
Moskva	189	305[2]	5,910
Western Manych	176	295[2]	37,820
Klyazma	159	394[2]	15,200

[1] The equivalent of the figures given in *Superficie de l'Europe*. later measurement by Strelbitsky yielded a result equal to 221 English miles.

[2] General von Tillo, in *Transactions* (*Izvestiya*) *Imp. Rus. Geog. So* vol. xix. (1883), pp. 160-161.

[3] Dr Al. Bludau in *Petermanns Mitteilungen* (1898), pp. 185-18 has given new calculations of the areas of the basins of certai European rivers, namely, the Tagus, 31,250 sq. m.; Ebro, 32,81 sq. m.; Guadalquivir, 21,620 sq. m.; Po, 28,800 sq. m.; Guadian 25,810 sq. m.; and Jucar, 8245 sq. m.

[4] St Martin, *Dict. de géog. univ.*

referred to not only have more or less well-marked breaks between them, but are themselves so notched by passes and cut by transverse valleys as to present great facilities for crossing in proportion to their average altitude. The first and second of these points have special importance with reference to the climate and will accordingly be considered more fully under that head. The second is also of importance with reference to the means of communication, to which the third also refers, and detailed consideration of these points in that relation will be reserved for that heading. Here, however, it may be noted that in Europe the distribution of the natural resources for the maintenance of the inhabitants is such that, if we leave out of account Russia, which is almost entirely outside of the series of highlands running east and west, the population north of the mountains is roughly about 50% greater than that south of the mountains, whereas in Asia the population north of the east and west highland barrier is utterly insignificant as compared with that to the south.

From the table given on p. 909 (col. 1) it will be seen that the most extensive of the highland areas of Europe is that of Scandinavia, which has a general trend from south-south-west to north-north-east, and is completely detached by seas and plains from the highland area to the south. There are other completely detached highland areas in Iceland, the British Isles, the Ural Mountains, the small Yaila range in the south of the Crimea, and the Mediterranean islands. The connected series of highlands is that which extends from the Iberian peninsula to the Black Sea stretching in the middle of Germany northwards to about 52° N. In the Iberian peninsula we have the most marked example of the tableland form in Europe, and these tablelands are bounded on the north by the Cantabrian Mountains, which descend to the sea, and the Pyrenees, which, except at their extremities, cut off the Iberian peninsula from the adjoining country more extensively than any other chain in the continent. Between the foot-hills of the Pyrenees, however, and those of the central plateau of France the ground sinks in the Passage of Naurouse or Gap of Carcassonne to a well-marked gap establishing easy communication between the valley of the Garonne and the lower part of that of the Rhone. The highlands in the north spread northwards and then north-eastwards till they join the Vosges, but sink in elevation towards the north-east so as to allow of several easy crossings. East of the Vosges the Rhine valley forms an important trough running north and south through the highlands of western Germany. To the south of the Vosges again undulating country of less than 1500 ft. in elevation, the well-known Burgundy Gate or Gap of Belfort, constitutes a well-marked break between those mountains and the Jura, and establishes easy communication between the Rhine and the Saône-Rhone valleys. The latter valley divides in the clearest manner the highlands of central France from both the Alps and the Jura, while between these last two systems there lies the wedge of the Swiss midlands contracting south-westwards to a narrow but important gap at the outlet of the Lake of Geneva. Between the Alps and the mountains of the Italian and Balkan peninsulas the orographical lines of demarcation are less distinct, but on the north the valley of the Danube mostly forms a wide separation between the Alps and the mountains of the Balkan peninsula on the south and the highlands of Bohemia and Moravia, the Carpathians and the Transylvanian Alps on the north. The valleys of the Eger and the Elbe form distinct breaks in the environment of Bohemia, and the Sudetes on the north-east of Bohemia and Moravia are even more clearly divided from the Carpathians by the valley of the upper Oder, the Moravian Gate, as it is called, which forms the natural line of communication between the south-east of Prussia and Vienna.

Rivers.

An estimate has been made by Strelbitsky of the length and of the area of the basins of all the principal rivers of Europe. In the table on p. 909 all the estimates given without any special authority are based on Strelbitsky's figures, but it should be mentioned that the estimates of length made by him evidently do not take into account minor windings, and are therefore generally less than those given by others. The authorities are separately cited for the originals of all other figures given in the table.[1]

The observations on the temperature of European rivers have been collected and discussed by Dr Adolf E. Forster.[2] He finds that the dominant factor in determining that temperature is the temperature of the air above, but that rivers are divisible into four groups with respect to the relation between these temperatures at different seasons of the year. These groups are rivers flowing from glaciers, in which the temperature is warmer than the air in winter, colder in summer; rivers flowing from lakes, characterized by peculiarly high winter temperatures, in consequence of which the mean temperature for the year is always above that of the air; rivers flowing from springs, which, at least near their source, are more rapidly cooled by low than warmed by high air temperatures; and rivers of the plains, which have a higher mean temperature than the air in all months of the year.

In various parts of Europe, more particularly in calcareous regions, such as the Jura, the Causses in the south-east of France, and the Karst in the north-west of the Balkan peninsula, there are numerous subterranean or partly subterranean rivers. Several of the more important rivers are of very irregular flow, and some are subject to really formidable floods. This is particularly the case with rivers a large part of whose basin is made up of crystalline or other impervious rocks with steep slopes, like those of the Loire in France and the Ebro in Spain. The Danube and its tributaries, the great rivers of Germany, above all eastern Germany, and those of Italy, are also notorious for their inundations. In southern Europe, where the summers are nearly rainless, most of the rivers disappear altogether in that season.

Name of Lake and Country.	Height above Sea.	Area.	Greatest Depth.	Mean Depth.	Volume. Millions of Cub. Ft.
	Ft.	Sq. m.	Ft.	Ft.	
Ladoga, Russia	15	7004	730	..	..
Onega, „	115	3765	About 1200	..	..
Vener, Sweden	145	2149	280	..	..
Chudskoye or Peipus, Russia	100	1357[3]	90	..	..
Vetter, Sweden	290	733	415	..	..
Saima, Russia	255	680	185	..	..
Päjäne, „	255	608	..	..	..
Enare, „	490	549	..	..	..
Segozero, „	..	481	140	..	..
Mälar, Sweden	1·6	449	170	..	..
Byelo-Ozero, Russia	400	434	35	..	..
Pielis, Russia	305	422	..	..	..
Topozero, Russia	..	411	..	..	..
Uleå, „	375	380	60	..	..
Ilmen, „	107	358	..	..	..
Vigozero, „	..	332	..	..	..
Imandra, „	..	329	..	..	..
Balaton, Hungary	350	266	13	..	..
Geneva, France and Switzerland	1220	225	1015	500	3,140,000
Kovdozero, Russia	..	225	..	..	..
Constance, Germany and Switzerland	1295	208	825	295	1,711,000
Hjelmar, Sweden	79	187	60	..	..
Neagh, Ireland	48	153	113	..	..
Kubinskoye, Russia	..	152	..	..	..
Mjösen, Norway	395	152	1485	..	..
Garda, Italy and Austria	215	143	1135	445	1,757,000
Torne-träsk, Sweden	1140	139	..	..	..
Neusiedler-see, Hungary	370	137	13	..	..
Scutari, Turkey	20	About 130	33	12½	45,900
Siljan, Sweden	..	123	..	..	..
Virzjärvi, Russia	115	107	24	..	..
Seliger, „	825	100	105	..	..
Stor Afvan, Sweden	1370	92	925	..	..
Yalpukh, Russia	..	89	..	..	..
Neuchâtel, Switzerland	1415	85	500	210	500,000
Ylikitkakärvi, Russia	680	85	30	..	..
Maggiore, Italy and Switzerland	645	82	1220	575	1,316,000
Corrib, Ireland	30	71	152	..	..
Como, Italy	655	56	1360	..	..

Lakes and marshes.

For many European lakes, especially the smaller ones, estimates have been made of the mean depth and the volume. A list of all the European lakes for which the altitude, extent, and greatest depth could be ascertained, compiled by Dr K. Peucker, is published in the *Geog. Zeitschrift* (1896), pp. 606-616, where estimates of the mean depth and the volume are also given where procurable. The table given above, comprising only the larger lakes, is mainly based on this list, where the original authorities are mentioned. The figures entered in the table not taken from this list are after Strelbitsky, the *Géog. Universelle* of V. de St Martin, or, in the case of Swedish lakes, from the official handbook of Sweden.[1]

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[1] In other parts of this work areas of river-basins and lakes, and other measurements, may be observed to conflict in some degree with those given here. Various authorities naturally differ, both in methods of estimating and in standards of precision.

[2] Penck's *Geographische Abhandlungen*, vol. v. pt. iv. (Vienna, 1894); noticed in *Geog. Journ.* vol. vi. p. 264.

[3] Including L. Pskov as well as the connecting arm known as Teploye.

The Alpine lakes break up into a southern and northern subdivision—the former consisting of the Lago Maggiore, and the lakes of Lugano and Como, Lago d'Iseo, and Lago di Garda, all connected by affluents with the system of the Po: and the latter the Lake of Geneva threaded by the Rhone, Lakes Constance, Zürich, Neuchâtel, Biel and other Swiss lakes belonging to the basin of the Rhine, and a few of minor importance belonging to the Danube. The north Russian lakes, Ladoga, Onega, &c., are mainly noticeable as the largest members of what in some respects is the most remarkable system of lakes in the continent—the Finno-Russian, which consists of an almost countless number of comparatively small irregular basins formed in the surface of a granitic plateau. In Finland proper they occupy no less than a twelfth of the total area.

A few of the number are very shallow. The Neusiedler See, for example (the Peiso Lacus of the Latins and Fertö-tava of the Hungarians), completely dried up in 1693, 1738 and 1864, and left its bed covered for the most part with a deposit of salt.[2] Lakes Copais in Boeotia and Fucino Celano in Italy have been entirely turned into dry land. The progress of agriculture has greatly diminished the extent of marsh land in Europe. The Minsk marshes in Russia form the largest area of this character still left, and on these large encroachments are gradually being made. Extensive marshes in northern Italy have been completely drained. The partial draining of the Pomptine marshes in Italy made Pope Pius VII. famous in the 18th century, and further reclamation works are still in progress there and elsewhere in the same country. (G. G. C.)

Geology.

The geological history of Europe[3] is, to a large extent, a history of the formation and destruction of successive mountain chains. Four times a great mountain range has been raised across the area which now is Europe. Three times the mountain range has given way; portions have sunk beneath the sea, and have been covered by more recent sediments, while other portions remained standing and now rise as isolated blocks above the later beds which surround them. The last of the mountain ranges still stands, and is known under the names of the Alps, the Carpathians, the Balkans, the Caucasus, &c., but the work of destruction has already begun, and gaps have been formed by the collapse of parts of the chain. The Carpathians were once continuous with the Alps, and the Caucasus was probably connected with the Balkans across the site of the Black Sea.

These mountain chains were not raised by direct uplift. They consist of crumpled and folded strata, and are, in fact, wrinkles in the earth's outer crust, formed by lateral compression, like the puckers which appear in a tablecloth when we push it forward against a book or other heavy object lying upon it. How the lateral or tangential pressures originated is still matter of controversy, but the usually accepted explanation is as follows. The interior of the earth in cooling contracts more rapidly than the exterior, and, if no other change took place, the outer crust would be left as a hollow sphere without any internal support. But the materials of which it is composed are not strong enough to bear its enormous weight, and, like an arch which is too weak in its abutments, it collapses upon the interior core. Where the crust is rigid it fractures, as an ordinary arch would fracture; and some portions fall inward, while other parts may even be wedged a little outward. Where, on the other hand, the crust is made of softer rock, it crumples and folds, and a mountain chain is produced. Such a mountain chain, for want of a better term, is called a folded mountain chain. The folding is most intense where a flexible portion of the crust lies next to a more rigid part. Where the folding has occurred, the rocks which were once comparatively soft become hard and rigid, and the next series of wrinkles will usually be formed beyond the limits of the old one. This is what has happened in the European area.

The oldest mountain chain lay in the extreme north-west of Europe, and its relics are seen in the outer Hebrides, the Lofoten Islands and the north of Norway. The rocks of this ancient chain have since been converted into gneiss, and they were folded and denuded before the deposition of the oldest known fossiliferous sediments. The mountain system must therefore have been formed in Pre-Cambrian times, and it has been called by Marcel Bertrand the Huronian chain. It is probable that a great land-mass lay towards the north-west; but in the sea which certainly existed south-east of the chain, the Cambrian, Ordovician and Silurian beds were deposited. In Russia and South Sweden these beds still lie flat and undisturbed; but in Norway, Scotland, the Lake District, North Wales and the north of Ireland they were crushed against the north-western continent and were not only intensely folded but were pushed forward over the old rocks of the Huronian chain. Thus was formed the Caledonian mountain system of Ed. Suess, in which the folds run from south-west to north-east. It was raised at the close of the Silurian period.

Then followed, in northern Europe, a continental period. By the elevation of the Caledonian chain the northern land-mass had grown southward and now extended as far as the Bristol Channel. Upon it the Old Red Sandstone was laid down in inland seas or lakes, while farther south contemporaneous deposits were formed in the open sea.

During the earlier part of the Carboniferous period the sea spread over the southern shores of the northern continent; but later the whole area again became land and the Coal Measures of northern Europe were laid down. Towards the close of the Carboniferous period the third great mountain chain was formed. It lay to the south of the Caledonian chain, and its northern margin stretched from the south of Ireland through South Wales, the north of France and the south of Belgium, and was continued round the Harz and the ancient rocks of Bohemia, and possibly into the south of Russia. It is along this northern margin, where the folded beds have been thrust over the rocks which lay to the north, that the coalfields of Dover and of Belgium occur. The general direction of the folds is approximately from west to east; but the chain consisted of two arcs, the western of which is called by Suess the Armorican chain and the eastern the Variscian. The two arcs together, which were undoubtedly formed at the same period, have been named by Bertrand the Hercynian chain. Everywhere the chief folding seems to have occurred before the deposition of the highest beds of the Upper Carboniferous, which lie unconformably upon the folded older beds. The Hercynian chain appears to have been of considerable breadth, at least in western Europe, for the Palaeozoic rocks of Spain and Portugal are thrown into folds which have the same general direction and which were formed at approximately the same period. In eastern Europe the evidence is less complete, because the Hercynian folds are buried beneath more recent deposits and have in some cases been masked by the superposition of a later series of folds.

The formation of this Carboniferous range was followed in northern Europe by a second continental period somewhat similar to that of the Old Red Sandstone, but the continent extended still farther to the south. The Permian and Triassic deposits of England and Germany were laid down in inland seas or upon the surface of the land itself. But southern Europe was covered by the open sea, and here, accordingly, the contemporaneous deposits were marine.

The Jurassic and Cretaceous periods were free from any violent folding or mountain building, and the sea again spread over a large part of the northern continent. There were indeed several oscillations, but in general the greater part of southern and central Europe lay beneath the waters of the ocean. Some of the fragments of the Hercynian chain still rose as islands above the waves, and at certain periods there seems to have been a more or less complete barrier between the waters which covered northern Europe and those which lay over the Mediterranean region. Thus, while the estuarine deposits of the Upper Jurassic and Lower Cretaceous were laid down in England and Germany, the purely marine Tithonian formation, with its peculiar fauna, was deposited in the south; and while the Chalk was formed in northern Europe, the Hippurite limestone was laid down in the south.

The Tertiary period saw fundamental changes in the geography of Europe. The formation of the great mountain ranges of the south, the Alpine system of Suess, perhaps began at an earlier date, but it was in the Eocene and Miocene periods that the chief part of the elevation took place. Arms of the sea extended up the valley of the Rhone and around the northern margin of the Alps, and also spread over the plains of Hungary and of southern Russia. Towards the middle of the Miocene period some of these arms were completely cut off from the ocean and large deposits of salt were formed, as at Wieliczka. At a later period south-eastern Europe was covered by a series of extensive lagoons, and the waters of these lagoons gradually became brackish, and then fresh, before the area was finally converted into dry land. Great changes also took place in the Mediterranean region. The Black Sea, the Aegean, the Adriatic and the Tyrrhenian Sea were all formed at various times during the Tertiary period, and the depression of these areas seems to be closely connected with the elevation of the neighbouring mountain chains.

Exactly what was happening in northern Europe during these great changes in the south it is not easy to say. The basaltic flows of the north of Ireland, the western islands of Scotland, the Faeroe Islands and Iceland are mere fragments of former extensive plateaus. No sign of marine Tertiary deposits of earlier age than Pliocene has been found in this northern part of Europe, and on the other hand plant remains are abundant in the sands and clays interbedded with the basalts. It is probable, therefore, that in Eocene times a great land-mass lay to the north-west of Europe, over which the basalt lavas flowed, and that the formation of this part of the Atlantic and perhaps of the North Sea did not take place until the Miocene period.

At a later date the climate, for some reason which has not yet been fully explained, grew colder over the whole of Europe, and the northern part was covered by a great ice-sheet which extended southward nearly as far as lat. 50° N., and has left its marks over the whole of the northern part of the continent. With the final melting and disappearance of the ice-sheet, the topography of Europe assumed nearly its present form, and man came upon the scene. Minor changes, such as the separation of Great Britain from the continent, may have occurred at a later date; but since the Glacial period there have, apparently, been no fundamental modifications in the configuration of Europe.

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[1] *Sweden, its People and its Industry* (Stockholm, 1904).

[2] See Ascherson, "Die Austrocknung des Neusiedler Sees," in *Z. der Ges. für Erdkunde zu Berlin* (1865).

[3] See Suess, *The Face of the Earth*; M. Bertrand, "Sur la distribution géographique des roches éruptives en Europe," *Bull. Soc. Géol. France*, ser. 3, vol. xvi. (1887-1888), pp. 573-617. A translation of a lecture by Suess, giving a short summary of his views on the structure of Europe, will be found in the *Canadian Record of Science*, vol. vii. pp. 235-246.

The elevation of each of the great mountain systems already described was accompanied by extensive eruptions of volcanic rocks, and the sequence appears to have been similar in every case. The volcanoes of the Mediterranean are the last survivors of the great eruptions which accompanied the elevation of the Alpine mountain system. (P. LA.)

Winds.

In western Europe by far the most prevalent wind is the S.W. or W.S.W. It represents 25% of the annual total; while the N. is only 6%, the N.E. 8, the E. 9, the S. 13, the W. 17 and the N.W. 11. Of the summer total it represents 22%, while the N. is 9, N.E. 8, E. 7, S.E. 7, W. 21 and N.W. 17. In south-eastern Europe, on the other hand, the prevailing winds are from the N. and E.—the E. having the preponderance in winter and autumn.[1] Of local winds the most remarkable are the föhn, in the Alps, distinguished for its warmth and dryness; the Rotenturm wind of Transylvania, which has similar characteristics; the bora of the Upper Adriatic, so noticeable for its violence; the mistral of southern France; the etesian winds of the Mediterranean; and the sirocco, which proves so destructive to the southern vegetation. Though it is only at comparatively rare intervals that the winds attain the development of a hurricane, the destruction of life and property which they occasion, both by sea and land, is in the aggregate of no small moment. About six or seven storms from the west pass over the continent every winter, usually appearing later in the southern districts, such as Switzerland or the Adriatic, than in the northern districts, as Scotland and Denmark.

Climate.

The great determining factors of the climate of Europe are these. The northern borders of the continent are within the Arctic Circle; the most southern points of the mainland are 13½° or more north of the Tropic of Cancer; to the east extends for about 3000 m. the continuous land surface of Asia; to the west lie the waters of the north Atlantic, which penetrate in great inland seas to the north and south of the great European peninsula; the prevailing winds in western Europe as already stated are more or less south-westerly; and the arrangement of the highlands is such as to allow of the penetration of winds with a westerly element in their direction far to the east. The first two of these factors are not distinguishing influences. They affect the climate of Europe in the same manner as they do that of any other land surface in the same latitudes.

The remaining factors, however, are of the highest importance. It is to them in fact that Europe owes in a very large measure those physical conditions which are the basis of its recognition as a separate continent. In estimating the value of those factors one must bear in mind, first, that the waters of the north Atlantic are exceptionally warm, especially on the European side of the ocean. The Gulf Stream carries a large body of warm water northwards to near the parallel of 40° N., and to the north of the Gulf Stream prevailing south-westerly winds, especially during the winter months, drift onwards to the western and northern shores of Europe, even as far east as Spitsbergen, large bodies of water of an exceptionally high temperature. Secondly, one must bear in mind that these relatively high temperatures over the ocean promote evaporation and thus favour the presence of a relatively large amount of water-vapour in the air over those parts of the ocean which adjoin the continent; and, thirdly, that, as the winds are the sole means of carrying water-vapour from one part of the earth's surface to the other, and the sole means of carrying heat and cold from the ocean to the land, the prevailing south-westerly winds are allowed by the superficial configuration to bring a relatively high rainfall and a relatively large amount of heat in winter to land farther in the interior than in any corresponding latitudes. During the summer the winds referred to have a cooling effect, but not to the same degree as those of winter tend to raise the temperature. From the point of view just indicated the only part of the world that is fairly comparable with Europe is the west of North America; but, as there the outline and superficial configuration are quite different, the oceanic influences affect only a narrow strip of seaboard and not any extent of land which could be regarded as of continental rank. It is owing to these influences that in the greater part of Europe there is a more or less continuous population dependent on agriculture. On the east side of Europe, again, the existence of the continent of Asia has a marked effect on the climate which also aids in giving to Europe its individual character. It is owing to that circumstance that the south-east of the continent, which has temperatures as favourable to agriculture as the corresponding latitudes of eastern Asia or eastern North America, is without the copious rains which make those temperatures so valuable, and hence forms part of the desert that divides the populations of Europe and Asia.

Precipitation.

On the local distribution of rainfall and temperature, the physical configuration of the continent has very marked effects. Here as elsewhere there is a striking difference both in the amount of rainfall and the temperature on the weather and lee sides of mountains and even low hills. But with reference to this it should not be forgotten that water-vapour, heat and cold may be carried farther into the land by winds blowing in a different direction from that of those by which they were introduced from the ocean, and, with reference to rainfall, that the condensation of water-vapour may be brought out by different winds from those by which the water-vapour was brought to the area in which it is condensed. Water-vapour that may have been introduced by a south-westerly wind may be driven against a mountain side by a northerly or easterly wind, and thus cause rain on the northern or eastern side of the mountain. Still, any rainfall map of Europe indicates clearly enough the origin of the water-vapour to which the rainfall is due. Such a map, taking into account the results of more detailed investigations of different parts of the continent, is that of Joseph Reger.[2] This map shows the rainfall or rather total precipitation in seven tints at intervals of 250 mm. (about 10 in.) up to 1000 mm., and beyond that at intervals of 500 mm. up to 2000 mm. In some parts of the continent the limits of a rainfall of 200 mm. and 600 mm. are also shown. The picture there given is too complicated for brief description except by saying quite generally that it shows on the whole a diminution in the total amount of precipitation from west to east, and that the heaviest precipitation is indicated on the west or south and most exposed sides of mountains. The areas of scantiest rainfall lie to the north and north-west of the Caspian Sea and in the interior of the Kola Peninsula, north-west of the White Sea. The Stye in the English Lake District, some 2 m. from and 650 ft. higher than Seathwaite, has long been reputed to be the station recording the heaviest rainfall in Europe, but it has been shown to have a rival in Crkvice, a station immediately to the north of the Bocche di Cattaro on the Dalmatian coast. In the period 1881–1890 the average rainfall at the Stye amounted to 177 in., in 1891–1900 that at Crkvice amounted to about 179 in.[3]

Snowfall.

The amount of the snowfall as distinguished from the rest of the precipitation is now coming to be recognized as an important climatological element. So far, however, the only European country in which a record of the snowfall is kept is Russia, but it may be pointed out that the scantiness of the winter precipitation and accordingly of snow in the south-east of Europe almost entirely prevents the cultivation of winter wheat, which is thus left without the protective blanket enjoyed in some other parts of the world with cold winters.

Seasonal distribution of rainfall.

The important subject of the seasonal distribution of the rainfall of Europe has received attention from Drs A. J. Herbertson, Köppen and Supan, and Mr A. Angot. The rainfall of each month in Europe as in the other continents is shown by Dr A. J. Herbertson in *The Distribution of Rainfall over the Land.*[4] On plate 19 of the *Atlas of Meteorology*, by J. G. Bartholomew and A. J. Herbertson, Dr Köppen has furnished maps showing the months of maximum rainfall and the seasons of maximum and minimum rain frequency in different parts of Europe. Mr A. Angot's work on the subject is published in two papers in the *Annales du bureau central météor. de France*, a series of memoirs in which the rainfall observations of Europe for the thirty years 1861–1890 are recorded and discussed. The first paper (1893, B, pp. 157-194) deals with the Iberian Peninsula, the second (1895, B, pp. 155-192) with western Europe (from about 43° to 58° N. and as far east as about 19° to 21° E.). Both papers are accompanied by maps showing by six tints the mean rainfall for each month as well as for the entire year; and that on western Europe, by maps extending in the west as far south as Avila, the proportion of the rainfall occurring during the winter, spring, autumn and summer months respectively. But the most instructive maps on the subject embracing the whole of Europe are four maps prepared by Dr Supan[5] to show the percentage of the total rainfall of the year occurring in spring, summer, autumn and winter respectively. From the maps it appears that all the southern and western coasts of Europe have a high proportion of rain in autumn, and that this is true also of the whole of the Italian peninsula and the islands of the western half of the Mediterranean, of all the south-west of the Balkan peninsula, including the Peloponnesus, of the Saône-Rhone valley and both sides of the Gulf of Bothnia, and that a high winter rainfall is characteristic of Iceland, the extreme western coasts of Scotland, Ireland, France and the Iberian peninsula, as well as of the greater part of the Mediterranean region, but more particularly the south-east, while in this region, and, again more particularly in the south-east, there is a great scarcity of summer rains, which, on the other hand, form the highest percentage in the interior and eastern parts of the continent. If the year be divided into a winter and summer half, the area with a predominance of summer rains begins in the east of Great Britain and extends eastwards, while the Mediterranean region generally is one of rainy winters and relatively dry summers. The consequence is that with similar conditions of soil and superficial configuration the Mediterranean region is agriculturally much less productive, except where there are means of irrigation, than the corresponding latitudes in the east of Asia and the east of North America, where there are corresponding summer temperatures but an opposite seasonal distribution of rainfall.

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[1] Vesselovski, as quoted by Voeikov, *Die atmosphärische Circulation.*

[2] Plate 1 in *Petermanns Mitteilungen* (1903).

[3] See a paper on "Das regenreichste Gebiet Europas," by Prof. Kassner, Berlin, in *Petermanns Mitteilungen* (1904), p. 281.

[4] London, 1901 (one of the publications of the Royal Geog. Society).

[5] Plate 21 in *Petermanns Mitteilungen* (1900)

Sunshine.

In connexion with the seasonal distribution of rainfall may be noticed the prevalence of sunshine and cloud. The map accompanying König's paper on the duration of sunshine[1] shows on the whole, outside of the Mediterranean peninsulas, an increase from north-west to south-east (Orkney Islands, 1145 hours = 26% of the total possible; Sulina, 2411 hours = 55%). In the Mediterranean peninsulas the duration is everywhere great—greatest, so far as the records go, at Madrid, 2908 hours = 66%. Dr P. Elfert's[2] map illustrating cloud-distribution in central Europe embraces the region from Denmark to the basin of the Arno, and from the confluence of the Loire and Allier to the mouths of the Danube.

Temperature.

The temperature of the continent has been illustrated by Dr Supan in an interesting series of maps based on actual observations not reduced to sea-level, and showing the duration in months of the periods within which the mean daily temperature lies within certain ranges (at or below 32° F.; 50°–68° F.; above 68° F.).[3] The first of these maps strikingly illustrates the effect on temperature of the strong westerly winds of winter, and, in the south, that of winds from the Mediterranean Sea as well as the protection afforded to the Mediterranean countries against cold winds from the north by the barrier of mountains. South of the parallel of 60° there is no lowland area in the west of Europe where the average daily temperature is at or below the freezing point for as much as one month, and in the Mediterranean region only the higher parts of the mountains besides the northern part of the Balkan Peninsula are characterized by such prolonged frosts. On the other hand, on the parallel of 50° N. the duration of such low temperatures increases at first rapidly, afterwards more gradually, from west to east. The second map illustrating the duration of average daily temperatures between 50° and 68° F., that is, the temperatures favourable to the ordinary vegetation of the temperate zone, shows that the duration of such temperatures increases on the whole from south to north, and that by far the greater part of the continent south of 53° N. has at least six months within those limits, and south of 58° N. at least five months. The third of the maps shows that the high temperatures which it illustrates are prolonged for a month or more throughout the Mediterranean region, but outside of that region hardly anywhere except in the south-western plains of France, the Rhone valley and a large area in the south-east of Russia. Without doubt an important cause of the prolonged duration of high temperatures in this last area is the relatively long duration of sunshine already mentioned as shown by König's map to be characteristic of south-eastern Europe.

Mention should here be made also of Brückner's remarkable treatise on the variations of climate in time. Though it deals with such variations over the entire land-surface of the globe, a large proportion of the data are derived from Europe, for which continent, accordingly, it furnishes a great number of particulars with regard to secular variations in temperature, rainfall, the date of the vintage, the frequency of cold winters, the level of rivers and lakes, the duration of the ice-free period of rivers (in this case all Russian), and other matters. Those relating to the date of the vintage are of peculiar interest. They apply to 29 stations in France, south-west Germany and Switzerland, and for one station (Dijon) go back with few breaks to the year 1391; and as the variations of climate of which they give an indication correspond precisely to the indications derived from temperature and rainfall in those periods in which we have corresponding data for these meteorological elements, they may be taken as warranting conclusions with regard to these points even for periods for which direct data are wanting. A period of early vintages corresponds to one of comparatively scanty rains and high temperatures. It is accordingly interesting to note that the data referred to indicate, on the whole, for Dijon an earlier vintage for the average of all periods of five years down to 1435 than for the average of the periods of the same length from 1816–1880; but that the figures generally show no regular retardation from period to period, but more or less regular oscillations, differing in their higher and lower limits in different periods of long duration.

Cultivated plants.

Much light has been thrown on the present state of agriculture in Europe by the publication of Engelbrecht's *Landbauzonen der aussertropischen Länder*.[4] Of the two chief bread-plants of Europe, wheat and rye, wheat is cultivated as far north as about 69° N. both in Norway and Finland, but the limit of the area in which more wheat is cultivated than rye to the west and south, more rye than wheat to the east and north, runs parallel to the west coast of the Netherlands and Belgium, then strikes south-eastwards so as to include nearly all Germany except Alsace-Lorraine and the south-west of Württemberg, also eastern Switzerland, nearly all the Alpine provinces of Austria and nearly the whole region north of the Carpathians, as well as the greater part of Bohemia within the area in which rye predominates, while in Russia the limit runs east-north-east from about 44° N. in the west to about 55° N in the Urals. On one side of this line wheat makes up more than 80% of the entire grain area[5] in western Rumania, in Italy and a large part of the south-west of France, and from 40% to 60% in the south-east of England. Spelt is cultivated in the south-west of Germany, Belgium and northern Switzerland, on the middle Volga and in Dalmatia and Servia. Rye covers more than 50% of the grain area in the east of Holland and Belgium, in the north-west of Germany, in central and eastern Germany and in middle Russia. Oats are more cultivated than all varieties of wheat in Ireland, in the west and the northern half of Great Britain, in Finland and in the greater part of Denmark and Schleswig-Holstein. Barley is more largely cultivated than oats both in the extreme north and the south of the continent. Maize is cultivated to a great extent in the north-west of the Iberian Peninsula, in the south-west of France, in northern Italy and in the lands bordering the lower Danube; in many parts covering an area equal to or greater than that occupied by all grain crops. Millets (various species of panicum) are most extensively cultivated in the south-east of Europe. The kind of millet known as guinea-corn or durra (*Sorghum vulgare* Pers.), so extensively cultivated in Africa and India, is grown to a small extent on the east side and in the interior of Istria. Buckwheat is cultivated in the west and east of the continent—in the west from the Pyrenees to Jutland, in the east throughout southern and middle Russia. The potato is very largely cultivated in western, northern and central Europe, but has made comparatively little progress in Russia. The cultivation of lentils is most largely pursued in the west and south-west of Germany and in the south and north of France. That of lupines has spread with great rapidity since 1840 in the dry sandy regions of eastern Germany, where lupines have proved as well adapted for such soils as the more widely cultivated sainfoin has done for dry chalky and other limestone soils. Sugar beet is most largely cultivated in the extreme north of France and the adjoining parts of Belgium and in central Germany, to a less but still considerable extent in south-eastern Germany, northern Bohemia and the south-west of Russia. Flax, like other industrial plants, shows a tendency to concentrate itself on specially favourable districts. It is most extensively grown in Russia from the vicinity of Riga north-eastwards, even crossing in the north-east the 70th parallel of latitude; but it is also an important crop in the north-east of Ireland, in Belgium and Holland, in Lombardy and in northern Tirol. Hemp is more extensively cultivated in central and southern Europe, above all in Russia. Teasels are grown in various spots in the south-east of France and in south Germany. The cultivation of madder is not yet extinct in Holland and Belgium, that of weld (*Reseda luteola*), woad (*Isatis tinctoria*) and saffron not yet in France.

The vine can be grown without protection in southern Scandinavia, and has been known to ripen its grapes in the open air at Christiansund in 63° 7′; but its cultivation is of no importance north of 47½° on the Atlantic coast, 50½° on the Rhine, and from 50° to 52° in eastern Germany, the limit falling rapidly southwards to the east of 17° E. The olive, with its double crop, is one of the principal objects of cultivation in Italy, Spain and Greece, and is not without its importance in Portugal, Turkey and southern Austria. Tobacco is grown to a considerable extent in many parts of western, central and southern Europe, for the most part under government regulation. The most important tobacco districts are the Rhine valley in Baden and Alsace, Hungary, Rumania, the banks of the Dnieper, Bosnia and the south-west and other parts of France. The cultivation is even carried on in Sweden and Great Britain, but the most northerly area in which it occupies as much as 0·1% of the grain area is the Danish island of Fyen (Fünen).

Hop-growing is hardly known in the south, but forms an important industry in England, Austria, Germany and Belgium. Among the exotics exclusively cultivated in the south are the sugar-cane, the cotton plant, and rice. The first, which is found in Spain and Sicily, is of little practical moment; the second holds a secondary position in Turkey and Greece; and the third is pretty extensively grown in special districts of Italy, more particularly in the valley of the Po. Even pepper is cultivated to a small extent in the extreme south of Spain. Of the vast number of fruit trees which flourish in different parts of the continent only a few can be mentioned. Their produce furnishes articles of export to Austria-Hungary, Germany, France, Belgium, Italy and Spain. In Sardinia the acorn of the *Quercus Ballota* is still used as a food, and in Italy, France and Austria the chestnut is of very common consumption. In the Mediterranean region the prevailing forms—which the Germans conveniently sum together in the expression *Südfrüchte*, or southern fruits—are the orange, the citron, the almond, the pomegranate, the fig and the carob tree. The palm trees have a very limited range: the date palm (*Phoenix dactylifera*) ripens only in southern Spain with careful culture; the dwarf palm (*Chamaerops humilis*) forms thickets along the Spanish coast and in Sicily, and appears less frequently in southern Italy and Greece.

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[1] *Nova Acta Leop. Karol. d. deutschen Akad. d. Naturforscher*, vol. lxvii. No. 3 (Halle, 1896).

[2] *Petermanns Mitteilungen* (1890), pl. 11 (text pp. 137-145).

[3] *Ib.* (1887), pl. 10 (text pp. 165-172).

[4] Berlin, 3 vols. (one made up of maps), 1898–1899.

[5] By this term (*Getreidefläche*) Engelbrecht designates the area occupied by wheat and other varieties of triticum, rye, oats and barley.

Wheat and rye.

Special interest attaches to the two main bread crops of Europe, wheat and rye, the average annual production of which in the different countries of the continent at three periods is shown in the following tables.

Average Production of Wheat in Millions of Bushels.

	1872–1876.[1]	1881–1890.[2]	1894–1903.[3]
Austria-Hungary[4]	137	161	191
Belgium	22	18	15
Bulgaria[5]	..	40	36
Denmark	4·7	5	3·6
France	277	309	335
Germany	101	93	127
Greece	..	7	4
Italy	140	122	131
Netherlands	6	6	6
Norway	0·3	0·3	0·4
Portugal	9	8	8
Rumania[5]	..	50	57
Russia[6]	275	242	325
Servia[5]	..	8	11
Spain[7]	168	73	101
Sweden	3	3·7	4·5
Switzerland	2	2·6	5
Turkey in Europe[5]	..	38	18
United Kingdom	91	78	57

Average Production of Rye in Millions of Bushels in the chief Rye-producing Countries of Europe.[8]

	1872–1876.	1881–1890.	1894–1903.
Austria-Hungary	129	122	124
Belgium	16	17	20
Denmark	15	17	22
France	69	69	73
Germany	209	228	368
Netherlands	10	11	16
Russia[9]	715	713	971
Spain	32	21	23
Sweden	18	20	27

Perhaps the most striking facts revealed by these two tables are these; first, that the United Kingdom is the only great wheat-growing country which has shown a great decline in the amount of production in two successive periods; and, second, that both Germany and Russia show a great advance under both wheat and rye between the last two periods. This gives interest to statistics of acreage under these two crops, and some data under that head are given in the adjoining tables.

Acreage under Rye.

Period.	Germany.	Russia (ex-Poland)
1881–1890	14·50	..
1883–1887	..	64·6
1899–1903	14·74	65·5

These figures show that the increased production is only in part, in some cases in small part, attributable to increase in area, and the following figures giving the average annual yield of wheat per acre (*a*) in the period preceding 1885, and (*b*) generally in the period of five years preceding 1905, shows that an improvement in yield in recent years has been very general.

	(*a*)	(*b*)		(*a*)	(*b*)
Austria	15·8	17·3	Italy	12·0	12·8
Hungary	15·5	17·5	Netherlands	25·0	30·7
Belgium	24·5	34·5	Russia	8·0	9·7
France	18·0	19·2	Poland	..	14·3
Germany	18·5	28·2	United Kingdom	29	29·9

Forests.

When the Aryan peoples began their immigration into Europe a large part of the surface must have been covered with primeval forest; for even after long centuries of human occupation the Roman conquerors found vast regions where the axe had made no lasting impression. The account given by Julius Caesar of the Silva Hercynia is well known: it extended, he tells us, for sixty days' journey from Helvetia eastward, and it probably included what are now called the Schwarzwald, the Odenwald, the Spessart, the Rhön, the Thüringerwald, the Harz, the Fichtelgebirge, the Erzgebirge and the Riesengebirge. Since then the progress of population has subjected many thousands of square miles to the plough, and in some parts of the continent it is only where the ground is too sterile or too steep that the trees have been allowed to retain possession. Several countries, where the destruction has been most reckless, have been obliged to take systematic measures to control the exploitation and secure the replantation of exhausted areas. To this they have been constrained not only by lack of timber and fuel, but also by the prejudicial effects exerted on the climate and the irrigation of the country by the denudation of the high grounds. But even now, on the whole, Europe is well wooded, and two or three countries find an extensive source of wealth in the export of timber and other forest productions, such as turpentine, tar, charcoal, bark, bast and potash.

Acreage under Wheat.[10]

Period.	United Kingdom.	France.	Italy.	Germany.	Austria.	Hungary.	Russia (*ex*-Poland)	Rumania.
Average, 1881–1885	2·8	17·2	11·7[11]	4·6	2·6	6·5	28·9[12]	.
„ 1886–1890	2·5	17·3	10·9[11]	4·8	2·8	7·1		
„ 1891–1895	2·0	16·7	11·3[11]	4·9	2·7	8·3	32·5	3·5
„ 1896–1900	2·0	16·9	11·3[11]	4·9	2·6	8·2	36·9	3·8
„ 1901–1903	1·7	16·3	12·0	4·4	2·6	9·0	42·8	3·9

The following estimates of the forest areas of European countries are given in G. S. Boulger's *Wood*:—

Countries.	Thousands of Acres.	Per cent of Total Area.
Russia	469,500	34
Sweden	43,000	24
Austria-Hungary	42,624	29
France	20,642	19
Spain	20,465	16·3
Germany	20,047	25·6
Norway	17,290	25
Italy	9,031	18
Turkey	5,958	14
United Kingdom	2,500	3·8
Switzerland	1,905	18·8
Greece	1,886	11·8
Portugal	1,107	5
Belgium	1,073	12
Holland	486	6
Denmark	364	4·6

Domestic animals.

Horse-breeding is a highly important industry in almost all European countries, and in several, as Russia, France, Hungary and Spain, the state gives it exceptional support. Almost every district of the continent has a breed of its own: Russia reckons those of the Bashkirs, the Kalmucks, the Don-Cossacks, the Esthonians and the Finlanders as among its best; France sets store by those of Flanders, Picardy, Normandy, Limousin and Auvergne; Germany by those of Hanover, Oldenburg and Mecklenburg, which indeed rank among the most powerful in the world; and Great Britain by those of Suffolk and Clydesdale. The English racers are famous throughout the world, and Iceland and the Shetland Islands are well known for their hardy breed of diminutive ponies. The ass and the mule are most abundant in the southern parts of the continent, more especially in Spain, Italy and Greece. The camel is not popularly considered a European animal; but it is reared in Russia in the provinces of Orenburg, Astrakhan and Taurid, in Turkey on the Lower Danube, and in Spain at Madrid and Cadiz; and it has even been introduced into Tuscany. A much more important beast of burden in eastern and southern Europe is the ox· the long lines of slow-moving wains in Rumania, for example, are not unlike what one would expect in Cape Colony. In western Europe it is mainly used for the plough or fattened for its flesh. It is estimated that there are about 100 distinct local varieties or breeds in Europe, and within the last hundred years an enormous advance has been made in the development and specialization of the finer types. The cows of Switzerland and of Guernsey may be taken as the two extremes in point of size, and the "Durhams" and "Devonshires" of England as examples of the results of human supervision and control. The Dutch breed ranks very high in the production of milk. The buffalo is frequent in the south of Europe, more especially in the countries on the Lower Danube and in southern Italy. Sheep are of immense economic value to most European countries, above all to Spain and Portugal, Great Britain, France, Hungary, the countries of the Balkan Peninsula, the Baltic provinces of Germany and the south-east of Russia. The local varieties are even more numerous than in the case of the horned cattle, and the development of remarkable breeds quite as wonderful. In all the more mountainous countries the goat is abundant, especially in Spain, Italy and Germany. The pig is distributed throughout the whole continent, but in no district does it take so high a place as in Servia. In the rearing and management of poultry France is the first country in Europe, and has consequently a large surplus of both fowls and eggs. In Pomerania, Brandenburg, West Prussia, Mecklenburg and Württemberg the breeding of geese has become a great source of wealth, and the town of Strassburg is famous all the world over for its *pâtés de foie gras*. Under this heading may also be mentioned the domesticated insects, the silkworm, the bee and the cantharis. The silkworm is most extensively reared in northern Italy, but also in the southern parts of the Rhone valley in France, and to a smaller extent in several other Mediterranean and southern countries. Bee-keeping is widespread. The cantharis is largely reared in Spain, but also in other countries in southern and central Europe.

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[1] Based on Scherzer, *Das wirtschaftliche Leben der Völker*, p. 12.

[2] From the *Fifth Report of the United States Department of Agriculture*, Division of Statistics, Miscellaneous Series, p. 13.

[3] Based on the *Corn Trade Year-book* (1904), p. 284.

[4] Exclusive of Bosnia and Herzegovina, in which the average production in 1894–1903 was about 2½ million bushels.

[5] The estimates for Bulgaria, Rumania, Servia and Turkey in Europe for 1872–1876 are not comparable with those of the two later periods on account of the territorial changes since that date. Those for Bulgaria in the period 1881–1890 include Eastern Rumelia.

[6] Including Poland.

[7] Spanish statistics very imperfect.

[8] Based on the same authorities as the wheat table. In the original, however, the figures for 1894–1903 are given in "quarters of 480 lb," while the figures given above are calculated on an average quarter of 462 lb.

[9] Including Poland, but not Finland, in which the average production of rye is estimated at about 11,000,000 bushels.

[10] Mainly from or based on the Agricultural Returns for Great Britain, 1905.

[11] Single years.

[12] Period 1883–1887.

Minerals.

The most important mineral products of Europe are coal and iron ore. In order of production the leading coal-producing countries have long been the United Kingdom, Germany, France and Belgium. Since 1897 Russia has held the fifth place, followed by Austria-Hungary, Spain and Sweden. The production in other countries is insignificant. Besides coal, lignite is produced in great amount in Germany and Austria-Hungary, and to a small amount in France, Italy and a few other countries. Down to 1895 the United Kingdom stood first among the iron-ore producing countries of Europe, but since 1896 the order under this head has been the German Customs' Union, the United Kingdom, Spain, France, Russia, Sweden, Austria-Hungary and Belgium. By far the most important iron-ore producing district of Europe is that which lies on different slopes of the hills in which German Lorraine, the grand duchy of Luxemburg and France meet, the district producing all the ore of Luxemburg and the principal supplies of Germany and France. Another important producing district is what is known as the Siegerland on the confines of the Prussian provinces of the Rhine and Westphalia. Next in importance to these are the iron-ore deposits of the United Kingdom, the chief being those of the Cleveland district south of the Tees, and the hematite fields of Cumberland and Furness.

With regard to the mineral production of Europe generally, perhaps the most notable fact to record is the relatively lower place taken by the United Kingdom in the production both of coal and iron. Here it is enough to state the main results. In the production of coal the United Kingdom is indeed still far ahead of all other European countries, but notwithstanding the fact that the British export of coal has been increasing much more rapidly than the production, this country has not been able to keep pace with Germany and Russia in the rate of increase of production. In 1878 the production of coal in the German empire was only about 34% of that of the United Kingdom, but in 1906 it had grown to nearly 50%. This, too, was exclusive of lignite, the production of which in Germany is increasing still more rapidly. It was equal to little more than one-fourth of the coal production in 1878, but more than two-fifths in 1906. The coal production of Russia (mainly European Russia) is still relatively small, but it is increasing more rapidly than that of any other European country. While in 1878 it was little more than 2% of that of the United Kingdom, in 1906 the corresponding ratio was above 8%. In the production of iron ores the decline in the position of the United Kingdom is much more marked. The production reached a maximum in 1882 (18,032,000 tons), and since then it has sunk in one year (1893) as low as 11,200,000 tons, while, on the other hand, there was a rapid increase in the production of such ores in the German Zollverein (including Luxemburg), France, Spain, Sweden and Russia, down to 1900, with a more progressive movement, in spite of fluctuations, in all these countries than in the United Kingdom in more recent years. In the total amount of production the United Kingdom in 1905 took the second place. While in 1878 the production of iron ores in the German Zollverein was little more than a third of that in the United Kingdom, in 1905 it exceeded that of the United Kingdom by nearly 60%.

An indication of the relative importance of different European countries in the production of ores and metals of less aggregate value than coal and iron is given in the following tables[1]:—

	Gold.	Silver.	Quicksilver Ore.	Tin Ore.
	kilos.	kilos.	m.t.	m.t.
Austria	126	38,940	91,494	54
German Empire	121	177,183	..	134
Hungary	3,738	13,642	..	..
Italy	..	..	80,638	..
Norway	..	6,367	..	..
Portugal	29	..	..	22
Russia	8,202[2]	..	?[4]	..
Spain	..	?[3]	26,186	86
United Kingdom	58	4,614	..	7,268[5]

Kilos = kilograms. M.t. = metric tons.

	Copper Ore.	Lead Ore.	Manganese Ore.	Zinc Ore.
	m.t.	m.t.	m.t.	m.t.
Austria	20,255	19,683	13,402	32,037
Belgium	..	121	120	3,858
Bosnia-Herzegovina	765	..	7,651	31
France	2,547	11,795[9]	11,189	53,466
German Empire	768,523	140,914	52,485	704,590
Greece	..	?[10]	10,040	26,258
Hungary	1,338	564	10,895	..
Italy	147,135	40,945	3,060	155,821
Norway	32,203	(see zinc)	..	3,308[13]
Portugal	352,689[6]	511	22	1,267
Russia	?[7]	..	?[12]	9,612
Spain	2,888,777[8]	263,519[11]	62,822	170,383
Sweden	19,655	1,938[9]	2,680	52,552[14]
United Kingdom	7,598	31,289	23,127	23,190

M.t. = metric tons.

Platinum has hitherto been obtained nowhere in Europe except in the auriferous sands in the Russian government of Perm. Nickel is derived from Germany, Norway and Sweden; antimony from Germany and Hungary; bismuth from Saxony and Bohemia. Bauxite, which is used in the manufacture of aluminium, is obtained from France, Styria and Ireland. In order of importance the chief salt-producing countries are the United Kingdom (in which for some years the amount produced has been for the most part stationary or declining), Germany (which is rapidly increasing its production), Russia, France, Spain, Italy, Austria-Hungary, Rumania and Switzerland. Besides common salt Germany has for many years been producing a rapidly increasing amount of potash salts, of which it has almost a monopoly. Italy (chiefly Sicily) is by far the most important producer of sulphur. Among other mineral products may be mentioned the boric acid and statuary marble of Tuscany, the statuary marble of Greece, the asphalt of Switzerland, Italy, Germany and Austria-Hungary, the slates of Wales, Scotland and France, the kaolin of Germany, England and France, and the abundant glass sands of Belgium, France and Bohemia.

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[1] Based on *Mines and Quarries: General Report and Statistics for 1906*, pt. iv. (Cd. 4145). 1908.

[2] Production in the Ural districts only.

[3] See note 11.

[4] A considerable quantity of quicksilver is produced in the government of Ekaterinoslav.

[5] Dressed.

[6] Cupreous pyrites and cupreous iron pyrites, besides which a considerable quantity of copper precipitate is produced.

[7] A small quantity of copper ore is produced in Finland, but the bulk of the Russian production is in the Asiatic provinces.

[8] Mainly cupreous iron pyrites.

[9] Argentiferous.

[10] In 1906 Greece produced 12,308 m.t. of argentiferous pig lead.

[11] Of which 158,424 m.t. argentiferous.

[12] A considerable quantity of manganese ore is produced in the government of Ekaterinoslav, but the main seat of Russian production is the Caucasus.

[13] Zinc and lead ore.

[14] In addition to 28,891 m.t. of calcined zinc ore.

Commerce, industries and railways.

With regard to commerce, industries and railways, as a whole, Europe may be said to be characterized by the rapid development of manufacturing at the expense of agricultural industry. With few exceptions the countries of Europe that export agricultural products are able to spare a diminishing proportion of the aggregate of such produce for export. Other countries are becoming more and more dependent on imported agricultural products. Most European countries, even if not able to export a large proportion of manufactured articles, are at least securing a greater and greater command of the home market for such products.[1] Inland centres of manufacturing industry are extending the range of their markets. All these changes have been largely, if not chiefly, promoted by the improvements in the means of communication, and the methods of transport by sea and land. Larger ships more economically propelled have brought grain at a cheaper and cheaper rate from all parts of the world, and improved methods of refrigeration have made fresh meat, butter and other perishable commodities even from the southern hemisphere articles of rapidly growing importance in European markets. Improvements in transport have likewise tended to cheapen British coal in many parts of the mainland of Europe. On the other hand, the extension of the railway network of the continent has brought a wider area within the domain of the manufacturing regions associated with the coalfields occurring at intervals in central Europe from the upper Oder to the basin of the Ruhr, as well as some of the more detached coalfields of Russia. As affecting the relative advantages of different European countries for carrying on manufacturing industry, three inventions or discoveries of recent years may be mentioned as of capital importance: (1) the invention in 1879 of the Thomas process for the manufacture of ingot iron and steel from the phosphoric iron ores, an invention which gave a greatly enhanced value to the ores on the borders of Lorraine, Luxemburg and Alsace, as well as others both in England and on the continent; (2) the invention of efficient machines for the application of power by means of electricity, an invention which gave greatly increased importance to the water-power of mountainous countries; and (3) the discovery of the fact that from lignite an even higher grade of producer gas may be obtained than from coal, a discovery obviously of special importance for the great lignite-producing districts of Germany and Bohemia.

Water-power.

Such particulars as can be procured with regard to the utilization of water-power in the countries of Europe which use that source of power most largely are given in the following table:—

Countries.	Date.	Total Horse-power used in Mechanical Industry.	Total Horse-power in Hydraulic Installations.	Percentage belonging to Hydraulic Installations.
		Thousands.	Thousands.	Per cent.
Germany	1895	3427	629	18
France	1899	..	575	..
	1904	2581[2]	650[2]	25
Austria-Hungary	1902	..	437	..
Italy	1899	2209	337	15
Sweden	1903	453	..	about 50[3]
Norway	1904	254	186	73
Switzerland	1895	153	88	58
	1895	153	95[4]	62
	1901	320	185	58
	1901	320	223[4]	70
	1905	516	?	?

The figures derived from the three recent industrial censuses of Switzerland are very instructive, especially if one is justified in including the electric among the hydraulic installations. The estimates that have been made of the total available water-power in a few European countries are mostly based on such problematical data that they are not worth giving. One very uncertain element in such calculations is the amount of water-power that is capable of being artificially created by the construction of valley-dams, such as have been erected on a small scale in the Harz and other mining and smelting regions of Germany from an early date, and are now being built on a much larger scale in the Rhine region and other parts of Europe, or is incidentally provided in the construction of canals.

Transcontinental routes.

The commercial history of Europe has illustrated from the earliest times the influence of the outline and physical features in determining great trade-routes along certain lines. At all periods land routes have connected the southern seas with the Baltic and the North Sea, effecting the great saving of distance more or less indicated by the following table:—

	Distance by Sea.	Direct Distance.	Distance by Rail.
	st. m.	m.	m.
St Petersburg–Odessa	5240	930	1217
Riga–Odessa	4985	765	1022
Danzig–Odessa	4735	745	1009
Stettin–Triest	4065	550	854
Lübeck–Venice	3920	640	871
Hamburg–Triest	3820	560	945
Hamburg–Venice	3805	555	880
Hamburg–Genoa	2845	640	880
Antwerp–Venice	3500	515	850
Antwerp–Genoa	2535	515	778
Antwerp–Marseilles	2350	?	725
Calais–Genoa	2400	555	780
Calais–Marseilles	2215	535	721
Havre–Marseilles	2135	475	678
Bordeaux–Cette	1945	227	295
Calais–Constantinople	3510	1445	2134
Calais–Salonica	3370	1215	1911
Christiania–Stockholm	780	260	357
Lulea–Narvik (Ofotenfjord)	1970	240	295

From the form of the continent it obviously results that the farther east the route lies the greater is the saving of distance. The precise direction of the routes has been very largely fixed, however, by the physical features; by the course of the rivers where navigable rivers formed parts of the routes; in other cases by the situation and form of the mountains, or the direction of the river valleys which is implied in the form of the mountains. From the Black Sea the most convenient starting-point is obviously towards the west, and two connecting routes with the Baltic lie wholly to the east of the mountains. One route makes use of the Bug or the Dniester, the San and the Vistula so far as possible, while another starting in the same way proceeds round the foot-hills of the Carpathians, thus finding easy crossing places on the head-streams of the rivers, as far as the Oder and then down that stream. Another route is up the Danube to the neighbourhood of Vienna, and then north-eastwards through the opening between the Carpathians and the Sudetic range to the head-waters of the Oder, crossing a water-parting little more than 1000 ft. in altitude. The first route was certainly used again and again by the ancient Greeks, starting from Olbia near the mouth of the Bug, the objective point being the coast in the south-east of the Baltic supplying the amber which was so important an article of commerce in early times. This route was again much used in the middle ages, when Visby, on Gotland, undoubtedly selected on account of the security afforded by an island station, was for hundreds of years an important centre of trade both in northern products (of which furs were the most valuable) and those of the East (pepper and other spices, silks and other costly articles). Numerous coins, Roman, Byzantine and Arabic, found not merely in Gotland itself but also at various points along the route indicated, testify to the long-continued importance of this route. In the middle ages the Oder route was also largely used whether reached by rounding the Carpathians or ascending the Danube, and in connexion with that route the island of Bornholm long formed a focus of commerce answering to that in Gotland farther east. The Danube route was also made use of farther west, and formed a large part of a great route connecting the East with the north-west of Europe. The valuable goods of the Orient could be conveyed up-stream as high as Ratisbon (Regensburg), and thence north-westward across Nuremberg to Frankfort-on-Main, from which access was had to the Rhine gorge leading on to Cologne and the ports of Dordrecht and Rotterdam Bruges and Ghent; or they could be carried still farther up-stream to Ulm, thence by a route winding through the north of the Black Forest to Strassburg and from that point north of the Vosges to the Marne and Seine.

Farther west use was made at an early date of passes by which the whole system of the Alps could be crossed, or partly crossed and partly rounded, in a single rise. The ancient Etruscans, in exchanging their earthenware and bronzes for the amber found largely in those

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[1] Probably the most complete synopsis of the evidence on this point is to be found in Prince Kropotkin's *Fields, Factories and Workshops* (London, 1899).

[2] The total horse-power used in mechanical industries is obtained by adding 650,000, the estimated total of horse-power in hydraulic installations given in an article in the *Annales de géographie* for January 1904, to the total steam-power in fixed engines officially given for 1903, and accordingly excludes gas and other engines not driven by steam- or water-power.

[3] The proportion estimated in the official publication entitled *Sweden: its People and its Industry*, edited by G. Sundbärg (Stockholm, 1904).

[4] Including the installations returned in the Swiss industrial censuses as electric, most if not all of which are probably driven by water-power.

imes not only in the Baltic but also on the eastern shores of the North Sea north of the Rhine mouths, made regular use of at least hree such passes. One of these was the Brenner, the summit of which is under 4500 ft. in height, approached on the south side by the valley of the Adige and its tributary the Eisak, on the other side by he Inn valley and that of its small tributary the Sill. By this route he Alps at about their widest are crossed with exceptional ease; and hence it was natural that it should have been used by the Etruscans to reach the amber shores of the Baltic, and in all subsequent periods in intercourse between central Europe and northern Italy. In their trade with the mouth of the Rhine the Etruscans appear to have used only the passes approached by the Dora Baltea, which leads equally to the Little St Bernard, to the south of Mont Blanc, and so to the Isère valley and the Rhone, and to the Great St Bernard, to the east of Mont Blanc, and so directly to the Rhone valley above the Lake of Geneva, by which route the remainder of the Alps could be rounded on the west and the Rhine valley reached by crossing the northern Jura. Roman roads were afterwards made across all these passes, although that across the Great St Bernard (the highest of all, above 8100 ft.) seems never to have been made practicable for carriages. The Romans also made use of three intervening passes by which in a single rise from the Po basin the heads of valleys leading right down to the head of Lake Constance could be reached. These were the Bernardino, Splügen and Septimer, to mention them in the order from west to east. By the Romans the Simplon was also made use of as affording the most direct connexion between Milan and the upper Rhone valley. All these passes were likewise in use in the middle ages when Venice and Genoa were the great intermediaries in the trade in pepper and spices and other Oriental products. The Brenner afforded the most direct connexion between Venice and southern Germany, on a route leading also to northern Germany by way of Ratisbon and afterwards the rivers of the Elbe basin, and finally (from the end of the 14th century) by a canal to Lübeck, which was the great distributing centre of these and other products for the Baltic. To take the most direct route to the Rhine valley and north-western Europe some other pass (the Seefeld or the Fern) in the Bavarian Alps had to be crossed and the Rhine valley reached by Augsburg, and thence either by way of Ulm or Frankfort. From Genoa the routes in the early middle ages were by way of Milan to the Lake of Constance, and thence by way of Ulm if the Rhine valley was the goal, and by way of Augsburg if it was the Baltic. The St Gotthard route, the most direct connexion between Milan and the north of the Alps, was added about the end of the 13th century. The Mont Cenis pass from an early date afforded the most direct connexion between Genoa and the middle Rhone valley by way of Turin. When modern carriage roads came to be built it was still the same routes that were chosen. The road across the Brenner, completed in 1772, was the first of these. The building of the great Swiss carriage roads across the passes in the early part of the 19th century was inaugurated by Napoleon's road across the Simplon completed in 1805. A later paragraph will show that modern railways follow much the same, if not exactly the same, routes. On the early use of the Saône-Rhone valleys, and the route between the foothills of the Cevennes and the Pyrenees, it is not necessary to insist, but it may be mentioned that English tin was sometimes conveyed to the Mediterranean (Marseilles) by this latter route in Roman times.

Inland waterways.

Since the introduction of railways inland waterways have in most countries taken a very inferior position as means of transport. The articles on the different countries supply the necessary information with respect to those which have a purely national interest, but here mention must be made of those which have significance as belonging to trans-European routes or have an international value. The importance of shortening the water-route between the opposite sides of the great European isthmus separating the Baltic and the Black Sea is brought into prominence by the constant revival of projects for a ship-canal connecting those coasts. A definite step taken with a view to carrying out such a project was the sanction given by the tsar in April 1905 for the appointment of a special commission to inquire into the practicability of a scheme for the excavation of a canal about 28 ft. deep between Riga and Kherson, utilizing the waters of the Düna or western Dvina, the Berezina and Dnieper. Since the completion in 1845 of the Ludwigs or Danube-Main Canal, running from the Main near Bamberg to Kelheim on the Danube, it has been possible to go by water from the mouth of the Rhine to the mouth of the Danube; but this canal has in reality no trans-European significance. It cannot take barges of a greater capacity than 125 tons, is not adapted for steamers, and carries only a very small amount of traffic. But projects for connecting the Danube with northern Europe by water are still entertained. Of these the most advanced are those for establishing connexions through Austria. On the 11th of June 1901 the Austrian diet passed an act prescribing the construction of a canal connecting the Oder with the Danube through the Morava, and another connecting the Danube at Linz with the Moldau-Elbe, and the improvement of the navigation on the connected waterways. The Oder-Danube canal thus authorized would have to cross a watershed of little more than 1000 ft. in altitude as against 1365 ft. in the case of the Ludwigs Canal; but the Elbe-Danube Canal would have to cross one of about 2250 ft. Under the provisions of the act the work is to be completed by 1924. In Germany projects have been actively agitated for improving the Danube-Main connexion either wholly or partly along the route of the present canal, and for establishing a new connexion by means of a canal of at least 6½ ft. in depth by way of the Neckar, the Rems and the Brenz, joining the Danube at Lauingen about midway between Ulm and Donauwörth. The Moldau-Elbe is itself an important international waterway, inasmuch as it allows of steamer traffic from Prague in Bohemia to Hamburg, and by means of a connecting canal to Lübeck. But the most important of all international waterways in Europe is the Rhine, on which even sea-going steamers regularly ascend to Cologne, and an amount of traffic crosses the Dutch frontier three or four times as great as that which makes use of the Manchester ship-canal. The river is also navigable to Basel in Switzerland, though above Strassburg the river is little used, being replaced since 1834 by the Rhine and Rhone canal, which connects the two rivers through the Ill and the Saône. The Rhine is also connected with the Seine by the Marne and Rhine canal passing north of the Vosges, and its tributary the Moselle is also navigable from France into Germany. The Meuse again is navigable from France through Belgium into Holland, and is connected by more than one route with the Seine, and in the densely peopled mining and manufacturing country in the north of France and the adjoining parts of Belgium numerous waterways ramify in different directions. Even in an article on Europe the entirely French canals connecting the Seine and Rhone (Burgundy canal, summit-level 1230 ft., completed 1832), the Loire and Rhone (Canal du Centre, summit-level 990 ft., completed in 1793), and the Canal du Midi, connecting the Garonne at Toulouse with Cette on the Mediterranean, may be mentioned inasmuch as they establish communication between different seas. The last is of special interest because it is the oldest (completed in 1681), because it makes use of the lowest crossing, surmounting the passage of Naurouse, or Gap of Carcassonne, at an altitude of 625 ft., and because it effects the greatest shortening of distance from sea to sea. On this account the project of establishing a ship-canal of modern dimensions along this route has been as often revived as that of the Black Sea and Baltic canal. In the east of Europe the Vistula and Memel are both international waterways, but they are of little importance compared with those in the west. The Kaiser Wilhelm or North Sea and Baltic canal, opened in 1895, has, however, no little international value, inasmuch as it shortens the sea-route to the Baltic for all North Sea ports to the south of Newcastle, and affords the means of avoiding a rather dangerous passage round the north of Jutland. A minor degree of international interest belongs to the ship-canal through the Isthmus of Corinth, opened on the 6th of August 1893.

Railways.

The following table gives a summary statement of the progress of railway construction in European countries down to the end of the 19th century:—

Railways in European Countries.

	Date of opening of first line.	Miles open.					
		1875.	1880.	1885.	1890.	1895.	1900.
Austria	1837	6,402	7,083	8,270	9,506	10,180	11,912
Belgium	1835	2,171	2,399	2,740	2,810	2,839	2,851
Bosnia-Herzegovina	1879	..	..	..	342	471	..
Bulgaria	1866	..	..	..	..	535	921
Denmark	1847	689	975	1,195	1,217	1,371	1,809
France	1828	13,529	16,275	20,177	20,666	22,505	26,739
German Empire	1835	17,376	20,693	22,640	25,411	27,392	30,974
Great Britain	1825	14,510	15,563	16,594	17,281	18,001	18,680
Greece	1869	7	7	278	452	?	641
Hungary	1846	3,992	4,421	5,605	6,984	8,651	10,624
Ireland	1834	2,148	2,370	2,575	2,792	3,173	3,183
Italy	1836	4,771	5,340	6,408	7,983	9,579	9,864
Luxemburg	1873	110	..	..	..	270	..
Netherlands	1839	1,006	1,143	1,496	1,653	1,869	2,007
Norway	1854	345	652	970	970	1,071	1,231
Portugal	1856	643	710	949	1,316	1,336	1,346
Rumania	1869	766	859	1,100	1,590	1,617	1,920
Russia [1]	1838	12,166	14,026	15,934	18,059	21,948	27,345
Servia	1884	..	..	155	335	335	355
Spain	1848	3,801	4,550	5,547	6,211	7,483	8,206
Sweden	1856	2,171	3,654	4,279	4,980	6,058	7,018
Switzerland	1844	1,257	1,596	1,795	2,014	2,233	2,401
Turkey	1872	..	727	657	657	935	..

[1] Excluding Finland.

The chief railways of most European countries are on the same gauge as that originally adopted in Great Britain, namely, 4 ft. 8½ in. Irish railways are, however, on the gauge of 5 ft. 3 in. The standard gauge in Russia is 5 ft., that of Spain and Portugal about 5 ft. 6 in. The still isolated railway system of Greece is upon a narrow gauge. The very general use of a common gauge obviously greatly facilitates international trade. It allows, for example, of wagons from Germany entering every country on its frontier except Russia. It allows of German coal being carried without break of bulk to Paris, Milan and the mainland of Denmark. By means of train-ferries German trains can also be conveyed to Copenhagen by way of Warnemünde and Gjedser and then across the channel separating Falster and Zealand; and there is a similar means of communication between Copenhagen and Malmö (Sweden) and between Lindau in Bavaria on the Lake of Constance and Romanshorn on the same lake in the Swiss canton of Thurgau. The establishment of this method of transport between England and France has been urged in opposition to the Channel Tunnel scheme.

Of the railway systems of the mainland of Europe as a whole the main features are these. There is a broad belt running from the North Sea eastwards between the lines marked by Amsterdam and Hanover on the north, and Calais, Liége, Düsseldorf and Halle on the south, in which important lines of railway run from west to east. About 12° E. those lines begin to converge on Berlin. This belt is crossed in the Rhine valley by a much narrower but very important belt running north and south, now connected with the Italian railway system through the St Gotthard tunnel. To the south of the west end of the west-to-east belt lies the principal railway focus in western Europe, Paris, from which important lines radiate in all directions; two of these radiating lines now establish communication with the Italian railway system, through the Mont Cenis and Simplon tunnels respectively, and other two connecting with the Spanish system round the ends of the Pyrenees. Berlin in central Europe is perhaps an even more important railway focus. Among the chief lines radiating from it are one through Leipzig and Munich and connecting with the Italian railway system by the Brenner route, and another through Dresden and Prague to Vienna, and then by the Semmering pass by one route to Triest and by another to Venice. East of Berlin the railways of Europe begin to form wider meshes. Two main lines diverge towards the north-east, one by Küstrin and Königsberg and the other by Frankfort on the Oder and Thorn, both uniting at Eydtkühnen to the east of Königsberg before crossing the Prussian frontier and passing on to St Petersburg. From Thorn a line branches off by Warsaw to Moscow, the chief railway focus in eastern Europe. South-east from Berlin there runs another important line through Breslau, Cracow and Lemberg to Odessa, skirting to a large extent the foot-hills of the Carpathians like the ancient trade route from Olbia to the Baltic. Two routes on which there are services organized by the International Sleeping Car Company connect London with Constantinople, and it is noteworthy that both of these indicate the importance of the physical feature which has determined the position of the great north-south belt of railways above mentioned, and also of towns famous as commercial centres in the middle ages. One of these is the route of the Orient Express, which goes by Calais, Paris and Strassburg, then east of Strassburg runs north in the Rhine valley for about 40 m. to Karlsruhe, then winds through the hilly country between the Black Forest proper and the Odenwald to Stuttgart, proceeding thence by Ulm, Augsburg and Munich to Linz and then by the valley of the Danube through Vienna and Budapest to Belgrade, and thence by the valleys of the Morava, Nishava and Maritza to Constantinople. The other is that of the Ostend-Vienna express, going by Ostend to Brussels, and through Aix-la-Chapelle to Cologne, then up the Rhine gorge southwards to Bingen and eastwards to Mainz and on to Frankfort (on the Main), thence south-eastwards by the route so celebrated in the middle ages through Nuremberg to Regensburg (Ratisbon), and thence down the valley of the Danube coinciding with the Orient Express route from a point a few miles above Linz. From the Orient Express route a branch crosses from the valley of the Morava to that of the Vardar, establishing a connexion with Salonica.

In the development of this railway system the mountains have proved the most formidable of natural obstacles, and at the head of the mountains in this respect as in others stand the Alps. The first railway to cross one of the main chains of the Alps was the Semmering line on the route from Vienna to the Adriatic, constructed in 1848–1854. Its summit is in a tunnel less than 1 m. long, 2940 ft. above sea-level or nearly 300 ft. below the level of the pass. South of the Semmering, however, various other passes have to be crossed, and it was not till 1857 that the railway to Triest (by Laibach) was completed and not till the late seventies that the more direct route to Venice across the Tarvis pass in Carinthia was established. Of the route from Triest by Görz across the Karawanken and Tauern Alps to Salzburg and south-eastern Germany the first section was opened only in 1906. After the Semmering the next railway to cross the Alps was that following the Brenner route which crosses the summit of the pass at the height of 4490 ft., and, as already stated, is the only pass that has to be crossed on the way from Munich to the plains of Italy. Next followed in 1871 the western route through the so-called Mont Cenis tunnel, really under the Col de Fréjus, to the west of the Mont Cenis pass, and effecting a crossing between the valleys of the Arc (Rhone basin) and the Dora Riparia (Po basin) at an altitude of 4380 ft., or nearly 2500 ft. lower than the pass previously used, but only by piercing the mountains in a tunnel more than 7½ m. long. Next in order was the St Gotthard route, opened in 1882, the most direct route between northern Italy and western Germany, connecting the Lake of Lucerne with the valley of the Ticino. Here the altitude is reduced to 3785 ft., about 3150 ft. below the sumit-level of the pass, but the tunnel length is increased to rather more than 9¼ m. The Simplon route opened in June 1906, between the upper Rhone valley and the Toce valley, shortening the route between Milan and northern France, effects the crossing at an altitude of only 2300 ft., nearly 4300 ft. lower than the pass, but by increasing the tunnel length to 12¼ m. Steps were subsequently taken to continue the Simplon route northwards by a tunnel through the Lötschberg in the Bernese Alps, and a project is entertained for continuing the Vintschgau (upper Adige) railway across or under the Reschenscheideck to the Inn valley. An important east-west crossing of the Alps was effected when the Arlberg tunnel (6·37 m. long, summit-level 4300 ft.) connecting the Inn valley with that of the Rhine above the Lake of Constance was opened in 1884.

Several lines wind through and cross the Jura. That which in 1857 pierced the Hauenstein, in the north of Switzerland, attained international importance on the opening of the St Gotthard tunnel, inasmuch as it lies on the route thence through Lucerne to the Rhine valley at Basel; and that which crosses the Col de Jougne between Vallorbe and Pontarlier acquired similar importance on the completion of the Simplon tunnel. Further projects are entertained for shortening the connexion between this tunnel and the north of France by making a more direct line from Vallorbe to the French side of the Jura, or by making a railway across or under the Col de la Faucille (4340 ft.), north-west of Geneva.

Of the two railways that pass round the extremity of the Pyrenees, the western was the first to be constructed, the eastern was not opened till 1878. Hitherto the intervening mountains have proved more of a railway barrier than the mightier system of the Alps, but in 1904 a convention was concluded between the French and Spanish governments providing for the establishment of railway connexion between the two countries at three points of the great chain.

There are several railways across the Carpathians, mostly by passes under 3000 ft. in height. The fact that the Tömös Pass, on the direct route from Hungary through Transylvania to Bucharest, attains an altitude of 3570 ft. was undoubtedly one reason why the railway following this route, completed in December 1879, passing through several tunnels, was one of the last to be constructed. But the obstruction of mountains has not been the only cause of delay in the building of railways. Sparseness of population and general economic backwardness have also proved hindrances, especially in Russia and the Balkan Peninsula. The railways to Constantinople and Salonica were completed only in 1888, and yet the highest altitude on the Constantinople line is only 2400 ft., that on the Salonica line 1750 ft. Among other important railways of recent date and of more than merely national significance may be mentioned that bringing Bucharest into connexion with the Black Sea port of Costantza by means of a bridge across the Danube at Chernavoda (opened in September 1895); a line across the Carpathians connecting Debreczen with Lemberg, the continuation of the line eastwards from Lemberg to Kiev; a network bringing the coalfield of the Donets basin into connexion with ports on the Sea of Azov; a line in the south-east of Russia connecting Novocherkask with Vladikavkaz, and branches running from the same point connecting that line with Novorossiysk on the Black Sea on the one hand, and with Tsaritsyn at the last angle of the Volga on the other hand; a line in northern Russia bringing Archangel into connexion with the European system at Vologda (opened in 1898); a detached line in the north-east across the Urals from Perm by Ekaterinburg (completed in 1878) to Tyumeñ (completed in 1884). Chelyabinsk on the Siberian railway has a branch running northwards to Ekaterinburg, and this line now affords uninterrupted communication with the northern Dvina, inasmuch as the railway which originally started at Perm has been carried westwards through Vyatka and then northwards to Kotlas at the point of origin of that river, to which point it was opened in 1900; and a line in the east connecting the European system at Samara with the great mining centre at Zlatoust, already in 1890 continued across the Urals to Miyas, and since then carried farther east as the great Siberian railway.

The result of the construction of the numerous transcontinental railways has been to bring rail and sea-routes and ports on opposite sides of the continents into competition with one another to a greater degree than is possible in any other continent. The more valuable, and above all perishable commodities may be sent right across the continent even through the mountains. Even from Great Britain, which is bound to carry on its external commerce in part by sea, goods are sometimes sent far south in Italy by railways running from one or other of the North Sea ports. It will hence be readily understood that for inland trade on the mainland the competition between ports on opposite sides of the continent and between different railways will be very keen, greatly to the advantage of the inland centres to which that competition extends. This competition is inevitably all the more keen now that the trade of Europe with the East is once more carried on through the Mediterranean as it was in ancient times and the middle ages. The great shortening of the sea-route in this trade at such ports as Marseilles, Triest, Venice and Genoa, indicated by the figures below, goes far to counterbalance the extra cost even of railway transport across the mountains.

Distance in Nautical Miles from Port Said.

London	3215	Marseilles	1506
Bremen	3502	Genoa	1426
Hamburg	3520	Venice	1330
Stettin	3749	Brindisi	930
St Petersburg	4300	Odessa	1130

Ethnology.

An enormous amount of investigation with regard to European ethnology has been carried on in recent years. These labours have chiefly consisted in the study of the physical type of different countries or districts, but it is not necessary to consider in detail the results arrived at. It should, however, be pointed out that the idea of an Aryan race may be regarded as definitely abandoned. One cannot even speak with assurance of the diffusion of an Aryan civilization. It is at least not certain that the civilization that was spread by the migration of peoples speaking Aryan tongues originated amongst and remained for a time peculiar to such peoples. The utmost that can be said is that the Aryan languages must in their earliest forms have spread from some geographical centre. That centre, however, is no longer sought for in Asia, but in some part of Europe, so that we can no longer speak of any detachment of Aryan-speaking peoples entering Europe.

The most important works, summarizing the labours of a host of specialists on the races of Europe, are those of Ripley and Deniker.[1] Founding upon a great multitude of data that have been collected with regard to the form of the head, face and nose, height, and colour of the hair and eyes, most of the leading anthropologists seem to have come to the conclusion that there are three great racial types variously and intricately intermingled in Europe. As described and named by Ripley, these are: (1) the Teutonic, characterized by long head and face and narrow aquiline nose, high stature, very light hair and blue eyes; (2) the Alpine, characterized by round head, broad face, variable rather broad heavy nose, medium height and "stocky" frame, light chestnut hair and hazel grey eyes; and (3) the Mediterranean, characterized by long head and face, rather broad nose, medium stature and slender build, dark brown or black hair and dark eyes. The Teutonic race is entirely confined to north-western Europe, and embraces some groups speaking Celtic languages. It is believed by Ripley to have been differentiated in this continent, and to have originally been one with the other long-headed race, sometimes known as the Iberian, and to the Italians as the Ligurian race, which "prevails everywhere south of the Pyrenees, along the southern coast of France, and in southern Italy, including Sicily and Sardinia," and which extends beyond the confines of Europe into Africa. The Alpine race is geographically intermediate between these two, having its centre in the Alps, while in western Europe it is spread most widely over the more elevated regions, and in eastern Europe "becomes less pure in proportion as we go east from the Carpathians across the great plains of European Russia." This last race, which is most persistently characterized by the shape of the head, is regarded by Ripley as an intrusive Asiatic element which once advanced as a wedge amongst the earlier long-headed population as far as Brittany, where it still survives in relative purity, and even into Great Britain, though not Ireland, but afterwards retired and contracted its area before an advance of the long-headed races. Deniker, basing his classification on essentially the same data as Ripley and others, while agreeing with them almost entirely with regard to the distribution of the three main traits (cephalic index, colour of hair and eyes, and stature) on which anthropologists rely, yet proceeds further in the subdivision of the races of Europe. He recognizes six principal and four secondary races. The six principal races are the Nordic (answering approximately to the Teutonic of Ripley), the Littoral or Atlanto-Mediterranean, the Ibero-Insular, the Oriental, the Adriatic or Dinaric and the Occidental or Cevenole.

Language.

Although language is no test of race, it is the best evidence for present or past community of social or political life; and nothing is better fitted to give a true impression of the position and relative importance of the peoples of Europe than a survey of their linguistic differences and affinities.[2] The following table contains the names of the various languages which are still spoken on the continent, as well as of those which, though now extinct, can be clearly traced in other forms. Two asterisks are employed to mark those which are emphatically dead languages, while one indicates those which have a kind of artificial life in ecclesiastical or literary usage.

I. INDO-EUROPEAN.		
1. INDIC branch, represented by		Gipsy dialects.
2. IRANIC branch, " "		(a) Ossetian.
		(b) Armenian.
3. HELLENIC branch, " "		*(a) Greek.
		(b) Romaic.
		(c) Neo-Hellenic.
4. ITALIC branch, " "		*(a) Latin.
		**(b) Oscan.
		**(c) Umbrian, &c.
	Neo-Latin	(d) French.
		(e) Walloon.
		(f) Provençal.
		(g) Italian.
		(h) Ladin (Rumonsh, Rumansh, Rheto-Romance).
		(i) Spanish.
		(j) Portuguese.
		(k) Rumanian.
5. CELTIC branch, represented by		(a) Irish.
		(b) Erse or Gaelic.
		(c) Manx.
		(d) Welsh.
		**(e) Cornish.
		(f) Low Breton.
6. TEUTONIC branch, represented by		**(a) Gothic.
	Scandinavian	**(b) Norse or Old Norse.
		(c) Icelandic and Faeroese.
		(d) Norwegian.
		(e) Swedish.
		(f) Danish.
	Low German	**(g) Saxon, Anglo-Saxon, or *First* English.
		(h) English.
		**(i) Old Saxon.
		(j) Platt - Deutsch or Low German.
		(k) Flemish } Netherlandish.
		(l) Dutch } Netherlandish.
		(m) Frisic.
	High German	**(n) Old High German.
		(o) Middle High German.
		(p) New High or Literary German.
7. SLAVONIC branch, represented by		*(a) Church Slavonic.
	South-Eastern	(b) Russian.
		(c) Ruthenian, Rusniak, or Little-Russian.
		(d) White Russian or Bielo-Russian.
		(e) Bulgarian.
		(f) Servo-Croatian.
		(g) Slovenian.
	Western	(h) Czech (Bohemian).
		(i) Slovakish.
		(j) Polish.
		(k) Sorbian (Wendic, Lusatian).
		*(l) Polabian.
8. LETTIC branch, represented by		**(a) Old Prussian.
		(b) Lettish.
		(c) Lithuanian.
9. UNATTACHED		**?(a) Old Dacian.
		(b) Albanian.
II. SEMITIC.		
1. CANAANITIC branch, represented by		*(a) Hebrew.
		**(b) Phoenician or Punic.
2. ARABIC branch, represented by		**(a) Arabic.
		**(b) Mozarabic.
		(c) Maltese.
III. FINNO-TATARIC (Turanian, Ural-Altaic, &c.).		
1. FINNO-UGRIC languages		(a) Samoyede.
		(b) Finnish or Suomi.
		(c) Esthonian, Livonian, Vepsish, Votish.
		(d) Lappish.
		(e) Cheremissian.
		(f) Mordvinian.
		(g) Ziryenian and Permian.
		(h) Votiak.
		(i) Magyar.
2. TATAR-TURKISH languages		(a) Turkish.
		(b) Kazan Tatar, Crimean Tatar, Bashkir, Kirghiz.
		(c) Chuvash.
3. MONGOLIAN languages.		Kalmuk.
4. UNATTACHED.		Basque.

From this conspectus it appears that there are still about 60 distinct languages spoken in Europe, without including Latin, Greek, Old Slavonic and Hebrew, which are still used in literature or ecclesiastical liturgies. Besides all those which are spoken over extensive territories, and some even which are confined within very narrow limits, are broken up into several distinct dialects.

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[1] See bibliography at the end of the article.

[2] See on the whole subject Hovelacque's *Science of Language* Latham's *Nationalities of Europe*, and the same author's *Philology*.

Political boundaries.

The boundaries of European countries have of course been determined by history, and in some cases only historical events can be held to account for their general situation, the influence of geographical conditions being seen only on a minute examination of details. In most cases, however, it is otherwise. The present political boundaries were all settled when the general distribution of population in the continent was in a large measure determined by the geographical conditions, and accordingly the lines along which they run for the most part show the influence of such conditions very clearly, and thus present in many cases a marked contrast to the political boundaries in America and Australia, where the boundaries have often been marked out in advance of the population. In Europe the general rule is that the boundaries tend to run through some thinly peopled strip or tract of country, such as is formed by mountain ranges, elevated tablelands too bleak for cultivation, relatively high ground of no great altitude where soil and climate are less favourable to cultivation than the lower land on either side, or low ground occupied by heaths or marshes or some other sterile soil; but it is the exception for important navigable rivers to form boundaries between countries or even between important administrative divisions of countries, and for such exceptions a special explanation can generally be found. Navigable rivers unite rather than separate, for the obvious reason that they generally flow through populous valleys, and the vessels that pass up and down can touch as easily on one side as the other. Minor rivers, on the other hand, flowing through sparsely peopled valleys frequently form portions of political boundaries simply because they are convenient lines of demarcation. A brief examination of the present political map of Europe will serve to illustrate these rules.

The eastern frontier of the Netherlands begins by running southwards through a marsh nearly parallel to the Ems but nowhere touching it, then winds south or south-westwards through a rather sparsely peopled district to the Rhine. This river it crosses. It then approaches but does not touch the Meuse, but runs for a considerable distance roughly parallel to that river along higher ground, where the population is much more scanty than in the valley. On the side of Belgium the Dutch boundary is for the most part thoroughly typical, winding between the dreariest parts of the Dutch or Belgium provinces of North Brabant, Limburg and Antwerp. The Scheldt nowhere forms a boundary between countries, not even at its wide estuary. The eastern frontier of Belgium is quite typical both on the side of Germany and Luxemburg. It is otherwise, however, on the south, there that country confines with France, and indeed the whole of the north-east frontier of France may be called a historical frontier, showing the influence of geographical conditions only in details. One of these details, however, deserves attention, the tongue in which it advances northwards into Belgium so as to give to France the natural fortress of Givet, a tongue, be it noted, the outline of which is as typical a boundary as is to be seen in Europe in respect of scantiness of population, apart from the fortress.

The mountainous frontiers of France on the east and south require hardly any comment. Only in the Burgundy Gate between the Vosges and the Jura has an artificial boundary had to be drawn, and even that in a minor degree illustrates the general rule. The division of the Iberian peninsula between Spain and Portugal goes back in effect to the Christian reaction against the Moors. The valley of the Miño and its tributaries establishes a natural connexion between Galicia and the rest of Spain; but an independent crusade against the Moors starting from the lower part of the valley of the Douro resulted in the formation of the kingdom of Portugal, which found its natural eastern limit on the scantily peopled margin of the Iberian tableland, where the rivers cease to be navigable and flow through narrow gorges, that of the Tagus, where the river marks the frontier, being almost without inhabitants, especially on the Spanish side.

The greater part of the Italian boundary is very clearly marked geographically, though we have to look back to the weakness of divided Italy to account for the instances in which northern mountaineers have pushed their way into southern Alpine valleys. Even in these parts, however, there are interesting illustrations of geographical influence in the way in which the Italian boundary crosses the northern ends of the Lago Maggiore and the Lake of Garda, and cuts off portions of Lake Lugano both in the east and west. In all these cases the frontier crosses from one steep unpeopled slope to another, assigning the population at different ends or on different sides of the lakes to the country to which belongs the adjacent population not lying on their shores.

Of the Swiss frontiers all that it is necessary to remark is that the river Rhine in more than one place marks the boundary, in one, however, where it traverses alluvial flats liable to inundation (on the side of Austria), in the other place where it rushes through a gorge below the falls of Schaffhausen. The southern frontier of Germany is almost throughout typical, the northern is the sea, except where a really artificial boundary runs through Jutland.

In the east of Germany and the north-east of Austria the winding frontier through low plains is the result of the partition of Poland, but in spite of the absence of marked physical features it is for the most part in its details almost as typical as the mountainous frontier on the south of Germany. All the great rivers are crossed. Most of the line runs through a tract of strikingly scanty population, and the dense population in one part of it, where upper Silesia confines with Russian Poland, has been developed since the boundary was fixed.

In the Balkan Peninsula the most striking facts are that the Balkans do not, and the Danube to a large extent does form a boundary. Geographical features, however, bring the valley of the Maritsa (eastern Rumelia) into intimate relation with upper Bulgaria, the connexion of which with Bulgaria north of the Balkans had long been established by the valley of the Isker, narrow as that valley is. On the side of Rumania, again, it is the marshes on the left bank of the Danube even more than the river itself that make of that river a frontier. An examination of the eastern boundary of all that is included in Russia in Europe will furnish further illustrations of the general rule.

Finally, on the north-west of Russia it was only natural that the Tornea and the Tana should be taken as lines of demarcation in that thinly peopled region, and it was equally natural that where the

Countries.	Area.	Population.			Pop. per sq. m.
	English sq. m.	About 1880.	About 1890.	About 1900.	
Austria-Hungary	241,466	37,884	41,358	45,405 [11]	188
Bosnia-Herzegovina (a)	19,735	1,336 [1]	..	1,568 [12]	81
Liechtenstein	61	..	9 [7]	..	147
Belgium	11,373	5,520	6,069	6,694 [16]	589
Denmark (b)	15,431	1,980	2,185	2,465 [14]	160
France	207,206	..	38,343 [7]	38,596 [14]	186
Monaco	8	..	..	15 [13]	..
German Empire	208,760	45,234	49,428	56,345 [16]	270
Luxemburg	1,003	..	..	237 [16]	247
Greece	24,974	..	2,187 [8]	2,434 [15]	97
Italy	110,676	28,460 [2]	..	32,450 [14]	293
San Marino	23	..	..	11 [17]	435
Montenegro	3,500	..	..	228 [16]	65
Netherlands	12,741	4,013 [3]	4,511 [8]	5,103 [17]	400
Portugal	34,347 (c)	4,160 [4]	4,660	5,423 [16]	153
Rumania	50,588	..	..	5,913 [17]	117
Russia	1,951,249	89,685 [1]	..	103,671 [18]	53
Finland	144,255	2,176 [1]	..	2,555 [11]	18
Servia	18,762	1,908 [5]	..	2,494 [16]	133
Spain (d)	191,994	16,432 [6]	17,262 [9]	18,618 [16]	97
Andorra	175	..	5	..	29
Sweden	173,968	4,566	4,785	5,136 [16]	30
Norway	126,053	..	2,001 [7]	2,231 [16]	18
Switzerland	15,976	2,846	2,933 [10]	3,314 [16]	207
Turkey (Europe) (e)	66,840	..	..	5,892 ?	90
Bulgaria (f)	37,323	2,008 [2]	3,154 [10]	3,733 [14]	100
Crete	3,328	..	302 [9]	304 [16]	91
Thasos	152	..	..	12 ?	79
United Kingdom	121,742	35,026 [2]	37,881 [7]	41,455 [14]	341

(a) Annexed by imperial decree to Austria-Hungary in 1908.
(b) Including Faeroe Islands.
(c) Area exclusive of Tagus and Sado inlets (together 161 sq. m.).
(d) Excluding Canary Islands. (e) With Novi-bazar.
(f) Bulgaria proclaimed its independence of Turkey in 1908.
[1] 1885. [2] 1881. [3] 1879. [4] 1878. [5] 1884. [6] 1887. [7] 1891.
[8] 1889. [9] Census 1890. [10] 1888. [11] Census 1900. [12] Census 1895.
[13] Estimate 1897. [14] Census 1901. [15] Census 1896. [16] Census 1900.
[17] Census 1899. [18] Census 1897.

ɔundary between Norway and Sweden descends from the fjeld in ıe south it should leave to Norway both sides of the valley of the lommen.

pulation.

The preceding table shows the area of the countries of Europe, with their estimated or enumerated populations in thousands (000 omitted) at different dates.

A noteworthy feature of the distribution of population in ırope, especially in western, southern and central Europe, in odern times, is the high degree of aggregation in towns, which exhibited in the following table[1] for the different countries or gions of the continent:—

	Percentage in Towns.		All Towns over 20,000.
	Over 100,000.	From 20,000 to 100,000.	
ngland and Wales	34·8	23·5	58·3
otland	29·7	9·9	39·7
eland	14·2	5·3	19·5
orway	10·8	6·8	17·6
weden	8·5	2·6	11·2
enmark	19·4	6·6	26·0
erman Empire	17·0	11·2	28·2
etherlands	22·3	15·0	37·3
elgium	18·6	12·0	30·6
ance	13·7	10·3	24·0
ain and Portugal	10·5	5·7	16·2
osnia, Servia and Bulgaria	..	4·2	4·2
umania	4·6	7·2	11·8
ungary	3·7	9·1	12·8
alicia and Bukovina	2·0	4·8	6·8
s-Leithan provinces of Austria (exclusive of the two latter)	12·4	5·9	18·3
land	10·6	4·2	14·8
ltic Provinces, Russia	11·4	8·3	19·7
oscow region[2]	9·6	5·4	15·0
ack earth governments, Great Russia[3]	0·7	4·9	5·6
overnments of middle and lower Volga[4]	3·3	4·0	7·3
uth Russia[5]	7·0	8·5	15·5
nland	3·8	4·3	8·1

he following table contains a list of the towns with more than ,000 inhabitants, not in every case according to the most nt census, but, in order to make the populations fairly comable with one another, according to the nearest census or ilable estimate to 1900. Population in thousands (000 tted):—

ndon (Greater, 1901)	6581
ndon (Registration, 901)	4536
is (w. subs.)	2877
(City, 1901)	2661
lin (w. subs.)	2073
(1900)	1884
nna (1900)	1662
Petersburg (w. subs., 897)	1267
nstantinople (w. subs.)	1200
scow (w. subs., 1897)	1036
sgow (w. subs., 1901)	910
mburg-Altona (1900)	867
erpool (w. subs., 1901)	767
nchester-Salford (1901)	765
dapest (1900)	732
rsaw (1897)	638
mingham (w. subs., 901)	599
les (comm., 1901)	565
Brussels (1901)	563
*Madrid (1900)	540
Amsterdam (1902)	540
*Barcelona (1900)	533
Munich (1900)	500
Marseilles (1901)	495
*Milan (comm., 1901)	493
Copenhagen (w. subs., 1901)	477
*Rome (comm., 1901)	463
Lyons (1901)	460
Leipzig (1900)	455
Leeds (w. subs., 1901)	444
Breslau (1900)	423
Odessa (1897)	405
Dresden (1900)	395
Edinburgh-Leith (1901)	393
Sheffield (1901)	381
Dublin (w. subs., 1901)	373
Cologne (1900)	372
*Lisbon (1900)	356
Belfast (1901)	349
Rotterdam (1902)	348
Turin (comm., 1901)	335
Bristol (1901)	329
Newcastle-Gateshead (1901)	325
Prague (w. subs., 1900)	317
Lódz (1897)	315
*Palermo (comm., 1901)	310
Stockholm (1902)	306
Elberfeld-Barmen (1901)	299
Bordeaux (w. subs., 1896)	289
Frankfort-on-Main	288
Riga (w. subs., 1897)	283
Bucharest (1899)	282
Bradford (1901)	280
Antwerp (1901)	273
‡West Ham (1901)	267
Nuremberg (1900)	261
Kiev (1897)	247
Hull (1901)	241
Nottingham (1901)	240
Hanover (1900)	237
Genoa (comm., 1901)	235
Magdeburg (1900)	230
Christiania (1900)	226
The Hague (1902)	222
Roubaix-Tourcoing (1901)	220
Düsseldorf (1900)	214
*Valencia (1900)	214
Florence (comm., 1901)	205
Leicester (1901)	212
Lille (1901)	211
Chemnitz (1900)	207
Portsmouth (1901)	189
Charlottenburg (1900)	189
Königsberg (1900)	188
Triest (1900)	179
Plymouth-Devonport (1901)	177
Stuttgart (1900)	176
Kharkov (1897)	174
Bolton (1901)	168
Oporto (1900)	168
Cardiff (1901)	164
Bremen (1900)	163
Ghent (1901)	162
Dundee (1901)	161
Vilna (1897)	160
Brighton-Hove (1901)	160
Lemberg (1900)	160
Liége (1901)	160
Halle a S. (1900)	157
Aberdeen (1901)	153
Bologna (comm., 1901)	152
*Venice (comm., 1901)	152
Catania (comm., 1901)	150
Messina (comm., 1901)	150
Salonica	150
Strassburg (1900)	150
Zürich (comm., 1900)	150
Seville (1900)	148
St Etienne (1901)	147
Sunderland (1901)	147
Dortmund (1900)	142
Danzig (1900)	141
Mannheim (1900)	140
Stettin (1895)	140
Croydon (1901)	139
Graz (1900)	138
Oldham (1901)	137
Saratov (1897)	137
Aachen (1900)	135
Gothenburg (1902)	134
Toulouse (1896)	134
Nantes (1901)	133
Kazan (1897)	132
Malaga (1900)	130
Havre (1901)	130
Blackburn (1901)	128
Brunswick (1900)	128
Ekaterinoslav (1897)	121
Rostov-on-Don (1897)	120
Essen (1900)	119
Posen (1900)	117
Preston (1901)	113
Astrakhan (1897)	113
Norwich (1901)	112
Murcia (1900)	112
Birkenhead (1901)	111
Athens (1896)	111
Tula (1897)	111
Brünn (1900)	110
Kishinev (1897)	109
Basel (comm., 1900)	109
Utrecht (1902)	109
Kiel (1900)	108
Reims (1901)	108
Krefeld (1900)	107
Derby (1901)	106
Kassel (1900)	106
Halifax (1901)	105
Nice (1901)	105
Southampton (1901)	105
Nancy (1901)	103
Szeged (1900)	103
Toulon (1901)	102
Cartagena (1900)	100

Comm. = commune. w. subs. = with suburbs.

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aken from a paper by Professor Voeikov on "Verteilung der lkerung auf der Erde unter dem Einfluss der Naturverhältnisse der menschlichen Tätigkeit," in *Petermanns Mitteil.* (1906), p. where corresponding figures are given for other parts of the l.

aluga, Smolensk, Tver, Moscow, Yaroslav, Kostromer and imir,

ursk, Orel, Tula, Ryazan, Tambov, Voronezh and Penza.

izhniy Novgorod, Kazan, Simbirsk, Samara, Saratov and khan.

essarabia, Kherson, Taurida, Ekaterinoslav and Don Province.

* In 1800 only those to which an asterisk is prefixed rose above 100,000. Thirty-four out of the 144 towns enumerated in the list above belong to the British Isles.

† The contiguous parliamentary boroughs of Birmingham and Aston Manor.

‡ Part of Greater London.

The Hegira, A. D. 622. Rise of Mahommedanism.

The next event that profoundly affected the history of Europe was the rise of Mahommedanism. In A.D. 622, sixteen years after Gregory's death, occurred the flight (*Hijra*) of Mahomet from Mecca to Medina, which fixed the memorable era of the Hegira. The full force of the militant religion founded by the Arab prophet was not felt till after his death (632). The emperor Heraclius, the vigour of his manhood passed, was unable to meet this new peril; the Arabs, strong in their hardy simplicity and new-born religious fanaticism, and aided by the treason and cowardice of the decadent Roman governing classes, overran Asia Minor, conquered Egypt and the whole of northern Africa, overwhelmed the Gothic kingdom in Spain, and even penetrated beyond the Pyrenees to the conquest of the province of Narbonne. One of the chief effects of these Arab conquests was that Christian civilization became gradually confined to Europe; another was that the trade routes to the East were closed to the Western nations. The conquest of Narbonne marked the limit of the advance of Islam in western Europe, for in 732 the Arabs were overthrown by Charles Martel in the battle of Tours, and a few years later were driven out of Gaul. In Spain, however, they succeeded in maintaining themselves throughout the middle ages, developing a high type of civilization which had a considerable influence on the intellectual life of medieval Europe; and it was not till 1494 that Granada, their last possession in the peninsula, was conquered by the Christian monarchs, Ferdinand and Isabella.

The Carolingians.

The battle of Tours emphasized and increased the power and reputation of Charles Martel. As a mayor of the palace to the decadent Merovingian successors of Clovis, he was virtually ruler of the Franks, and, after his death, the last of the *rois fainéants* of the house of Merovech was deposed, and Pippin, Charles's son, was elected king of the Franks. The prestige of the Carolingian house (to give it the name it was later known by) was increased when, at the urgent entreaty of Pope Stephen III., Pippin marched into Italy and saved Rome from the Lombards, who were endeavouring to extend their power southwards. Pippin's son Charles (Charlemagne) finally conquered the Lombards in 774 and thus added part of northern Italy to his dominions.

The coronation of Charles the Great as emperor, 800.

In 797 an event of the highest importance to the European world took place. The emperor Constantine VI, was deposed by his mother Irene, who seized the throne. Thereupon Pope Leo and the Roman people definitely threw off the authority of the emperors of Constantinople, on the ground that a woman could not hold the position of Caesar. In 800 Leo crowned Charlemagne emperor at Rome, and henceforth till 1453, when Constantinople was conquered by the Turks, there was an Eastern and a Western empire. Till his death in 814 Charlemagne was king of the Franks as well as emperor. His kingdom embraced not only all Germany and modern France, but included a large part of Italy and Spain as far as the Ebro. Under his rule western Europe was united in a powerful empire, in the organization of which the principles of Roman and Teutonic administration were blended; and, after his death, he left to his successors, the Frankish and German kings, the tradition of a centralized government which survived the chaos of the period that followed, and the prescriptive right to the title and prestige of Roman emperors—a tradition and a claim that were to exercise a notable effect on the development of European history for centuries to come. (See FRANCE: *History* and CHARLEMAGNE.)

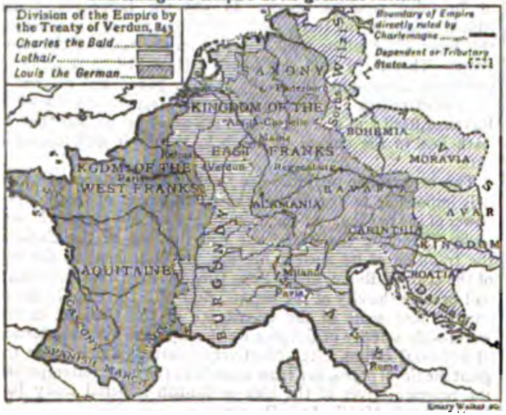
Europe after the death of Charlemagne.

The period from the death of Charlemagne (814) to the 12th century is characterized in western Europe by the general weakening of the idea of central government and by the rise of feudalism. During the same period the East Roman or Byzantine empire escaped disruption and, preserving the traditions of Roman civil and military administration, formed an effective barrier for Europe and Christendom against the advancing tide of Islam. At the same time, however, the growing divergence between the Eastern and Western Churches, which had been accentuated by the iconoclastic controversy (see ICONOCLASTS), and was destined in 1053 to culminate in a definite schism, was gradually widening the breach between the two types of European civilization, which came into violent conflict at the beginning of the 13th century, when crusaders from western Europe captured Constantinople and set up a Latin empire in the East (see ROMAN EMPIRE, LATER; CHURCH HISTORY; CRUSADES). In western Europe, meanwhile, the unity of the empire did not long survive Charlemagne. Its definite break-up dates from the treaty of Verdun (843), by which Charles the Bald received Neustria, Aquitaine and western Burgundy, Louis the German Bavaria, Swabia, Saxony and Thuringia, and the emperor Lothair the middle kingdom known by his name, the *regnum Lotharii* or Lotharingia (see LORRAINE). By the partition of Mersen (870) Lotharingia itself was divided between the West and East Frankish realms—France and Germany, terms which from this time begin to represent true national divisions. With the treaties of Verdun and Mersen the history of the European state system may be said to begin.

Rise of feudalism.

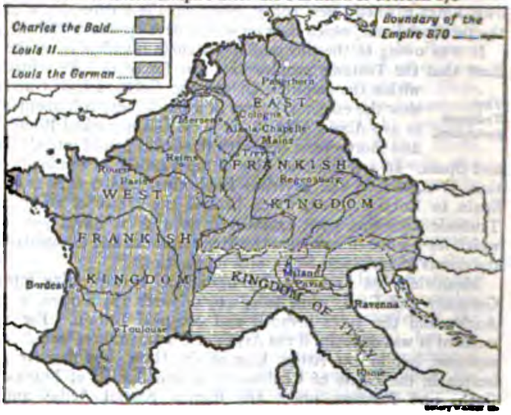
At first, indeed, it seemed as though the nascent states were about to be dissolved by disruption from within and attacks from without. All alike were subject to the attacks of the Norse sea-rovers, hardy pirates who not only scourged all the coasts of Europe but penetrated, burning and harrying, far inland up the great waterways. Meanwhile, the weakening of central government due to dynastic

Charlemagne's Empire at its greatest extent.



Emery Walker sc.

The Western Empire after the Partition of Mersen 870



struggles had led to the growth of independent or semi-independent powers within the states themselves. The Frank landowners had successfully asserted their independence of the jurisdiction of the king (or emperor) and his officials; the imperial officials themselves, dukes or counts, had received grants of lands with similar immunities (*beneficia*), and these had become hereditary. Thus sprang up a class of great territorial nobles to whom, amid the growing anarchy, men looked for protection rather than to the weak and remote central power; and so, out of the chaos that followed the break-up of the empire of Charlemagne, was born the feudal system of the middle ages (see FEUDALISM). This organization was admirable for defence; and with its aid, before the close of the first decade of the 10th century, the frontiers of France and Germany had been made safe against the northern barbarians, who had either been driven off and barriers erected against their return—*e.g.* the marks established by Henry the Fowler along the middle Elbe—or, as in the case of the Normans, absorbed into a system well adapted for such a process. By the treaty of St Claire-sur-Epte (911) between Charles the Simple and Rollo, chief of the Norsemen, the Normans were established in the country since known as Normandy (*q.v.*), as feudatories of the French crown. In England, by the treaty of Wedmore (878) between Alfred and the Danish king Guthrum, the Danes had already been established in a large part of England.

Royalty and feudalism.

Feudalism, by the time the Northmen had been subdued by its aid, was quite firmly established in the western part of Europe. During the 11th century it was carried by the Normans into England, into Sicily and southern Italy, and by the nobles of the first crusade into the newly established kingdom of Jerusalem (1099). By the kings of France, England and Germany, however, who saw themselves in danger f being stripped of all but the semblance of power by its delegaion to their more or less nominal vassals, the feudal organization was early recognized as impossible as a form of state government, f the state was to be preserved; and the history of the three great European powers during the succeeding centuries is mainly hat of the struggle of the sovereigns against the disruptive ambitions of the great feudal nobles. In England the problem was, rom the outset, simplified; for though William the Conqueror ntroduced the system of feudal land tenure into England in 1066 e refused to set it up as his system of government, retaining longside of it the old English national policy. In France, on the ther hand, feudalism as a system of government had become rmly established; and it was not till the days of Philip Augustus 1180–1223) and Louis IX. (1226–1270) that the monarchy egan to get the upper hand. From this time until the 17th century the power of the French monarchy, in spite of occasional apses, grew steadily stronger. The reverse was the case with the German kingship. Its association with the undefined claims nvolved in the title of Roman emperor, traditionally attached to , and notably those to authority in Italy, necessitated concession after concession to the feudal nobles, in order to purchase heir support for their assertion. The kingship, moreover, ecame elective; the imperial title was obtainable only at Rome t the hands of the pope; and the German kings thus became ntangled in contests, not only with their own vassals, but with he tremendous spiritual force of the medieval papacy by hich, for its own ends, the spirit of feudal insubordination was om time to time fomented. Thus in Germany the feudal nobles radually acquired a sovereign status which, in some cases, has rvived the territorial rearrangements of the 19th century and ft its mark on the federal constitution of modern Germany; hile the kingship and the imperial title grew more and more hadowy till in 1806 it vanished altogether. (See ENGLISH ISTORY; FRANCE: *History*; GERMANY: *History*.)

he rise of e house Capet.

In France the process by which a strong hereditary monarchy as established was a slow one. During the greater part of the 10th century the Carolingians, stripped of the vast domains which had been the basis of the power of Pippin, owed their continued existence to the forbearance of Hugh the Great, count of Paris. In 987, owever, the last Carolingian king died, and Hugh Capet, son of Hugh the Great, the most powerful of the territorial magnates, was chosen king of France. With his election dates the real beginning of the French monarchy, and under him and his successors Paris became the capital of France. Hugh's election, however, was the work of the great feudatories, and France remained divided among a number of great fiefs, of which the chief were Brittany, Anjou, Flanders, Vermandois, Champagne, Burgundy, Aquitaine, Poitou, Gascony, Toulouse and Normandy.

The royal power in Germany.

While the central power in France advanced slowly but steadily, the development of the royal authority in Germany was in the 10th and 11th centuries more rapid. In 911 the German magnates had elected Conrad the Franconian to reign over them, and in 919 Henry "the Fowler" of Saxony, "whose reign forms one of the great turning-points in the history of the German nation." He defeated the Hungarians, the Slavs and the Danes, and by encouraging the growth and development of towns he contributed greatly to the formation of the German kingdom. His immediate successors, Otto the Great and Otto II., continued his work, which was only interrupted for a short time during the reign of the idealist Otto III., whose "cosmopolitan imperialism" brought him into collision with the German Church and to some extent with the German nobles. Henry II. (1002–1025) asserted with success his authority over Germany, and his successor Conrad II., who belonged to the Salian or Franconian line, did much to secure unity and prosperity to the Empire. His son and successor Henry III. (1039–1056) governed Germany wisely, and his reign witnessed the culminating point of the Holy Roman Empire. At the time of his death it seemed probable that Germany, like England and France, would gradually escape from the thraldom of the great feudatories. The future of the German monarchy depended upon the ability of future kings to suppress the forces of feudal disintegration in Germany, and to withstand the temptation of struggling to establish their influence over Italy. Unfortunately for German kingship Henry IV. (1056–1106) was only six years old on his accession, and when he became a man he found that the papacy under Hildebrand's influence was practically independent of the emperor. Had Henry confined his efforts to coercing the German barons he might, like the Normans and Angevins in England, and like the Capetians in France, have proved successful. Unfortunately for Germany Henry entered upon the famous contest with the papacy under Gregory VII. (1073–1080), which ended in the 13th century in the defeat of the Empire in the person of Frederick II. The struggle began in 1073 over the question of investiture (*q.v.*), and widened into a duel between the spiritual and temporal powers. During the early years of the contest the influence of the papacy reached a high pitch and made itself felt in the crusading movement, which received its first impetus from Pope Urban II., who appealed to Europe at the council of Clermont in 1095 to recover the Holy Places from the Turks.

The eastern Empire and the Crusades.

During the 11th century the Eastern Empire was attacked by the Russians, the Normans and the Seljuks. The emperor Alexius Comnenus found himself on his accession in 1081 threatened by the Seljuks (the victors in the decisive battle of Manzikert in 1071) and by the Sicilian Normans who in 1081 besieged Durazzo. In 1083 he defeated the Normans in the battle of Durazzo, and with the death of Robert Guiscard in 1085 all danger from a fresh Norman invasion passed away. But the first crusade brought new anxieties to Alexius, for he feared that the crusaders might attack Constantinople. That fear removed, he took advantage of the increased connexion between eastern and western Europe by bestowing commercial privileges upon the Italian trading republics, who thus gained access to the ports of the Empire on easy terms.

With the era of the Crusades, which lasted till the middle of the 13th century, Europe entered upon a period of change, the importance of which is realized by contrasting the condition of western Christendom in the 11th with its condition in the 13th century. Between the opening and close of the crusading movement Europe underwent a complete revolution. While the

The Crusades and the Hildebrandine reformation.

Crusades tended to enhance the prestige and authority of the papacy and the power of European monarchs, they also led to increased knowledge of the East, to the rapid development of commerce, to the introduction of new industries, to the rapid decline of the influence of the feudal nobility, and to the rapid development of town life (see COMMUNE). At the same time the Hildebrandine reformation was having an immense influence upon the intellectual condition of Europe. The 12th century saw the establishment of many new monastic orders (see MONASTICISM), and at the same time a remarkable speculative and literary revival (see SCHOLASTICISM). This movement owed not a little of its success to the influence of the Crusades, which stirred up intellectual as well as commercial activity. This intellectual activity, as well as the fruits of commercial expansion, were—since learning was still a monopoly of the clerical order—weapons in the hands of the papacy, which in the 12th century attained the height of its power, if not of its pretensions. It is, indeed, impossible to exaggerate the influence of the Roman Church upon the development of Europe at this period. The popes, in fact, represented Europe in a sense that could not be predicated of the emperors; the terror of their spiritual power, their vast wealth derived from the tribute of all the West, their unique experience of international affairs, and—in the case of the great popes of this epoch—the superiority of their minds and characters, made them not only the spiritual rulers of Europe, but the effective centres of whatever political unity it possessed. As a Byzantine observer was to observe of Innocent III., they had become the successors of the Caesars rather than of Peter (see PAPACY).

Growth of the royal power in France.

Nowhere were the beneficial effects of the Crusades seen more clearly than in France. The smaller fiefs were steadily absorbed by the greater lordships, which in their turn fell victims to the royal power. It might almost be said that "modern France is a creation of the Crusades." The effects of the crusading movement were felt in France as early as the reign of Louis VI. (1108–1137). Aided by his able minister Suger, Louis managed before his death to add to the possessions of his house the Île de France and a prospective claim to Poitou and Aquitaine. Under his successor Louis VII. (1137–1180) the consolidation movement was checked owing to the marriage of Eleanor of Aquitaine (after her divorce from Louis VII.) to Henry II. of England. By the addition of his wife's lands (Gascony and Guienne) to those which he had already inherited from his father and mother (Normandy, Anjou, Touraine and Maine) Henry was enabled to form the powerful though short-lived Angevin empire. But the lost ground was rapidly recovered by Philip Augustus (1180–1223), who took advantage of the weakness and folly of John of England, and before 1215 had united firmly to France Normandy, Maine, Anjou and Touraine. Louis VIII. and Louis IX. adhered firmly to the policy of Philip IV., and in 1258, by the treaty of Paris, Henry III. of England recognized the loss of Poitou. There thus remained to England out of the vast continental domains of Henry II. only Gascony and Guienne.

General results of the Crusades.

The rest of Europe was also in various degrees affected by the Crusades. While Spain was occupied in a crusade of her own against the Moors and gradually driving them into Granada, Germany, Italy, and to some extent England, were interested in, and influenced by, the Crusades against the Turks. During the absence of many of the nobles in the East the growth of towns and the development of the mercantile class proceeded without interruption. The trading classes demanded strong governments and equal justice, and vigorously supported the monarchs in their suppression of feudalism.

During the 12th and 13th centuries the Crusades thus proved a large factor in the commercial prosperity of the Italian maritime states, an "open door" between East and West was secured, and reinforcements from Europe were poured into Syria as long as the peoples of the West regarded the stability of the Latin kingdom of Syria as a matter of prime importance. During the crusading period a check was placed to the tide of Mahommedan conquest, while to the caliphate the Crusades proved a perpetual drain upon its material resources. To the Mahommedans the possession of the Holy Places by the Christians was as great a humiliation as their desecration by the Mahommedans was to the crusaders. Unfortunately the Crusades led to a disastrous schism between the Byzantine empire and western Christendom, which had calamitous results. The decay of the crusading spirit was a necessary result of the growth of the consolidation of the European nations, but the price paid was the fall of Constantinople and the establishment of the Turks in eastern Europe. The Crusades thus not only postponed the conquest of Constantinople by the Turks for some two hundred years, but led, as had already been said, to a vast expansion of commerce, as seen in the rapid growth and development of the Italian cities, and to a striking development of town life.

The struggle between the Empire and the papacy.

The Crusades had enormously strengthened the power and prestige of the papacy, and indirectly contributed to its victory over the Empire in the person of Frederick II. From the reign of the emperor Henry IV. to the death of Frederick II. in 1250 the struggle between the Empire and the papacy continued, and is coincident in point of time with the Crusades. The reign of Frederick Barbarossa (1152–1190) saw that struggle at its height, and during that reign it became apparent that the emperor's efforts to unite Italy and Germany under one crown were doomed to failure. The rise and success of the alliance of Italian republics known as the Lombard League no doubt contributed to the success of the papacy, but in their contest with the popes the emperors never had any chance of gaining a permanent victory. Frederick II. continued with great energy to attempt the hopeless task of dominating the papacy, but his possession of Sicily only made the popes more determined than ever to establish their predominance in Italy. Frederick's death in 1250 marked not only the triumph of the papacy in Italy, but also that of feudalism in Germany. He has been called the "most dazzling of the long line of imperial failures," and with him ends the Empire as it was originally conceived. Henceforward the Holy Roman Empire, which implied the unity of Italy and Germany, and the close alliance of pope and emperor, no longer exists save in name, and its place is taken by a glorified German kingship presiding over a confederation of turbulent German nobles.

Europe in the 14th and 15th centuries.

Thus with the later years of the 13th century Europe had arrived at the definite close of one epoch and the beginning of another. The period of the Crusades was over, the theory of the Holy Roman Empire had broken down. The period from the beginning of the 14th to the close of the 15th century might well be styled the latter days of medieval Europe.

During the 14th and 15th centuries the idea of regarding Europe as one state in which emperor and pope presided over a number of subordinate kings gave way before the spirit of nationalism and particularism. England, France and Spain were rapidly becoming strong centralized monarchies which stood in striking contrast to the weakened Empire. Partly no doubt owing to the failure of the Empire and papacy to work together, a great impetus had been given to the formation of national monarchies. While Frederick II. had failed, Louis IX. and Philip IV. of France, Ferdinand III. of Castile (1217–1252), James the Conqueror, king of Aragon (1213–1276) and Edward I. of England (1239–1307) succeeded in laying the foundations of strong monarchies which after two centuries of struggles with the dying efforts of feudalism were established on a firm basis. In spite of the intellectual activity and political developments which characterized the 13th, 14th and 15th centuries it remains true that the later middle ages were marked by the decay of those remarkable social and political forces which had been such striking characteristics of the earlier period (see MIDDLE AGES).

Thus the 14th and 15th centuries have characteristics which differentiate them from all preceding and succeeding centuries, *Summary of the characteristics of the 14th and 15th centuries.*

The triumph of the papacy over the Empire had been short-lived. Owing to the disturbed state of Italy, Clement V. was in 1305 compelled to take refuge at Avignon, and till 1377—a period known as the Babylonish captivity—the popes remained in France. While the Empire and papacy steadily decline, while the Byzantine empire falls before the Turks, strong monarchies are gradually formed in England, France, Spain, and Portugal, and in Italy the Renaissance movement covers the later years of the 15th century with glory (see Renaissance). During these centuries there is common to Europe no one principle which is to be found in all kingdoms. But while the old system, founded on belief in the unity of Europe under the Empire and papacy, declines amid chaos and turbulence, there is much intellectual and political activity which portends the appearance of an entirely new state of things. The 14th and 15th centuries may truly be styled a period of transition.

The decline of the Empire, 1254-1519.

From the death of Conrad IV., the son of Frederick II., in 1254 to 1273, when Rudolph of Habsburg became king, chaos reigned in Germany, and the period is known as the Great Interregnum. The forces of decentralization strengthened themselves, and the emperors found that the formation of a strong and united German kingdom was an impossibility. Rudolph of Habsburg (1273-1291), realizing what were the limits of his power in Germany and the futility of attempting to establish his hold upon Italy, began that policy of family aggrandizement which was continued so notably by successive members of his house. His reign witnessed the firm establishment of the house of Anjou in Naples, and, after the Sicilian Vespers in 1282, the supremacy of the house of Aragon in Sicily. Refusing to follow the example of Frederick II. and to take part in distant expeditions, Rudolph conquered Austria, Styria, Carinthia and Carniola, Vienna became the capital of the Habsburg dominions in Germany, and his son Albert of Austria, who was king from 1298 to 1308, was careful to continue the policy of his father. Though no Habsburg was again elected to the imperial throne till 1438, when the long succession of emperors began which continued unbroken till 1742, the establishment of the Habsburgs in Austria by Rudolph proved an event of European importance. From that time the leading members of the Habsburg family never lost an opportunity of aggrandizement. In 1335 they received Carinthia, in 1363 the Tirol. While, however, the Habsburgs, the Wittelsbachs and later the house of Brandenburg were strengthening themselves, the Empire was steadily declining in power and influence. The 14th century saw Switzerland shake itself free from the Austrian house and establish its independence, which was, however, not formally acknowledged till the treaty of Westphalia in 1648.

During the 14th century the weakness of the Empire became more and more accentuated under the weak rule of Louis IV. On his death in 1346 his successor Charles of Luxemburg, known as the emperor Charles IV., made a celebrated attempt to form a strong centralized German monarchy. With that object he issued in 1356 the Golden Bull, by which it was hoped that all matters connected with the imperial election would be settled. The number of imperial electors was settled, and henceforth they were to consist of the archbishops of Cologne, Mainz and Trier, and of the king of Bohemia, the duke of Saxony, the margrave of Brandenburg and the count palatine of the Rhine. Charles hoped to concentrate gradually in his house all the chief German provinces, and having by the Golden Bull endeavoured to check the growth of the towns, he expected to establish firmly the imperial influence in Germany. But the towns were too strong to be coerced, and during his reign the Swabian cities formed a union; and though the marriage of his son Sigismund to the heiress of the king of Hungary and Poland, and the possession of Brandenburg, which fell to him in 1373, seemed steps towards the realization of his hopes, his death in 1378 left his work unfinished. Moreover, his son and successor Wenceslaus (1378-1400) proved, like Richard II. of England and Charles VI. of France, unequal to the task of checking the growing independence of the nobles and the cities. The Hanseatic League (*q.v.*) was at the height of its power, and in 1381 the Rhenish towns formed a confederation. Wenceslaus, like Richard II., had fallen upon evil times. The advance westwards by the Turks occupied the attention of his brother Sigismund, now king of Hungary; he was himself unpopular in Bohemia, and at the same time was exposed to the intrigues of his cousin Jobst of Moravia, who had secured Brandenburg. In 1400 Wenceslaus was formally deposed by the electors, and spent the rest of his life in Bohemia, where he died in 1419. His successor Rupert of the palatinate reigned from 1400 to 1410, and during his reign the council of Pisa endeavoured to bring to an end the great schism which had followed upon the return of Pope Urban VI. from Avignon to Rome in 1377. Two popes had been elected, one living at Rome, the other at Avignon, and Christian Europe was scandalized at the sight of two rival pontiffs. On Rupert's death the electors chose Sigismund the brother of Wenceslaus, and he ruled as emperor from 1411 to 1437.

Decline of the papacy.

Sigismund, emperor, 1411-1437.

The taking of Constantinople by the Turks.

Thus at the beginning of the 15th century the papacy was seen to have fallen from the high position which it occupied at the time of the death of Frederick II. The Avignon captivity followed by the great schism weakened its temporal as well as its spiritual power and prestige, while national developments and dynastic ambitions, such as led to the Hundred Years' War, diverted men's minds from religious to purely temporal concerns. The work of Wycliffe and Hus illustrated not only the decline of papal prestige but also the general opinion that reform in the papacy was necessary. Sigismund's reign as emperor was rendered noteworthy by the part which he took in the council of Constance (*q.v.*), and by his successful efforts to suppress the Hussite movement in Bohemia (see Hussites). That country on the death of Wenceslaus in 1419 fell to Sigismund, but it was not till 1431, after a long and sanguinary war, that the opposition to the union of Bohemia with the Empire was suppressed. Led by Žižka and other able chiefs, the Bohemians who were Slavs utilized the Hussite movement in a vigorous attempt to secure their independence. In 1436 Sigismund was formally acknowledged king of Bohemia. In 1431, the year of the final overthrow of the Bohemians and the Hussites, he opened the council of Basel (*q.v.*), being resolved to establish a religious peace in Europe and to prevent the Hussite doctrines from spreading into Germany. In 1438 Sigismund died, leaving Germany involved in a quarrel with the papacy, but having successfully withstood the efforts of the Bohemians to acquire independence. Sigismund's death marks an epoch in the history of the Empire, for his successor Albert of Austria proved to be the first of a long line of Habsburg emperors. Albert himself reigned only from 1438 to 1440, but on his death the imperial dignity was conferred upon another member of the Habsburg house, Frederick, duke of Styria and Carinthia, known as the emperor Frederick III. With his accession the imperial throne became practically hereditary in the Habsburg family. Frederick's long reign, which lasted from 1440 to 1493, was of little benefit to Germany; for he showed no administrative skill and proved a weak and incapable ruler. Undoubtedly his lot fell upon evil days, for not only were the Turks at the height of their power, but both Bohemia and Hungary gave him much anxiety. The imminent fall of Constantinople, the last barrier of Christendom against Islam in the East, was a threat not only to the Empire, but to all Christian Europe. But western Europe was too much occupied with internecine feuds to unite effectively against the common enemy. In vain the emperor John VI. had gone in person to solicit aid at the various courts of the West; in vain he had humbled himself to pay the price asked, by subscribing to the abnegation of the distinctive tenets of the Orthodox Church, which secured the ephemeral reunion of Christendom at the council of Florence (1438). The crusading spirit was dead; the European powers stirred no finger to save the imperial city; and in 1453 Sultan Mahommed II. rode through the breach over the body of the last of the Eastern

Caesars, and planted the crescent on the dome of the metropolitan church of Eastern Christendom (see TURKEY; and ROMAN EMPIRE, LATER).

The fall of Constantinople marked the definite establishment on European soil of a power alien and hostile to all that was characteristic of European civilization. It was a power, moreover, which could live only by expanding; and for over two hundred years to come the dread of Ottoman aggression was a dominant factor in the politics of eastern Europe. The tide of Turkish advance could have been arrested by a union of Europe; but the appeals of Pope Nicholas V. fell unheeded upon a sceptical age, intent only on its dynastic and particularist ambitions. To the emperor the ousting of the Ottomans from the Balkan peninsula seemed of less importance than the consolidation of the Habsburg power in Germany, and its extension over the neighbouring kingdoms of Hungary and Bohemia. France was exhausted by the long agony of the Hundred Years' War, which came to an end the very year of the fall of Constantinople, and the French kings—especially Louis XI. (1461–1483)—were busy for the rest of the century crushing out the remnants of feudalism and consolidating the power of the monarchy. As for Italy, with its petty tyrants and its *condottieri*, there was no hope of uniting it for any purpose whatever, least of all a religious purpose, and Spain was busy with her own crusades against the Moors. The exploits of John Hunyadi, king of Hungary, against the Turks, therefore, remained isolated and unsupported. In 1456 he checked their advance northwards by a brilliant victory which led to the relief of Belgrade; but he died the same year, and his death was followed by a struggle for the succession between Hungarians and Bohemians. The racial and religious quarrels of the Balkan peoples had made it possible for the Turks to obtain a foothold in Europe; the jealousies and internecine struggles of the Christian states made possible the vast expansion of the Ottoman power, which in the 17th century was to advance the frontiers of Islam to those of Germany and to reduce the emperors, in their relations with the Porte, to the status of tributary princes.

The victory of Ladislaus, son of Casimir, king of Poland, who succeeded in uniting in his own person the crowns of Bohemia, Hungary and Poland, threatened to result in the permanent independence of those countries of the house of Habsburg. But in 1490 Ladislaus was compelled by Maximilian, son of Frederick III., to sign the treaty of Pressburg, providing for the eventual succession of the Habsburgs to Hungary and Bohemia.

Consolidation of the Habsburg power.

In other ways the reign of Frederick III. laid the foundations of the greatness of his family. In 1477 Maximilian married Mary, duchess of Burgundy and heiress of Charles the Bold, and through her the Habsburgs obtained Franche Comté and the Netherlands. The line, *Bella gerant alii, tu felix Austria nube*, well described the method by which the house of Habsburg increased its possessions and established its fortunes. A.E.I.O.U. (*Austriae est imperare orbi universo*) was the device invented for his house at that time by Frederick III. and it proved no idle boast. Maximilian I., the son of Frederick III., reigned from 1493 to 1519, and during his reign Europe passed from medieval to modern times. Some reforms in the Empire were carried out, but the events of his reign made it apparent that it was impossible to set up a centralized monarchy in Germany (see MAXIMILIAN I.; GERMANY and AUSTRIA: *History*).

France in the 13th and 14th centuries.

Far different developments were taking place during the 14th and 15th centuries in France, Spain, the Scandinavian north and in England. During the greater part of the 14th century France was engaged in foreign wars and in internal complications, and it seemed doubtful if a strong centralized monarchy would be firmly established. The failure of Philip VI. (1328–1350) and John (1350–1364) in their contest with England weakened the central power in France, and, though Charles V. (1364–1380), owing to his own sagacity and the weakness of the English government, managed to regain for France many of her lost provinces, the French power both at home and abroad again declined under the rule of the incapable Charles VII. (1380–1422). In fact the year 1422 may be said to mark the lowest stage in the history of the French monarchy. From that year an improvement gradually set in. A national sentiment, as exemplified in the career of Joan of Arc (*q.v.*), was developed; an alliance, essential for the successful expulsion of the English from France, was made in 1435 between the king of France and the duke of Burgundy; and in 1439 the famous ordinance empowering the king to maintain a standing army and to raise money for its maintenance was passed at Orleans by the states-general. These measures proved successful; in 1453 the Hundred Years' War came to an end, and Louis XI. managed between 1461 and 1483 to establish an absolutism in France on sure foundations. Under his successor Charles VIII. (1483–1498), Brittany was annexed, and France, secure from all danger of a feudal reaction, entered with the invasion of Italy in 1494 by Charles VIII. upon modern times. A similar process is observable in England and Spain. In England the Wars of the Roses were followed by the establishment of a strong monarchy under Henry VII., while in Spain Ferdinand and Isabella established in place of anarchy the royal authority, and during their reign suppressed all attempts at provincial independence. In 1491 the consolidation of Spain was completed by the conquest of Granada. In 1397, by the union of Calmar, the three kingdoms of Norway, Sweden and Denmark were united under Eric XIII. This union was, however, short-lived, and in the early years of the 16th century came definitely to an end (see NORWAY; SWEDEN; DENMARK).

The close of the middle ages.

The close of the middle ages and the beginning of modern times was marked by several noteworthy events. The invention of printing, the discovery of America and the invasion of Italy by Charles VIII. all occurred before the end of the 15th century, while in the early years of the 16th century the ideal of civil and ecclesiastical unity was finally shattered by the Reformation and by the development of the modern states system, accompanied by the prominence henceforward attached to the question of the balance of power.

The Renaissance.

During the whole of the 15th century Europe had been affected by what is known as the Renaissance movement, which marked the transition from the medieval to the modern order. This movement, caused by the growth of learning, had its first home in Italy, which had witnessed a marvellous revival of interest in classical antiquity, in painting and in sculpture, accompanied by a keen intellectual activity in religious and political, no less than in literary matters. Criticism of existing beliefs was developed, knowledge became widely diffused, and, while the way was prepared for the substitution of individualism for the old ecclesiastical system, the development of commerce coincident with the discovery of America and the establishment of monarchical systems destroyed feudalism (see RENAISSANCE). The later years of the 15th, and the early years of the 16th, centuries may be described as the transition from medievalism to modern times, from feudalism to individualism, from the idea of a world church and a world empire to one in which national consolidation was the chief feature and monarchical government a necessity.

Summary of European history from 1500.

From the beginning of the 16th century Europe entered upon modern times. Many events marked the close of the middle ages. The discovery of America, the decay of Venice, the development of the European states system, the rise of diplomacy as a permanent international system (see DIPLOMACY), the wars of religion—all these are the general characteristics of the new period upon which Europe now enters. With the growth of monarchies arises the belief in the divine right of kings, the development of territorial sovereignty, and wars of ambition like those waged by Louis XIV.

With the 18th century democratic ideas first begin to appear side by side with the rule of the enlightened despots such as Frederick the Great, Catherine II. and Joseph II. The outbreak of the French Revolution brings to an end the old European system, upsets the ideas on which it was founded, and leads to important territorial changes.

The balance of power and the beginning of modern times.

The advent of the Reformation, as has already been pointed out, finally shattered that ideal of civil and religious unity which had been the main characteristic of the middle ages. Thus from the beginning of the 16th century Europe sees the development of the modern states system and becomes the scene of national wars in which the idea of the balance of power was the leading principle (see BALANCE OF POWER). That principle did not allow of the recognition of the rights of nationalities, and till the wars of the French Revolution the interests of the various European states were usually subordinated to the dynastic aims of their rulers. During the ensuing centuries the balance of power in Europe was seriously threatened; during the first half of the 16th century by Charles V., during the latter half of the same century by Philip II., in the first half of the 17th century by the house of Habsburg, and in the latter half by Louis XIV.

The close of the Seven Years' War seemed to prelude a period of British ascendancy on the continent, but that danger passed away with the outbreak of the war between Great Britain and her American colonies. For a time the balance of power in Europe was completely shattered by Napoleon's brilliant conquests, but his fall, while to a great extent restoring the political equilibrium, gave an opportunity to Alexander of Russia to dominate Europe. Thus the 16th century definitely marked the beginning of modern times both from a political as well as from a religious point of view.

The Reformation and the rivalry of Charles V. and Francis I.

With the accession of Francis I. to the French and Charles V. to the imperial throne began the long rivalry between France and the house of Habsburg, which continued with few interruptions till 1756. In the struggle between Charles V. and Francis I., which began in 1521, the former had the advantage, and the battle of Pavia (1525) seemed likely to lead to the permanent pre-eminence of the imperial cause. But unexpected allies were found by Francis in the German reformers and in the Turks. The nailing by Luther of his ninety-five theses to the door of the Wittenberg church, followed by the decisions of the diet of Worms in 1521, led to a rapid development of Lutheran opinions among the princes of the north of Germany. Charles V.'s victory over France in 1525 and his reconciliation with the papacy in 1529 seemed, however, to prelude the suppression of the Protestant opinions. But Francis I. again took up arms, while the invasions of Suleiman the Magnificent, during whose reign the Turkish influence was not only felt in Hungary and Germany but extended to the west basin of the Mediterranean, forced Charles to temporize. When in 1544 the conclusion of the peace of Crépy with Francis I. enabled Charles to turn his attention to the rapid growth of Protestantism, it was too late to adopt with any chance of success a policy of suppression. In 1552 he found himself compelled to agree to the treaty of Passau which implied the adoption of a policy of compromise, and which in 1555 was followed by a definite arrangement at Augsburg, which admitted the principle of *cujus regio, ejus religio*. Till the outbreak of the Thirty Years' War in 1618, the settlement of Augsburg tended to keep peace between the Catholics and the Protestants. Equally unsuccessful were Charles's later efforts against France; in 1553 he lost Metz, Toul and Verdun, and in 1556 he retired to Spain, leaving the Empire to his brother Ferdinand, and Spain, the Netherlands and his Italian possessions to his son Philip. The latter, after winning the battle of St Quentin in 1557, made peace with Henry II. of France by the treaty of Cateau-Cambrésis in 1559.

The Counter-Reformation.

By this peace a term was put to the struggle between France on the one hand and the Empire and Spain on the other, and the kings of France and Spain were enabled to turn their attention to the issues raised by the immense growth of Protestantism since 1521. While Charles V. had been engaged in his struggles with the Turks and the French, Protestantism had rapidly developed. In Sweden, in Denmark, in England, in various parts of Germany, and in France Protestant principles had been largely adopted (see REFORMATION).

Though the forces of Roman Catholicism had for a time been vanquished they had still to be counted with. From the middle of the 16th century the growth of Protestantism began to be checked, and a period of reaction against the Reformation set in. For a time it seemed that the efforts of Roman Catholicism would be successful and that the cause of Protestantism would be permanently weakened. The papacy since the beginning of the 16th century had reformed itself, the council of Trent (*q.v.*), which closed its sittings in 1564, had given Roman Catholicism a "clearly and sharply defined body of doctrine," and the Catholic Church had become "more united, less wordly, and more dependent on herself." In this work of reorganization the Jesuits had played a great part, and the success of the Counter-Reformation was largely due to their efforts (see JESUITS). Paul III., Pius IV. and V., Gregory XIII. and Sixtus V. are all good examples of the reforming popes of the 16th century. Under them the Jesuits worked; they restored Catholicism in Poland, Bohemia and south Germany; and supported by them the Inquisition crushed Protestantism out of Spain and Italy.

The aims of Philip II.

The interest of the Counter-Reformation movement from 1559 to 1618 centres round Philip II. of Spain. While Pius V. (1566–1572) is the best example of the Counter-Reformation popes, Philip II. took the lead among European Catholic monarchs in working for the extinction of Protestantism. His recovery of the southern Netherlands for the Catholic cause, his attempt to conquer England, his intention of subjugating France, were all parts of a scheme to advance simultaneously his own power and that of the Counter-Reformation.

Circumstances combined to aid Philip, and while he was endeavouring to carry out his political aims, the Jesuits were busily occupied in winning back large portions of Europe to allegiance to the papacy. But failure attended most of Philip's projects. Though he succeeded in recovering the southern or Walloon provinces of the Netherlands, he was unable to conquer the northern provinces, which under William of Orange formed themselves into the Dutch republic (see HOLLAND: *History*). His scheme for the conquest of England failed, and the Spanish Armada was totally defeated in 1588. Nor was his plan for the subjection of France more successful. After a tedious civil war between the Catholics and Huguenots, Henry of Navarre appeared as a national leader, who, having overcome the armies of the League with which Philip was allied, concluded the peace of Vervins in 1598. In consenting to this treaty Philip acknowledged that his schemes for the establishment of his influence over France had failed. Thus, when the 16th century closed, England's independence was assured, the Dutch republic was established, the French monarchy was rapidly recovering from the effects of the religious wars and the decadence of the Spanish monarchy had set in. But the religious question was still unsettled, religious passions ran high, and no satisfactory agreement between Catholicism and Protestantism had been, or seemed likely to be arrived at. The successes of the Counter-Reformation under the Jesuits and such men as Ferdinand of Styria (afterwards the emperor Ferdinand II.) and Maximilian of Bavaria only roused strenuous opposition on the part of Calvinist princes such as Frederick IV., the elector palatine.

The approach of the Thirty Years' War.

Various events had indicated the approach of a final struggle between Protestantism and Catholicism during the early years of the 17th century. The seizure of Donauwörth, a town with Protestant sympathies, by Maximilian of Bavaria in 1607, the formation of the Protestant Union in 1608 and of the Catholic League in 1609, the questions raised in 1609 by the Cleves-Jülich affair, the preparations of Henry IV. of France for an anti-Habsburg campaign—all these showed that the political atmosphere was charged with electricity. Till 1618, however, an open conflict between Protestantism and Catholicism in Germany was averted; in that year the acceptance, by the Calvinist Frederick, the elector palatine, of the crown of Bohemia, proved the starting-point of the Thirty Years' War.

The Thirty Years' War.

Till the death of Gustavus Adolphus in 1632 that war preserved a religious or semi-religious character. The emperor Ferdinand II., Philip III. of Spain and Maximilian of Bavaria undoubtedly hoped to suppress Protestantism in Germany, while Wallenstein, the great imperial general, was prepared to conquer Denmark, Sweden and Norway, and to convert the Baltic into an Austrian lake. Though the resistance of Christian IV. of Denmark was vain, the jealousy felt by the Catholic princes of Wallenstein and the skill of Gustavus Adolphus caused the total failure of these ambitious schemes. All hope of seeing the imperial flag waving over the Baltic was dispelled by the victory of Breitenfeld, and that of Lützen in 1632, and though Gustavus Adolphus fell in the last-named battle, he had saved north Germany from falling into the hands of the Jesuits.

Entry of France into the war.

With his death the Thirty Years' War became in the main a political struggle between France and the Habsburgs—a continuation of the wars of Francis I. and Henry II. against Charles V., and of the war between Henry IV. and Philip II. Ferdinand II. had attempted to carry back the religious history of the Empire more than seventy years, and had failed. He had endeavoured to make the Empire a reality and to revive and carry out the designs of Charles V. His failure was now complete. The edict of Restitution issued in 1629 remained a dead letter, and from 1632 to 1648 he and his successor Ferdinand III. had to employ all their energies in defending their possessions from the attacks of the French and Swedes.

The death of Gustavus Adolphus followed in 1634 by the assassination of Wallenstein proved an admirable opportunity for the entry of France into the Thirty Years' War. And till 1648, in spite of occasional reverses, the French and their allies gradually wore down their adversaries. After the death of Henry IV. in 1610 France had temporarily retired from a foremost place in the politics of Europe, and for some thirty years her ministers were busy in coercing the Huguenots and establishing the supremacy of the crown which was threatened by the nobles. Once united at home France was ready and eager to seize the opportunity for inflicting a severe blow upon the Habsburgs in Spain and Austria. The time for such action was well chosen. Austria was weakened by the war which had been waged since 1618, while Spain, exhausted by her efforts in the preceding century, had entered upon a long period of decay, and was about to see Portugal regain its independence. The Protestant princes in the north of Germany were ready to ally with France and Sweden against the emperor, even the Catholic Bavarian duke was to prove a doubtful ally of the Habsburg house. In 1642 Richelieu and in 1643 Louis XIII. died, but though Louis XIV. was an infant, and the French nobles by their cabals hindered the work of the regency, Mazarin successfully carried out the anti-Habsburg policy of his predecessors and brought the war against Austria to a successful conclusion. (See further THIRTY YEARS' WAR.)

The peace of Westphalia, 1648.

The peace of Westphalia in 1648 marked the virtual close of religious conflicts in Europe. It also marked the end of the attempts of the Habsburgs to establish a monarchical system throughout all Germany. By that peace the practical independence of the German princes was assured. Henceforward each prince could decide what form of religion was to be observed in his dominions. Thus Lutheranism, Calvinism and Catholicism were alike tolerated, and this recognition of the principle of compromise prepared the way for a wider toleration. Moreover, the petty principalities of the Empire, which numbered over 300, were allowed the right of concluding alliances with any foreign power, of making their own laws, and of carrying on war. Thus, in consequence of this most important concession of the emperor, the Empire lost all cohesion and became little more than a confederation. The states had firmly established their "liberties," the princes were now emancipated from imperial control, and it was evident that, unless by some means the house of Austria could re-establish its ascendancy, the eventual dissolution of the Empire must sooner or later follow. The peace of Westphalia thus marks for Europe, and in a special sense for Germany, the end of an important epoch. For Germany the changes introduced into its political life amounted to nothing less than a revolution, for there "the mainspring of the national life was broken." For Europe the Thirty Years' War brought to a close "the mighty impulses which the great movements of the Renaissance and Reformation had imparted to the aspirations" of men in all parts of the western world.

The treaties of the Pyrenees and Oliva.

It was not, however, till the treaties of the Pyrenees (1659) and Oliva (1660) were signed that the echoes of the Thirty Years' War died away, and Europe entered upon a period in which the political ambitions of Louis XIV. threatened the interests of Europe and absorbed the attention of all European statesmen. During the intervening years from 1648 to 1659 Spain and France continued the struggle, while Charles X. of Sweden in 1654 entered upon a career of aggression and conquest in the north of Europe, which was only ended with his death on the 23rd of February 1660. Upon the balance of power in the north of Europe the wars of Charles X. had little permanent effect, and the peace of Oliva to a great extent merely marked the restoration of the *status quo*. But the peace of the Pyrenees was far more important. During its struggle with France, Spain found itself also involved in hostilities with England, and the real rottenness of the Spanish monarchy became rapidly apparent. Any assistance which might have been hoped for from the emperor was prevented by the formation of leagues of German princes—lay and ecclesiastical—in 1657 and 1658, which had the full support of France. The effect of the formation of the second league was at once apparent: all hope of assistance to Spain from the emperor was seen to have disappeared, and the conclusion of a pacific settlement between France and Spain was at once arrived at. The peace of the Pyrenees was a triumph for the *Rheinbund*, no less than for France.

The age of Louis XIV.

With the beginning of the personal rule of Louis XIV. in 1661, and the return of Charles II. to England in 1660, a new period in the history of personal monarchy in Europe began. At the time of the peace of Westphalia the monarchy in Europe was under a cloud. In England the cause of Charles I. was lost in France the Fronde was holding its own against Mazarin; in Germany the princes had triumphed over the emperor; even in Russia the nobles were aiming at the curtailment of the power of the crown. But from 1660 it became evident that these attempts to secure the curtailment of the monarchical power were, with few exceptions, not destined to be successful. Though all chance of the establishment of a strong central authority in Germany had disappeared, the various states composing the Empire now entered upon a new period in their history and speedily formed miniature despotisms. Of these Brandenburg, Saxony and Bavaria were the most important. In Denmark Frederick III. made his crown hereditary, and his establishment of an absolutism was imitated by Charles XI. of Sweden a few years later.

Thus when Louis XIV. took into his own hands the government of France, the absolutist principle was triumphant all over Europe. The period of his personal rule lasted from 1661 to his death in 1715, and is known as "the age of Louis XIV." During that period France was the leading monarchy in Europe, and the most conspicuous not only in arms but also in all the arts of civilization. While Turenne, Luxemburg, Villars and many others exemplified, till the rise of Marlborough, the pre-eminence of French generals, Pascal, Racine, Corneille, Molière and Fénelon testified to the commanding position taken by France in the world of literature. The building of Versailles and the establishment of the French court there was an event of importance not only in the history of France, but also in the history of Europe. The history of Europe may without exaggeration be said during the reign of Louis XIV. to centre round Versailles.

The political condition of Europe, 1661-1688.

During his reign France took the lead in European politics, and established her supremacy all the more easily, owing partly to the weakness of most of the European countries, partly to the aggressions of the Turks, whose invasions of eastern Europe occupied from 1683 to 1699 the attention of the Poles and of the Austrians. The weakness or neutrality of the various European states was due to various causes. England was prevented till 1689 from taking a part in opposing the ambitious schemes of Louis XIV. owing to the personal aims of Charles II. and James II. Philip IV. and Charles II. of Spain could do nothing to resist the growing ascendancy of France, owing to the increasing weakness and rapid decadence of Spain, whose disappearance from the rank of great powers was one of the most striking features in the history of Europe during the second half of the 17th century. The weakness of Germany from the peace of Westphalia to the end of the century, due partly to the establishment of the independence of the princes of the Empire, partly to the unrest in Hungary, partly to the aggressions of the Turks, was obviously an immense gain to Louis XIV.

Louis' aggressions.

Realizing the strength of his own position and the weakness of that of most of the European states, he entered in 1667 into the Devolution war and secured several fortresses in the Spanish Netherlands. From 1672 to 1678 he was again at war with Holland, and from 1673 with the emperor, Spain and Brandenburg as well. At the same time the Turks invaded Poland, but were successfully resisted by John Sobieski. In 1676, however, they made the favourable treaty of Zurawna, securing Kamenets and portions of Podolia and the Ukraine. Thus, while the Turks were threatening the independence of eastern Europe, Louis XIV. was attacking the independence of western Europe. In 1678 he made the treaty of Nijmwegen, securing great advantages for France. Till the end of the century Europe was faced with two serious problems: Could she successfully cope with the Turks on her eastern frontier? And could she resist the continued aggressions of France on her western frontier? Consequently the years from 1678 to the end of the century were of vital importance to the European world. For during that period the French and Turks made unceasing efforts to extend their frontiers at the expense of Germany. Encouraged by the weakness of the chief European states, Louis set up the Chambers of Reunion, seized Strassburg in time of peace and attempted to annex Luxemburg. At the same time it seemed that an independent Gallican Church would be set up, and that Louis, like Henry VIII., would sever all connexion with Rome. The persecution of the Jansenists and the revocation of the edict of Nantes in 1685 established something akin to religious uniformity in France. Buoyed up by his successes abroad and at home, and conscious that he had nothing to fear from England or from Spain, Louis prepared to carry out his schemes, with regard to the extension of his territory eastwards, at the expense of Germany. Simultaneously with Louis' aggressions in western Europe, the Turks had made an attempt to capture Vienna in 1683. Fortunately the efforts of the emperor Leopold, aided by John Sobieski, king of Poland, were successful, and the Turkish tide of conquest was gradually but successfully checked. It was not, however, till the accession of William III. to the English throne that the tide of French conquest in western Europe was in like manner successfully resisted, and it was not till the treaty of Ryswick in 1697 that Louis realized that Europe had set a limit to his conquests. That treaty inflicted a blow on the prestige of France, just as the treaty of Karlowitz, concluded in 1699, was an important step in the decline of the Ottoman power. By that treaty, which marks a definite beginning in the history of the Austro-Hungarian monarchy, the hands of the emperor were freed, and he was able to devote his attention to the Spanish succession question, which already engrossed the attention of all Europe.

The Spanish Succession War.

The decadence of Spain had been obvious to all Europe since the middle of the century, and in anticipation of the death of the Spanish king Charles II., Louis XIV. and William III. had made a partition treaty in October 1698, which was superseded in March 1700 by a second partition treaty. However, on the death of King Charles on the 1st of November 1700 Louis repudiated the partition treaties and accepted the crown of Spain for his grandson Philip, who became Philip V. of Spain. Not content with this success Louis committed a number of aggressive acts which led to the War of the Spanish Succession in 1702. That war continued till 1713, when the treaty of Utrecht, followed in 1714 by the treaties of Rastadt and Baden, ended a struggle which had many results of vital importance to Europe. Great Britain, strengthened by the possession of Gibraltar and Minorca, by her establishment in Canada, and by trading rights in South America, henceforward stood forth as a rising colonial power to whom the command of the sea was essential. Austria obtained not only Belgium, which she held till the French Revolution, but also a firm foothold in Italy, which she maintained till 1859. To Spain the war indirectly brought unexpected benefits. Freed from her expensive possessions in Belgium and Italy, and now ruled by a new dynasty, Spain, so far from meeting with the fate which later attended Poland, entered upon a new period in her career, and throughout the 18th century showed considerable power of resistance to the colonial policy of Great Britain.

The 18th century.

With all its defects the treaty of Utrecht proved in many ways an excellent settlement. Till 1740, although a few short wars took place, Europe as a whole enjoyed peace. But with the settlement of Utrecht Europe seemed to have lost all touch with the high ideals which occasionally, as in the career of Gustavus Adolphus, or in the English great rebellion, or in the defence of Vienna by John Sobieski, were met with. The 18th century was marked by the dominance of a perverted system of the balance of power, which regarded such acts as the Prussian seizure of Silesia and the partition of Poland as justifiable on the ground that might is right.

European politics—1715-1740.

Before many years had passed after the treaty of Utrecht it became evident that two new nations were forcing themselves into the front rank of European powers. These were Russia and Prussia. The treaty of Nystad in 1721 was to the north of Europe what the treaty of Utrecht was to the western and southern nations. It marked the decline of Sweden and the rise of Russia, which henceforth played an important part in European politics. Nevertheless till 1740 with the exception of the short Polish Succession War 1733-35 and the equally short war of 1737-39, in which Russia and Austria fought against Turkey, no general European struggle took place. That this was so was due in great measure to the alliance of 1717 between Great Britain and France, to the subsequent peace policy upheld by Walpole, Fleury, Patiño and Horn (the English, French, Spanish and Swedish ministers), to the hostility between the courts of Vienna and Madrid—only momentarily healed by the treaty of Vienna in 1725—and to the uncertain character of Russian politics.

During those years from 1713 to 1740 the great powers were slowly forming themselves into groups, bound together by motives of interest. Thus Spain and France after 1729 began to realize that both countries were interested in checking Great Britain's colonial developments, while Spain was also ready to seize every opportunity of increasing her possessions in Italy at the expense of Austria.

1740 a new epoch.

With the year 1740 Europe entered upon a new epoch. The rivalry of Austria and Prussia for the leadership of Germany definitely began, and the struggle between Great Britain and France for supremacy in India, Canada and the West Indies entered upon an acute phase. The War of the Austrian Succession (1740-48) holds therefore an important place in the history of Europe, and proved with the Seven Years' War, which was practically a continuation of it, of very real interest to Europe.

In April 1748 Great Britain, France and Holland signed preliminaries of peace, which on the 18th of October became the definitive treaty of Aix-la-Chapelle. The other powers concerned agreed to the treaty with reluctance, Spain on the 20th of October, Austria on the 8th of November, and Sardinia on the

The Treaty of Aix-la-Chapelle, 1748.

20th of November. By the terms of the peace France and Great Britain restored the conquests in America, India and Europe which each had made from the other. As regards the other powers, the peace left serious heart-burnings. Sardinia, though gaining territory in the Milanese, was compelled to relinquish her hold on Piacenza and its territory, and to restore Finale to Genoa; Austria had to yield Parma and Piacenza to Don Philip, and to recognize the loss of Silesia to Prussia; Spain was compelled to forgo all hope of regaining Gibraltar. The importance of the terms of this treaty lies in the fact that they indicate not only the lines followed by later European settlements, but also the tendency of later European developments. To Great Britain the treaty was only a pause in her expansion in Canada and in her advance to the establishment of her influence over all India. To France the treaty was equally a presage of future disasters in India and Canada. The retention of Silesia by Prussia was a pronouncement to all Europe that a new power had arisen which was destined in 1866 to oust Austria from her dominant position in Germany. The gains won by Sardinia, too, indicated that the real danger to Austria's position in Italy would come from the house of Savoy.

The Seven Years' War.

The Seven Years' War (1756–63) opened with a diplomatic revolution as important as that of 1717, when France and Great Britain made an alliance. In May 1756, as a reply to the treaty of Westminster the Second, made in January between Great Britain and Prussia, France and Austria, united in the treaty of Versailles. This unexpected union, which lasted till the French Revolution, between two powers which had been hostile to each other from the beginning of the 16th century, amazed all Europe. However, it had not the results expected, for although Russia, which was allied with Austria, sent large armies headed by capable generals to the war, Frederick the Great remained unconquered. This result was partly due to the English alliance, partly to the incapable French generals, and partly to the state of internal politics in Russia. The treaties of Paris (February 10, 1763) and Hubertsburg (February 15) marked an important stage in the history of Europe. By the first Great Britain emerged from the war an imperial power with possessions all over the world, by the second Prussia was recognized as the equal of Austria in Europe.

Close of the Seven Years' War to the French Revolution.

The period from the close of the Seven Years' War to the French Revolution saw all the special characteristics and tendencies of the 18th century in an accentuated form. Benevolent despotism found representatives not only in Frederick the Great and Maria Theresa, but also in Joseph II., Catherine II., Charles III. of Spain, and Leopold of Tuscany. Reforming ministers, too, flourished in the persons of Tanucci, Turgot, Squillaci, Florida Blanca, D'Aranda and many others. Instances, too, of the low state of political morality are to be found. The indefensible seizure of Silesia by Frederick the Great was followed in 1772 by the equally immoral partition of Poland, and it was clearly apparent that monarchs, though ostensibly actuated by a desire for the welfare of their subjects, were resolved that reforms should come from above and not from below. The chief European events during these years were (1) the partition of Poland; (2) the war of the Bavarian Succession; (3) the alliance of Russia with Prussia in 1764 and with Austria in 1781; (4) the entry of France and Spain into war between Great Britain and her American colonies; (5) the combined attack of Russia and Austria against Turkey (1787–92); (6) the Triple Alliance of 1788.

No sooner was the Seven Years' War ended than France and Spain, having made the third family compact in 1761 (the other two were signed in 1733 and 1743), prepared to take revenge upon Great Britain at the first favourable opportunity. The result of this determination, and of Great Britain's absorption in internal politics, was that Russia, Prussia and Austria were enabled to carry out the first partition of Poland in 1772. The entry of France into the American war of independence rendered it impossible for Joseph II., single-handed, to carry out his project of exchanging the Austrian Netherlands for Bavaria, and he was compelled, after a short war, to give up for the time his project and to agree to the treaty of Teschen (1779). The continuance of the American War proved of great value to Russia and enhanced her position in Europe. Not only had she, together with France, brought about the treaty of Teschen, but in 1780 she headed the league of armed neutrality, and between 1780 and 1784 annexed the Crimea. The conclusion of the war of American Independence enabled Great Britain to regain her influence in Europe, and when Russia and Austria combined to attack Turkey, and when France threatened to re-establish her influence in Holland, Pitt formed with the Prussian king and the stadtholder the famous Triple Alliance of 1788. During the ensuing four years the influence of that alliance made itself felt in an unmistakable way. All hope of the establishment of French influence in Holland was destroyed; Denmark was forced to relinquish an attack on Sweden, then at war with Russia; and after Leopold of Tuscany had succeeded Joseph II. as emperor in 1790, the revolution in the Netherlands was brought to an end. Moreover, through the influence of Leopold the hostility of Prussia to Austria was removed, and the two powers in July 1790 made the treaty of Reichenbach. Great Britain, the chief member of the Triple Alliance, had supported the pacific solution of all these questions so menacing to European peace, and Pitt was aided in his policy by the emperor Leopold, who in 1791 made the treaty of Sistova with the Turks. Danger to the peace of Europe was, however, caused by the attempt of the Spaniards to annex Nootka Sound, and by the continuance of the war between Russia and Turkey. The former difficulty was, however, removed in November 1790 by an agreement between Great Britain and Spain, and in January 1792 Russia made the treaty of Jassy with Turkey.

French Revolution, 1789.

Opening of the war between France and Great Britain, 1793.

Instead of Europe remaining at peace the year 1792 saw the beginning of a series of wars which did not come to a final conclusion till the battle of Waterloo. While the east of Europe was engaged in war, and while the Triple Alliance was busy attempting to restore peace to Europe, the French Revolution had broken out in 1789. The assistance given by France to the American colonists had brought the country to bankruptcy, and no course was left to Louis XVI. except to summon the states-general in May 1789. In that year a revolution against the reforms of Joseph II. had taken place in the Netherlands, and a revolution was being prepared in Poland for the overthrow of the aristocratic constitution and for the establishment of an hereditary monarchy. At first the revolution in France was entirely occupied with internal reforms, but after the dissolution of the Constituent Assembly in September 1791 the Girondists, whose influence became paramount, determined by the advice of Brissot to insist upon a policy of menace towards the Empire which would inevitably lead to war. War would, they hoped, result in the downfall of monarchy in France. On the other hand, Lafayette and his party advocated war on the ground that it would strengthen the cause of monarchy. In April 1792 war was accordingly declared upon Austria, then in alliance with Prussia. After a short period of failure the French in September won the battle of Valmy, and in November the battle of Jemappes. French armies advanced to the Rhine, Belgium was occupied, the Scheldt was declared open, and Holland was threatened. In consequence of the danger to Holland, Pitt adopted a warlike tone, and in February 1793 France declared war upon Great Britain. In that war Spain, Sardinia and Tuscany joined, so that France was practically fighting all Europe. Nevertheless, owing to the want of union among the allies, to the Polish questions which distracted Prussia and Austria, and to the determination and patriotism of all classes in France, the allies were discomfited and the league of powers broken up in 1795, when the treaties of Basel were made. Only Great Britain, Austria and Sardinia remained in arms against France, which was till 1799 ruled by the Directory The next few years witnessed a series of most startling events. The successes of Napoleon Bonaparte in the Italian campaigns of 1797 and 1798 led to the peace of Cherasco with Sardinia, *The treaties of Lunéville and Amiens.*

and the peace of Campo Formio with Austria. Only Great Britain remained at war with France. In 1799, taking advantage of the absence of Napoleon in Egypt, the Second Coalition was formed by Russia, Great Britain and Austria. Though the French were driven from Italy, Massena defeated the Russians in Switzerland, and the English were forced to retire from Holland. The return of Napoleon from Egypt was followed by the establishment of the Consulate in November 1799, by the overthrow of the Austrians at Marengo and Hohenlinden, by the treaty of Lunéville with the emperor, and by the treaty of Amiens in 1802 with the English government. (See FRENCH REVOLUTIONARY WARS.)

The German Revolution.

Up to this point the Revolution may be said to have benefited Europe and to have shaken to its base the 18th-century ideas of government. During the years succeeding the peace of Campo Formio a revolution was effected in Germany. The Holy Roman Empire had become an anachronism, and as soon as France became possessed of the left bank of the Rhine it was obvious that the imperial constitution required revision. The jealousies existing among the German princes and the overthrow of Austria at Austerlitz enabled Napoleon to carry out a revolution in Germany according to his own ideas. At first, in 1804, new arrangements were made with regard to the character and formation of the diet. The constitution of that assembly was so altered that a Protestant majority free from Austrian influence was now assured. The middle states, such as Prussia, Baden, Bavaria, Württemberg and Hanover, received additions of territory, taken either from the ecclesiastical states or from the lands belonging to the imperial knights. After Austerlitz Napoleon in 1806 established the Confederation of the Rhine, and the Holy Roman Empire came finally to an end. A great European revolution had now been effected, but much remained to be done before a feeling of nationality could be aroused among the people of central Europe.

The causes of Napoleon's success.

Already before the peace of Amiens Pitt had tried to stir up national feeling in Austria and Prussia, the means which he suggested for opposing Napoleon being in great measure those which were adopted in 1813 and 1814. But during Pitt's lifetime central Europe was not moved by any feeling of nationality or of patriotism. During the war of the Second Coalition in 1799 Austria had acted without any regard for her allies, while Prussia, from motives of jealousy of and from want of confidence in Austria, had refused to move. It was not till the small states which hitherto had formed independent units had been destroyed and Austria and Prussia trampled under foot by Napoleon that a strong national spirit in Germany was evoked. Until the treaty of Tilsit had been signed in 1807 these was no visible growth of a national uprising in any part of Europe. During the intervening years Prussia had been crushed at Jena and her kingdom cut short (1806), while Alexander I. of Russia, after a fierce campaign against Napoleon, had agreed in 1807 to the treaty of Tilsit, which apparently placed Europe at the feet of France and Russia. Napoleon was, as he thought, now in a position to bring about the humiliation of Great Britain. Already in November 1806, realizing that he could not ruin England by direct invasion, he had issued the first Berlin Decree, which ordered the exclusion of British goods from the continent. The Continental System necessitated by the victory of Trafalgar was thus definitely set up. After Tilsit he proposed to become supreme in the Baltic, and, by securing the dependence of Spain and Portugal, to dominate the Mediterranean, and to resume his plans for conquests in the East, and for the destruction of the British power in India. Thus the effects of the British naval victories of the Nile and Trafalgar would be completely nullified, the Mediterranean would be closed to British ships, Great Britain's Indian possessions would be lost, and Great Britain herself would be forced by starvation into surrender. Fortunately for Europe various circumstances hindered the realization of these ambitious schemes. Alexander, who feared that the French emperor desired Constantinople, never proved a very helpful ally, the measures taken by Great Britain seriously interfered with Napoleon's schemes, and, before he had subjugated Spain, first Austria in 1809 and then Russia in 1812 offered an active resistance to his projects. The first note of opposition to Napoleon's plans was struck by Canning, when in 1807 he carried off the Danish fleet to England. Then the British fleet conveyed to Brazil in safety the Portuguese royal family when Portugal was invaded by Junot, while the surrender of 30,000 French troops at Baylen in July 1808, which was followed in August by the convention of Cintra, indicated that Spanish patriotism was, when roused, as effective as in the days of the Spanish Succession War. Austria was the first country to follow the example of Spain, and though she was defeated at Wagram and forced to accept Napoleon's hard terms, the national feeling aroused in Germany in 1809 rapidly developed. But Napoleon was apparently unconscious of the growth and importance of a national sentiment in any of the subject countries. In 1810 he had married Marie Louise of Austria, on the 20th of March 1811 a son was born to him, and he now seems to have resolved upon the establishment of a strictly hereditary empire with Paris its capital and Rome its second city. In extent, his empire would be vaster than that of Charlemagne, and the pope was to be completely subordinate to the emperor. This conception of the establishment of a reformed Holy Roman Empire with its centre at Paris did not appear unrealizable in 1811 when everything seemed to favour the new Charlemagne. Napoleon's power was apparently securely established, and during the years 1810 and 1811 he was again returning to his vast oriental designs A sudden check, however, was about to be placed upon his ambitious schemes.

Napoleon aims at the destruction of Great Britain.

The triumph of "nationality."

The establishment of French influence in Italy and Germany had stirred up in both countries a national feeling, the growth of which was encouraged by the example of Spain. No greater mistake was ever made by Napoleon than when, ignoring the strength of the Spanish resistance, and the development of a national movement in Germany, he resolved to enter upon the Russian campaign and to march to Moscow. Unconsciously Napoleon "had called into vigorous life the forces of Democracy and Nationality in Germany and Italy." The failure of the Moscow campaign led at once to a national rising in Prussia, and as soon as Austria had united her forces with those of Prussia and Russia, the overthrow of Napoleon at Leipzig in October 1813 was the result, and "the imperial yoke was shaken from the neck of the German people." Napoleon's wars had roused feelings of patriotism in Italy, Germany, Russia and Spain. It was at least realized by the nations of continental Europe, what had long been apparent to Englishmen, that a nation to be strong must be united. To "the subversive cosmopolitanism" of the French Revolution was now opposed the modern idea of nationality, against which the Napoleonic legions hurled themselves in vain. (See NAPOLEON I.; NAPOLEONIC CAMPAIGNS; FRENCH REVOLUTION; ALEXANDER I., emperor of Russia; METTERNICH.) (A. HL.)

Reconstruction of Europe.

Congress of Vienna, 1814-1815.

The downfall of Napoleon involved that of the political system of Europe which he had constructed. The changes wrought by the revolutionary period in the old states system were, however, too profound to admit of any attempt at a complete restoration, even had the interests of the allied powers been consistent with such a course. The object of the four great powers in whose hands the settlement of Europe now lay, was rather, after taking precautions to confine France within her "legitimate boundaries," to arrange such a "just equilibrium" in Europe that no individual state should for the future be in a position to overset the balance of power. The first object was to be attained by the re-establishment of the ancient dynasty in France, as a guarantee to Europe against a renewal of the revolutionary propaganda; the second was the work of the congress of Vienna, by which, between September 1814 and June 1815, the reconstruction of Europe was taken in hand. The opening of the congress, in which for the first time all Europe seemed to be united for the friendly settlement of common interests, was hailed as the dawn of a new era. In a sense it was so; but hardly in the manner nor to the degree that some had hoped. In its councils the arts of the old diplomacy, still inspired by the traditional principles or lack of principles, were directed to the old ends; and the world, as though the popular upheaval of the Revolution had never been, was treated as real estate to be parcelled out by the executors of Napoleon's empire among sovereigns by divine right, regardless of the wishes of the populations, which figured in the protocols merely as numbers to be balanced and bartered one against the other.

This process of "dividing the spoils," as Gentz called it, was naturally pregnant with possibilities of quarrels. Of these the most dangerous was that provoked by the resolution of the emperor Alexander I. at all costs to keep the former grand-duchy of Warsaw for himself, while compensating Prussia for the loss of some of her Polish territories by the annexation to her of all Saxony. The deadlock caused by the stubborn insistence on this plan, which the other great powers were equally determined to frustrate, all but led to war, and by a secret treaty signed on the 3rd of January 1815, Great Britain, France, and Austria agreed to make common cause in that event against Russia and Prussia. It needed Napoleon's return from Elba (March 1815) to remind the powers that their particular interests must still be subordinated to those of Europe. The common peril restored the broken harmony; and while the armies of the Alliance were closing in for the final struggle with the French emperor, the congress hurried on its deliberations, and on the 9th of June 1815, a few days before the battle of Waterloo, by which Napoleon's power was finally shattered, the Final Act, embodying the treaties of Vienna, was signed.

Territorial adjustments of the Vienna treaties.

The territorial arrangements thus effected were for half a century the basis of the states system of Europe, and the treaties in which they were defined the charter of international relations. It was in central Europe, where Napoleon's policy had most profoundly affected the pre-revolutionary system, that the greatest changes were made. No attempt, indeed, was made to restore the Holy Roman Empire, in spite of the protest of the pope against the failure to re-establish "the centre of political unity"; but the Confederation of the Rhine having come to an end, Germany was reconstituted as a confederation of sovereign states, in which all the former members of the Empire which had survived the revolutionary epoch found a place (see GERMANY). Austria, in virtue of the imperial tradition of the house of Habsburg, received the presidency of the federal diet; but the bulk of her territories lay outside the frontiers of the Confederation, and the non-German character of the Habsburg monarchy was accentuated by the other arrangements at the congress. In Italy Lombardo-Venetia was erected into a kingdom under the Austrian crown; while the dynastic settlements in the other Italian states tended to make Austrian influence supreme in the peninsula (see ITALY). In return for this, Austria surrendered her claim to her former possessions in the Low Countries, which were annexed to the crown of Holland, so as to form, under the title of the United Netherlands, an efficient barrier to French aggression northwards. The function of defender of Germany on the Rhine frontier which Austria thus abandoned was assigned to Prussia, an arrangement pregnant with momentous issues. In compensation for her disappointment in the matter of Saxony, half of which was ultimately restored to the dynasty of Wettin, she received a large accession of territory in the Rhine provinces, carved partly out of the suppressed kingdom of Westphalia, partly out of the former ecclesiastical states, and comprising the imperial city of Aix-la-Chapelle and the former electorate of Cologne. To Prussia also was conceded the right to garrison the federal fortress of Luxemburg.

Of the other German states, Bavaria, which alone was sufficiently powerful to be of any great importance in the general affairs of Europe, reaped the reward of her timely defection from the cause of her protector Napoleon. She had, indeed, to restore to Austria the territories annexed to her at the expense of the Habsburg monarchy by the French emperor: Tirol, the Quarters of the Inn and of the Hausruck, and part of Salzburg. But she received ample compensation elsewhere, notably the former Bavarian Palatinate with a strip of territory to connect it with Bavaria proper. The right to garrison the federal fortress of Mainz was also ultimately conceded to her. Bavaria was thus placed in a position to continue her traditional policy of aiming at the position of a European great power and holding the balance between Austria and Prussia (see BAVARIA: *History*). The two other German states whose elevation to kingdoms had symbolized a similar ambition, Saxony and Württemberg, were henceforth relegated to a position of third-rate importance. Saxony depended for her very existence on the rivalry of her more powerful neighbours. Württemberg protested in vain against the dictatorship of the great powers to which she was forced to submit. Finally, the electorate of Hanover, partly out of compliment to the king of Great Britain, partly because with the abolition of the Holy Empire the title elector had fallen obsolete, was elevated to a kingdom. The request of the elector of Hesse for a similar concession in his case was refused by the powers assembled at Aix-la-Chapelle in 1818.

Of great importance were the changes effected in the north and east of Europe. The affairs of the Ottoman empire, which the treaty of Bucharest (1812) between Russia and Turkey had left in a very unsatisfactory condition, were not dealt with by the congress, in spite of the efforts of Great Britain to bring them into discussion. But the concessions made to the emperor Alexander elsewhere represented a notable advance in the European position of Russia. The possession of Finland, conquered from the Swedes in 1808, was confirmed to her; and, above all, the erection of the former grand-duchy of Warsaw into a constitutional kingdom of Poland under the Russian crown not only thrust the Muscovite power like a wedge into the heart of Germany, but seemed to threaten the Polish possessions of Austria and Prussia by setting up a quasi-independent Poland as a centre of attraction to the scattered elements of the Polish nation; though in the sequel the establishment of the city of Cracow and its territory as an independent republic, to avoid the difficult question of its assignment elsewhere, proved a more fruitful source of nationalist unrest. In the north the settlement confirmed by the congress marked the definite withdrawal of the Scandinavian Powers from any active influence on the affairs of the continent. Alone of the *parvenu* monarchs of the Napoleonic age Bernadotte retained the crown of Sweden, to which, by the treaty of Kiel, that of Norway had been added. On the other hand, by the cession of Swedish Pomerania to Prussia, Sweden finally withdrew from the southern shores of the Baltic. The Scandinavian states ceased henceforth to play any determining part in European politics. In the south, on the other hand, the restoration of Savoy and Piedmont to Victor Emmanuel I., king of Sardinia, and the incorporation in his dominions of the territories of the former republic of Genoa, were factors pregnant with mighty issues. The object of this increase of the power of the house of Savoy was but to erect a barrier against any possible renewal of French aggression in Italy; in effect it established the nucleus of the power which was to struggle successfully with Austria for the hegemony of Italy.

The gains of Great Britain in Europe were comparatively small, though by no means unimportant. By the retention of Malta she secured her power in the Mediterranean, and this was further increased by the treaty of Paris (November 5, 1815), by which the powers recognized her protectorate over the Ionian Islands. (See VIENNA, CONGRESS OF.)

The powers and France.

But for the episode of the Hundred Days, France would have emerged from the congress with recovered prestige and mistress of at least some of the territorial gains of the revolutionary wars; though Napoleon had thrown away, during the negotiations at Châtillon, the chance of preserving for her her "natural frontiers" of the Rhine, the Alps and the Pyrenees. After Napoleon's second downfall she was in serious danger of dismemberment, for which the German powers clamoured as essential to their safety. That Louis XVIII. continued to rule over the territories "handed down to him by his ancestors" was due to the magnanimity, or policy, of the emperor Alexander I. (*q.v.*), and the commonsense of Castlereagh and Wellington, who saw well that the "just equilibrium," which it was their object to establish, could not be secured if France were unduly weakened, and that peace could never be preserved if the French people were left to smart under a sense of permanent injury. By the second peace of Paris, signed on the 20th of November 1815, France retained her traditional boundaries. The unsatisfied ambition to secure her "national frontiers" was to bear troublesome fruit later.

That the treaties embodied in the Final Act of Vienna represented a settlement of all outstanding questions was believed by nobody. They had been negotiated for weary months in an atmosphere of diplomatic and feminine intrigue; they had been concluded in a hurry, under the influence of the panic caused by Napoleon's return from Elba. To Friedrich von Gentz they were at best but "partial arrangements," useful as forming an authoritative basis for the establishment of a more complete and satisfactory system. The history of the international politics of Europe for the years immediately succeeding the congress of Vienna is that of the attempt to establish such a system.

Treaty of Nov. 20, 1815, and the Concert of Europe.

After a quarter of a century of almost ceaseless wars, what Europe needed above all things was peace and time to recuperate. This conviction was common to all the powers who had inherited Napoleon's dictatorship in Europe; but on the question of the method by which peace should be secured, and the principles which should guide their action, a fateful divergence of view soon became apparent within their councils. All were agreed that France still represented the storm centre of Europe; and a second treaty, signed on the 20th of November 1815, renewed the provisions of the treaty of Chaumont, in view of any fresh outburst of the French revolutionary spirit. But the new treaty went further. By its 6th article it was declared that "in order to consolidate the intimate tie that unites the four sovereigns for the happiness of the world, the High Contracting Powers have agreed to renew at fixed intervals . . . meetings consecrated to great common objects and to the examination of such measures as at each of these epochs shall be judged most salutary for the peace and prosperity of the nations and for the maintenance of the peace of Europe." This was the formal charter of the concert of the great powers by which for the next seven years Europe was governed, a concert to which the name "Holy Alliance" has been commonly but erroneously applied. The Holy Alliance, drawn up by the emperor Alexander I., and signed by him, the emperor Francis, and King Frederick William III. of Prussia on the 26th of September 1815, represented a different and conflicting ideal. Actually it was not a treaty at all, but at best a declaration of principles to which any Christian could subscribe, at worst—to quote Castlereagh—"a piece of sublime mysticism and nonsense" from the political point of view (see HOLY ALLIANCE). It gained its sole political importance from the persistent efforts of the tsar and his ministers to replace the committee of the great powers, established by the treaty of the 20th of November, by a "Universal Union" of all the powers, great and small, who had signed the Holy Alliance, and thus to establish that "Confederation of Europe" of which the autocratic idealist had borrowed the conception from the theorists of the 18th century (see ALEXANDER I., emperor ot Russia). It was clear from the first that any attempt to set up such a central government of Europe under a "universal guarantee" would imperil the independence of the sovereign states; and from the first Great Britain, represented by Castlereagh, protested against it. She would consent to take common action on the basis of the treaties she had actually signed, consulting with her allies on each case as it arose; but to vague and general engagements she refused to commit herself. The attitude of Austria and Prussia was from the outset less clear. Metternich was torn between dread of revolution and dread of Russia· the Holy Alliance, though essentially "verbiage," might be useful in holding the imperial Jacobin in check; the "universal guarantee" could not but be discouraging to the "sects"; on the other hand, the extreme willingness of the tsar to march 200,000 Russians for any "European" purpose in any direction convenient or inconvenient to Austria, was—to say the least—disconcerting. Frederick William III., on the other hand, though he too had signed the Holy Alliance with reluctance, in moments of panic saw in the "universal guarantee" his best defence against the renewed attack by France which was his nightmare. In effect, owing to the firm attitude of Castlereagh at the congress of Aix-la-Chapelle, "the transparent soul of the Holy Alliance" never received a body, though attempts were subsequently made at the congresses of Troppau, Laibach and Verona to apply some of its supposed principles—attempts that led to the definitive breach of Great Britain with the Alliance.

The Holy Alliance.

England and the Concert.

Congress of Aix-la-Chapelle, 1818.

The highwater-mark of the activity of the Allies as a central government for Europe was reached at the congress of Aix-la-Chapelle (*q.v.*) in 1818. France was now admitted to the Alliance, the objects of which were reaffirmed by a public declaration to which she adhered; but at the same time a secret treaty renewed the compact of Chaumont between the four other powers. Certain questions outstanding from the congress of Vienna were referred for settlement to a ministerial conference to meet at Frankfort in the following year. The treaty which was the result of this conference was signed on the 20th of July 1819. The bulk of it was concerned with territorial settlements in Germany: between Austria and Bavaria, and Bavaria and Baden; but some of the articles arranged for the cession of the border fortresses Philippeville and Mariembourg to the Netherlands, defined the frontiers of Savoy, and settled the reversion of the Italian duchies held by the empress Marie Louise.

Alexander I. of Russia and Metternich.

Meanwhile the balance of forces within the European concert had shown a tendency to shift. At the outset the restless activity of the emperor Alexander, his incalculable idealism, and his hardly veiled ambitions had drawn Austria and Great Britain together in common suspicion of an influence that threatened to be little less disturbing to the world's peace than that of Napoleon. But at Aix Metternich had begun to realize that, in the long-run, the system of repression which he held to be essential to the stability of the European, and above all of the Austrian, polity would receive little effective aid from Great Britain, fettered as she was by constitutional forms; while Alexander, alarmed at the discovery of revolutionary plots against his person, had already shown gratifying signs of repentance. The "Jacobin" propaganda of the tsar's agents continued, it is true, especially in Italy; and, in spite of the murder of the dramatist Kotzebue, as a Russian emissary, by the fanatical "Bursche" Karl Sand, Alexander joined with Castlereagh in protesting against the reactionary policy embodied in the Carlsbad Decrees of October 1819. But the murder of the duke of Berri on the 13th of February 1820 completed the Russian autocrat's "conversion." At the congress of Troppau, which met in the autumn of the same year, he was a "changed man," committed henceforth heart and soul to Metternich and his policy The outcome of this new understanding was the famous Troppau Protocol, published to the world on the 19th of November 1820, and signed by Austria, Prussia and Russia. The immediate occasion of this manifesto was the military insurrection, under General Pepe, at Naples, by which the Spanish constitution of 1812 had been forced on the king (see NAPLES: *History*). But the protocol embodied a general principle involving issues infinitely more important than any arising out of this particular question. "States which have undergone a change of government due to revolution," it declared, "the results of which threaten other states, *ipso facto* cease to be members of the European alliance, and remain excluded from it till their situation gives guarantees for legal order and stability. If, owing to such alterations, immediate danger threatens other states, the powers bind themselves, by

Congress and protocol of Troppau, 1820.

peaceful means, or if need be by arms, to bring back the guilty state into the bosom of the Great Alliance."

This was, in effect, an attempt to apply the principle of the Carlsbad Decrees to all the world; and, had the attempt succeeded, all Europe would have been turned into a confederation on the model of that of Germany; for a political alliance, charged with the safeguarding of the territorial settlement defined by treaty, would have been substituted a central diet of the great powers, armed with undefined authority; and the sovereign independence of the nations would have been at an end. To any such principle, and therefore to the protocol in which it was embodied, Great Britain offered an uncompromising opposition. In vain Metternich urged upon Castlereagh that the protocol was but the logical conclusion drawn from premises to which he was already committed; for, if the alliance was to be effective in maintaining peace, it must interfere wherever and whenever peace should be threatened, and therefore to crush internal revolutions which could not but have an external result. The logic was perfect; the proposition that on which every "project of peace" must eventually break. Castlereagh's reply was, in brief, that Great Britain could never admit a principle which she would not in any circumstances allow to be applied in her own case.

The absence of the signatures of Great Britain and France from the Troppau protocol marked the first rift in the alliance, a rift that was soon to develop into a breach. For the time, indeed, the crack was "papered over." Castlereagh was prepared to leave Austria a free hand to deal with the risings in Naples and Piedmont, since she had treaty rights in the former case and her interests, as an Italian power, were threatened in both. Great Britain was even represented at the congress which reassembled at Laibach in January 1821, though Lord Stewart, the ambassador at Vienna, was not armed with full powers. Castlereagh had approved of the invitation sent to the king of Naples to attend the congress, as implying "negotiation," an improvement on the dictatorial attitude of the protocol. But everything in the conferences tended still further to shatter the unstable foundations of the alliance. Capo d'Istria, as though the debates of Aix-la-Chapelle had never been, raised once more the spectre of the "Universal Union" which Castlereagh believed he had laid for ever. Metternich, anxious to prove to the Italian Liberals that the tsar was no longer their friend, welcomed the demonstration, and Prussia followed obediently in Austria's wake. "It is clear," wrote Lord Stewart, "that a Triple Understanding has been created which binds the parties to carry forward their own views in spite of any difference of opinion which may exist between them and the two great constitutional governments." (See TROPPAU and LAIBACH.)

First rift in the alliance.

Congress of Laibach, 1821.

But the narrower "Holy Alliance" of the three autocratic monarchies, as opposed to the two western constitutional monarchies, was not in fact destined to take shape till after the Paris revolution of 1830. Several factors delayed the process, notably the revolt of the Greeks against the Ottoman rule, and the Spanish question, which latter formed the main subject of discussion at the congress of Verona in 1822. In the Eastern Question the interests of Austria and Great Britain were identical; both desired to maintain the integrity of Turkey; both saw that this integrity was in the greatest peril owing to the possible intervention of the Orthodox tsar in favour of his co-religionists in revolt; and both agreed that the best means of preventing such intervention was to bind the Russian emperor to the European concert by using his devotion to the principles of the Holy Alliance. At Verona, however, the Eastern question was entirely overshadowed by that of Spain, and in this matter the views of Great Britain were diametrically opposed to those of the other powers of the alliance. She shared indeed with France and Austria the strenuous objection to the emperor Alexander's proposal to march 150,000 Russians into Piedmont in order to deal with Jacobinism whether in France or Spain; but she protested equally strenuously against the counter-proposal of France, which was ultimately adopted, that a French army should march into Spain to liberate the king from his constitutional fetters in the name of Europe. George Canning, carrying on the tradition of Castlereagh, once more protested, through Wellington, as British plenipotentiary at the congress, against the whole principle of intervention, and when, in spite of the British protest, the other powers persisted, the breach of Great Britain with the continental alliance was proclaimed to all the world. When, on the 7th of April 1823, the French army under the duke of Angoulême crossed the Bidassoa, the great experiment of governing Europe through a central committee of the great powers was at an end. (See VERONA, CONGRESS OF; ALEXANDER I.; LONDONDERRY, ROBERT STEWART, 2nd marquess of; CANNING, GEORGE.)

Effect of revolution in Spain.

Congress of Verona, 1822.

Henceforth, though the treaties survived, and with them the principle of the concert on which they were based, "Europe" as a diplomatic conception tends to sink into the background and to be replaced by the old international anarchy of the 18th century. To Canning this development seemed wholly welcome. He applied to the rivalry of states the Liberal principle of free competition as the sole condition of healthy growth. "Villèle is a minister of thirty years ago," he wrote to Bagot on the 3rd of January 1823, "no revolutionary scoundrel: but constitutionally hating England, as Choiseul and Vergennes used to hate us, and so things are getting back to a wholesome state again. Every nation for itself, and God for us all." But the essential difference between the rivalries of the 18th and 19th centuries was in the conception of the "nation." To Canning, as to the diplomatists of the congress of Vienna, "nation" was synonymous with "state," and national boundaries were those defined by the treaties, which Canning was as bent on preserving as any of his reactionary contemporaries. The conception of the divine right of every nationality to readjust political frontiers to suit its own ideals was as foreign to him as to Metternich. Yet this principle of nationality, which was destined during the 19th century to wreck the political structure consecrated at Vienna, and to leave to the succeeding age a host of unsolved and insoluble problems, found in Canning its earliest champion in the higher councils of Europe. The recognition of the independence of the South American republics and of the belligerent rights of the Greek insurgents were both in the first instance motived by the particular interests of Great Britain; but they were none the less hailed as concessions to the principles of nationality, to which they gave an impetus which was destined to continue till the face of Europe had been transformed.

End of the "Confederation of Europe."

Principle of nationality.

This in fact constitutes the main significance for Europe of the War of Greek Independence, which lasted from the first rising of the Greeks in the Morea in 1821 till the signature of the treaty of London on the 7th of May 1832 (see GREEK INDEPENDENCE, WAR OF; TURKEY: *History*). Its actual outcome, so far as the political structure of Europe was concerned, was but to add an insignificant kingdom to the European states system. But its moral effect was immense. The sacrosanctity of the *status quo* had been violated, and violated with the active aid of three of the powers of the continental alliance: Russia, France and Great Britain. Metternich was right when he said that, in principle, there was no difference between the Greek insurgents and any other "rebels against legitimate authority," and the Liberals of all Europe, forced into inactivity by the Austrian police system, hailed in the Greeks the champions of their own cause. Philhellenism, beyond its proper enthusiasm, served as a convenient veil for agitations that had little concern with Greece. Other forces making for political change were simultaneously at work. The peace secured by the concert of the powers had given free play to the mechanical and industrial innovations that heralded the marvellous economic revolution of the coming age; wealth increased rapidly, and with it the influence and the ambition of the middle classes. The revolution of July 1830, which established the *bourgeois* monarchy in France, marked their first triumph. In

Europe and the revolt of Greece.

Economic progress; rise of the middle classes.

Revolutions of 1830.

countries less economically advanced, *e.g.* Germany and Italy, the attempt to follow French example ended in failure; but the revolt of the Belgians, for reasons partly economic and partly national, against the domination of the Dutch, resulted in the establishment of the independent kingdom of Belgium—the first actual breach in the territorial settlement of 1815. In Great Britain the agitation of the disfranchised middle classes, which seemed to threaten a violent revolution, ended in 1832 in the passing of the Reform Bill and their admission to political power. (See FRANCE; GERMANY; ITALY; BELGIUM; ENGLISH HISTORY.)

The easy success of the revolutions in the west of Europe had been due, not to any reluctance of the reactionary powers to interfere on the basis of the old agreements, but to their preoccupation with the national revolt in Poland (*q.v.*). In view of this, and of the attitude of Great Britain, they had to recognize the title of Louis Philippe as king of the French, merely stipulating that he should guarantee to maintain the treaties. In spite of the overthrow of the legitimate dynasty in France, and of the partition of the kingdom of the Netherlands, the territorial settlement of Vienna remained, after the revolution of 1830, substantially intact. Outside the limits of the treaties, however, fateful changes were in progress. These were determined, broadly speaking, by the two main questions that dominated international politics between the years 1831 and 1841: (1) the antagonism between the western constitutional powers, France and Great Britain, and the eastern autocratic powers, Russia, Austria and Prussia; and (2) the crisis in the Eastern question resulting from the revolt of Mehemet Ali, pasha of Egypt, against the Porte.

Anglo-French "entente."

The strained relations between Great Britain and France, resulting from the French policy of aggression in the Spanish peninsula, which had more than once brought the two powers to the verge of war, had been eased before the fall of the government of Charles X. The peril of a French hegemony over the vast colonial empire of Spain had been forestalled by Canning's recognition of the independence of the South American republics; the intrigues of France in favour of the partisans of Dom Miguel in Portugal had been checkmated by a politic breach, on behalf of the Portuguese Liberals, of the British principle of non-intervention, and finally the chief cause of offence had been removed, in 1827, by the withdrawal of the French army of occupation from Spain. In the Greek question the two powers had acted cordially in concert; and this good understanding even the French conquest of Algiers in 1830, which laid the foundations of the French empire in Africa, had not availed to shatter; for the eyes of the Tory ministry were still fixed on France as the potential focus of revolutionary propaganda, and any over-sea possessions she might acquire were, in Wellington's opinion, so many hostages for her good behaviour given to British sea-power. The results of the July revolution in Paris were accepted by Great Britain so soon as it became clear that Louis Philippe stood for peace and not for revolutionary aggression; the armed intervention of France in favour of the Belgians in August 1831 was stopped by the firm language of Palmerston; the French occupation of Ancona, as a countermove to Austrian aggressions in Italy, was accepted as "an incident of the balance of power"; and the intention of the king of the French to abide by the treaties, which became clearer with the consolidation of his power at home, paved the way for that *entente* between the two Liberal powers which lasted until 1840.

The constitutional v. the autocratic powers.

The Eastern question. Mehemet Ali.

The cleavage between the fundamental principles of the two groups of autocratic and constitutional powers was not only apparent in their general attitude towards constitutional and national movements, but affected also the position taken up by them during the crisis of the Eastern question evoked by the revolt of Mehemet Ali, pasha of Egypt, a crisis by which between 1839 and 1841 all other diplomatic issues were overshadowed. (See MEHEMET ALI.) During the Greek revolt the efforts of Austria had been directed to preventing a Russian attack upon Turkey; these efforts had failed, and Metternich's worst fears seemed to be realized when the Russo-Turkish campaigns of 1828–29 issued in the treaty of Adrianople (September 14, 1829) and the apparently complete vassalage of the sultan to the tsar. But when, in 1832, Sultan Mahmud appealed in his despair to the emperor Nicholas to save him from ruin at the hands of the Egyptian rebels, and, as the result, the treaty of Unkiar Skelessi (July 8, 1833) seemed to place definitely in the hands of Russia the keys of the Black Sea, it was left to France and Great Britain to give voice to the protest of Europe. Austria, alarmed by the revolutionary movements of 1830, accepted the fact of Russian preponderance at Constantinople, rather than risk a breach with the autocrat who was now the main pillar of the Holy Alliance. The emperor Nicholas, for his part, was equally prepared to surrender some of his ambitions in the East for the sake of the common cause, the more so since to Russian statesmen the maintenance of Turkey in a condition of weakness and dependence now seemed preferable to any attempt to break it up. The result of these dispositions was the convention of Münchengrätz (September 18, 1833) between Russia, Austria and Prussia, by which the three powers undertook to guarantee the integrity of the Ottoman empire. In the following month a secret convention was signed at Berlin between the same powers (October 15), reaffirming the right of the powers to intervene in the internal affairs of a friendly state at the request of its legitimate sovereign, a right with which no third power would be allowed to interfere, such interference to be regarded by the three powers as an act of hostility directed against all of them.

Conventions of Münchengrätz and Berlin, 1833.

The Tsar Nicholas I. and Palmerston.

This reconstitution of the "Holy Alliance" on a narrower basis was the work of the emperor Nicholas, whose masterful personality had by this time quite overshadowed the influence of Metternich in the councils of the autocratic powers. There was no formal breach of the Grand Alliance; the "treaties" remained in force; but the French revolution of 1830 had produced a practical disruption which was every day accentuated by the attitude of the British government under the influence of Palmerston. For Palmerston had now become "the firebrand of Europe," openly proclaiming his contempt for international law and equally openly posing as the protector of "oppressed nationalities." "If these two powers (France and England)," wrote the tsar to King Frederick William of Prussia, "have the courage to profess loudly rebellion and the overturn of all stability, we ought to have the right and the courage to support Divine right." This deep cleavage of principles was immediately exhibited in the attitude of the powers towards the troubles in the Spanish peninsula. In September 1833 Ferdinand VII. of Spain died, and, under the Pragmatic Sanction, his daughter Isabella succeeded under the regency of Queen Christina; in July, Dom Miguel, the absolutist pretender to the throne of Portugal, had made himself master of Lisbon. In Spain Don Carlos, Ferdinand's brother, claimed the crown as the legitimate heir, and began the long agony of the Carlist wars; in Portugal the constitutionalists upheld in arms the rights of Queen Maria da Gloria (see SPAIN and PORTUGAL). Carlists and Miguelists, making common cause, had the moral support of the allies of Münchengrätz; while France and Great Britain took the side of the Liberals. A formal alliance between the two western powers, proposed by Talleyrand, was indeed refused by Palmerston, who had no wish to commit Great Britain to an irrevocable breach with Austria and Russia, and was suspicious of the ambitions of France in Spain; but ultimately a triple alliance between Great Britain, Spain and Portugal—with the object of restoring order in the peninsula—was converted, under pressure from the French government, into the Quadruple Alliance of the 22nd of April 1834.

Affairs of Spain and Portugal. Quadruple Alliance of 1834.

The *entente* implied by this formal instrument was, however, more apparent than real. When, in the spring of 1835, Queen Christina applied to the Allies for help against a renewed Carlist rising, Palmerston's suspicions were again aroused by

Nicholas I. and Great Britain.

Breach of Anglo-French "entente" 1840.

the somewhat naïve suggestion of Thiers that France should once more intervene as in 1823, a suggestion that was firmly rejected. Palmerston's counter-proposal of an English expedition met with as little favour in Paris. The Anglo-French *entente* was proving but a "cardboard alliance," as Wellington called it; and the emperor Nicholas, to whom the existence of Louis Philippe as king of the French was at once a sacrilege and a menace, began with a good hope to work for its destruction. The fears roused by the Reform Act of 1832 had been belied by its results; the conservative temper of the British electorate had restored to Great Britain the prestige of a legitimate power; and the pledge of the tsar's renewed confidence and goodwill was the visit of the cesarevich (afterwards the emperor Alexander II.) to the English court in 1839. This was not without its effect on the public sentiment; but the triumph of the tsar's diplomacy was due to fresh complications in the Eastern question, due to the renewed effort of Sultan Mahmud to crush the hated viceroy of Egypt. These events will be found outlined in the article Mehemet Ali. Here it will suffice to say that the convention of London of the 15th of July 1840, signed by Great Britain, Austria, Prussia and Russia without calling France into counsel, marked the definite breach of the Anglo-French *entente*, a breach which was but imperfectly healed by the Straits' Convention signed by all the powers on the 13th of July 1841.

Great Britain and France.

The Straits' Convention was hailed by Count Nesselrode, the Russian foreign secretary, as having re-established "the federative system of the European states on its old basis." This was true, in so far as it created yet another precedent for the concerted action of the European powers, and once more consecrated the right of 'Europe" to decide in common on questions of first-rate international importance. But the divergence of interests and principles within the concert were too great to be healed by the settlement of a single issue, however important, and this divergence increased as events moved towards the revolutionary outbreaks of 1848. When, in 1846, the independent republic of Cracow was suppressed by agreement of the three autocratic powers, on the ground that it had become a dangerous centre of revolutionary agitation, it was Great Britain and France that protested against an arbitrary infraction of the treaties by the very governments which had laid the greatest stress upon their sanctity. The *entente* between the two Liberal powers had been patched up after the closure of the Egyptian Question; it was cemented by visits of Queen Victoria and the prince consort to the Château d'Eu (1843 and 1845), and of King Louis Philippe to Windsor (1844); and it survived, in spite of several causes of friction, notably the crisis in Morocco (*q.v.*), until 1846, when the affair of the Spanish Marriages brought it to a somewhat dramatic conclusion.

The "Spanish Marriages."

The "February Revolution," 1848.

The attempt to secure the succession to the Spanish throne for his descendants by pressing on the marriage of the duke of Montpensier with the infanta Luisa, before that of the young queen Isabella had been proved to be fruitful in children, was on the part of Louis Philippe more than a breach of faith with Great Britain (how deeply it was resented may be learnt from Queen Victoria's letters); it was a breach of faith with the revolution that had made him king. Since 1840, indeed, the whole tendency of the king's policy had been to revert to the traditional standpoint of the Bourbons; internally, "resistance" to the growing claims of the democracy; externally, dynastic ambition. But in endeavouring to win the goodwill of the reactionary powers he only succeeded in losing that of the classes of his own people on which his authority was based. In 1847 he joined with the three autocratic powers in supporting the clerical and reactionary *Sonderbund* in Switzerland, in defiance of the protests of Great Britain and the attitude of the majority of Frenchmen. When, in February 1848, the revolution broke out in Paris, the *bourgeois* monarchy, utterly discredited, fell without a struggle (see France and Louis Philippe).

Revolutions of 1848 outside France.

The revolution in Paris was not the cause of the political upheaval which in the year 1848 convulsed Europe from Ireland to the banks of the Danube; it had indeed been preceded by the triumph of Liberalism in Switzerland, by successful revolutions in Naples and Palermo, and by the grant of a constitution in Piedmont; but flaming up as it were in the revolutionary centre of Europe, it acted as the beacon signal for the simultaneous outbreak of movements which, though long prepared, might but for this have been detached and spasmodic. It was this simultaneity which gave to the revolutions of 1848 their European character and their formidable force. They were the outcome of various, dissimilar and sometimes contradictory impulses—political, social, racial. In France the issue resolved itself into a struggle between the new working-class ideal of Socialism and the *bourgeois* ideal of the great Revolution; in England the Chartist movement presented, in a less degree, the same character; in Germany, in the Austrian empire, in Italy, on the other hand, the dominant motives were constitutional and nationalist, and of these two the latter became in the end the determining factor. The events of the different revolutions are described elsewhere (see France; Austria; Germany; Hungary; Italy). From the point of view of Europe such unity as they possessed was due to their being, so far as Central Europe was concerned, directed against the system of "stability" associated with the name of Metternich. In hatred of this system German, Czech, Magyar, and Italian were united; Kossuth's great speech of the 3rd of March echoed far beyond the frontiers of Hungary; the fall of Metternich (March 13) was a victory, not only for the populace of Vienna, but for all the peoples and races which had worn the Austrian fetters. It was the signal for revolutions in Hungary (the passing of the "March Laws"), in Bohemia, in Prussia (March 15), in Milan; on the 23rd of March, Charles Albert of Sardinia, placing himself at the head of the Italian national movement, declared war against Austria. Against a movement so widespread and apparently inspired by a common purpose the governments were powerless. The collapse of the Austrian administration, of which the inherent rottenness was now revealed, involved that of those reactionary powers which had leaned upon it. One by one they accepted what seemed to be the inevitable; even Pope Pius IX. sent troops to fight under the banner of St Peter for the Italian cause; while in Berlin Frederick William IV., wrapped in the gold and black colours of imperial Germany, posed as the leader of "the glorious German revolution." When, on the 18th of May, the parliament of United Germany was opened at Frankfort, it seemed as though pan-German dreams were on the threshold of realization; while in Italy, early in the same month, Lombardy, Modena, Parma and Piacenza declared by plebiscites for incorporation in the north Italian kingdom, Venice following suit on the 4th of June. A profound modification of the European states system seemed inevitable.

Causes of the failure of the revolutionary movements.

That, in the event, the revolutions of 1848 left the territorial settlement of Vienna intact, was due in the main to the marvellous resisting power of the Habsburg monarchy, the strength of which lay in the traditional loyalty of the army and the traditional policy of balancing race against race within the empire. The triumph of democracy in Germany was made possible only by the temporary collapse of the Habsburg power, a collapse due to the universality and apparent unanimity of the onslaught upon it. But it was soon clear that the unanimity was more apparent than real. The victory of the democratic forces had been too easy, too seemingly overwhelming; the establishment of the constitutional principle in the main centres of autocracy seemed to make common action against the powers of reaction of secondary importance, and free play was allowed to the racial and national antagonisms that had been present from the first. The battle of German, as well as of Italian, liberty was being fought out on the plains of Lombardy; yet the German democrats, whether in Vienna or Frankfort, hailed the victories of the veteran Radetzky as triumphs of Germanism. In Bohemia the revolution was wrecked on the rivalry of German and Czech; and when the Hungarians drew the sword against Austria, the imperial government was reinforced by the hatred of the southern Slavs for their Magyar task-masters.

Victory of the conservative forces.

Thus, from the chaos of warring races, the old order began slowly to reappear. So early as the 15th of June 1848 Prince Windischgrätz had restored order in Prague and received the thanks of the Frankfort parliament; on the 25th of July Radetzky's victory at Custozza set free the imperialist army in Italy; on the 4th of September Jellachich, ban of Croatia, invaded Hungary in the name of the united empire; on the 1st of November Windischgrätz entered democratic Vienna. The alliance of the army and the Slav races had won the victory over German democracy. The combating of Hungarian nationalism proved a longer and a harder task; but the Austrian victory of Kapolna (February 26–27, 1849) encouraged Schwarzenberg to dissolve the rump of the *Reichsrath* at Kremsier and proclaim a new constitution for the whole empire, including Hungary. The Magyar victories that followed issued in the proclamation, on the 14th of April, of the independence of Hungary. But though the Austrian arms had not been strong enough to crush the Hungarian revolt, they had proved at least the vitality of the conservative principle. The emperor Nicholas I. of Russia had watched in disgusted silence the weak spirit of concession with which the revolutions had been everywhere met; so long as the sovereigns seemed to forget their divine mission he had held rigorously aloof, and had only broken silence to congratulate Windischgrätz on his capture of Vienna and Schwarzenberg on his reassertion of vigorous principles. Now, however, that Divine Right was in arms against the forces of disorder, he was prepared to listen to the prayer of the emperor Francis Joseph for assistance against the Hungarian rebels. The engagements of 1833 were remembered; and in the brotherly spirit of the Holy Alliance, Hungary was subdued by Russian armies and handed over, without *quid pro quo*, to her legitimate king.

Prussia and Austria. Convention of Olmütz, 1850.

Görgei's capitulation of Világos (August 14, 1849) cleared the ground for the complete restoration of the system destroyed by the March revolutions of the year before. The refusal of Frederick William IV. of Prussia to accept the imperial crown (April 21, 1849) had already advertised the failure of the constitutional and unionist movement in Germany; and Prussia, her military prestige restored, stood once more face to face with Austria in rivalry for the hegemony of Germany. In the diplomatic contest that followed Prussia was worsted, her claims to an independent supremacy in the north were defeated, and the convention of Olmütz (November 29, 1850) restored the *status quo* of the Confederation as established in 1815.

Napoleon III. and Europe.

Within three years of the great upheaval of 1848 the forces of revolution seemed everywhere to have been subdued, the states system of Europe to have been re-established on the basis of the treaties of Vienna. In reality, however, this restoration was only on the surface; the cracks in the structure of the European system had—to use Bismarck's phrase applied to another occasion—only been "papered over"; and soon ominous rents revealed the fact that the forces that had threatened it with sudden ruin were still at work. One fateful breach in the treaties had, indeed, been accepted as beyond repair; when the dust of the revolutionary turmoil was at length laid a Bonaparte was once more firmly seated on the throne of France. The emperor Nicholas, watching from the calm of Russia, had realized all that the recognition of this fact would involve; he had proposed to set in motion the somewhat rusty machinery of the Grand Alliance, but the other autocratic powers were in no case to support a legitimist crusade, and when Napoleon in 1852 assumed the title of emperor, all Europe recognized his right to do so, even Nicholas being fain to content himself with refusing to treat the *parvenu* monarch as his "brother," and to admit his style of "third" Napoleon, which seemed to imply a dynastic claim. Napoleon, indeed, was accepted by the powers, as he was welcomed by the French people, as the "saviour of society" from the newly revealed perils of the social revolution. For new and ominous forces had made their appearance since the revolution of 1830 had established the middle classes in power. The industrial development had proceeded in the west of Europe with astonishing rapidity, with its resulting concentration of vast populations in factories and factory cities; and this "proletariat," excluded from any voice in the government, and exposed in accordance with the prevailing economic theories of doctrinaire Liberalism to the horrors of unrestricted competition, had begun to organize itself in a movement, of which the catchword was "the right to work" and the banner the red flag of the socialist commune. The reign of Charles X. had been the *reductio ad absurdum* of the principle of legitimacy; that of Louis Philippe had discredited for ever government based solely on the *bourgeoisie*; the socialistic experiments of 1848 in Paris had collapsed amid the anarchy and bloodshed of the June days. At this opportune moment Louis Napoleon Bonaparte proclaimed to the French people the "Napoleonic Idea" as conceived by himself. The great Napoleon had been the incarnation of the Revolution, had "sprung armed from the Revolution, like Minerva from the head of Jupiter"; he had ruled because to him the people, by whom the Revolution had been made, had delegated the duty of representing, protecting and guiding it. Of this idea Louis Napoleon conceived himself to be the heir; and when by a double plebiscite the French nation had established him in supreme power, first as president for life (1851), then as emperor (1852), he was able to claim that he represented the people in a far more immediate sense than could be asserted of the chance majority of any representative assembly.

Rise of socialism.

"The Napoleonic Idea."

Economic revolution in Europe.

It was clear that, sooner or later, Napoleon III. would prove a disturbing force in Europe. His title to rule was that he represented France; it followed therefore that he must be hostile to "the treaties," by which the traditional aspirations of France, *e.g.* for her "natural boundaries" of Rhine, Alps and Pyrenees, were restrained. He reigned as "emperor of the French"; it followed that he represented that principle of nationality which the treaties ignored. He could not afford—as Metternich had said of Ferdinand of Naples—"to treat his throne as an arm-chair"; and any activity he might display would be almost certainly at the expense of the established order. At the outset, indeed, it was his policy to pose as its custodian. To conciliate the French clericals he supported the pope against the Italian Liberals; but otherwise he proclaimed aloud his devotion to the arts of peace. A period of rapid material expansion succeeded the unrest of the revolutionary years; engineers and men of science were quickly producing a change in all the material conditions of life, greater than could have been effected by any political revolution; especially the face of Europe was gradually being covered with a network of railways, which it was hoped would draw the European nations not only materially but morally closer together. The first universal exhibition, opened under the auspices of the prince consort at London in 1851, was intended to advertise and consecrate the dawn of a new era of international peace and goodwill. The Crystal Palace at Sydenham, once hailed as the "bright Koh-i-nur of the West," remains the dismal monument of a hope so soon to be belied by the hard logic of events. For no period since 1815 has been so occupied with wars and the rumours of war as the twenty years that followed the opening of this great temple of peace.

The Crimean War.

One question, that of the ultimate destination of the duchies of Schleswig and Holstein, which threatened the tranquillity of the West, was temporarily settled by the conference of London in 1852 (see SCHLESWIG-HOLSTEIN QUESTION). But about the same time anxious watchers noticed on the political horizon in the East a cloud, no bigger than a man's hand, that threatened a serious storm. At first this was no more than a quarrel between Greek and Latin monks about the custody of certain holy places and things in Palestine.

Congress of Paris, 1856.

It soon, however, became clear that behind these insignificant combatants loomed the figures of the emperors of Russia and France. The motives that induced Napoleon to take up the cause of the rights of the Latin church in this matter were partly political, partly personal. He resented the tsar's attitude towards himself; he wished to gain the firm support of the clergy for his throne; he desired to win prestige for himself and his dynasty by reasserting the traditional influence of France in the Ottoman empire. The events that led up to the Crimean War, and those of the war itself, are told elsewhere (see CRIMEAN WAR). Great Britain had been drawn into the war by her traditional policy of preserving the Ottoman empire as a barrier against the advance of Russia to the Mediterranean and the consequent danger to the British empire in India. It is now generally conceded that, so far as these objects were concerned, the war was a tragic mistake. The hopes that were built on the capacity of Turkey to reform itself were disappointed; the restrictions imposed upon Russia were repudiated at the first opportunity, during the Franco-German War in 1870; and the results of the Russo-Turkish War of 1876 have shown that a far more effective barrier against Russia than the weakened Ottoman empire has been furnished by the young and vigorous national states of the Balkan Peninsula. None the less, the treaty of Paris (1856), by which the war was closed, marks an important epoch in the diplomatic history of Europe; and it is impossible to say that the blood spilled in the Crimea was wholly wasted. At the time the main success of the allied powers seemed to be in the thrusting back of Russia from the Danube by the cession of Bessarabia, the extinction of Russian sea-power in the Black Sea, the formal repudiation of the tsar's claim to a special right of interference in Turkey. But the true significance of the work of the congress of Paris lies in the impetus given by it to the development of an effective international law. The concert of Europe was consecrated anew by the solemn admission of the Ottoman empire to an equality of *status* with the European powers and the declaration of the collective obligations of Europe towards it. The congress, moreover, acted in some sort as the legislative body of Europe; it established the principle of the free navigation of the Danube and of the right of all nations to carry their commerce into the Black Sea; by a declaration, signed by all the powers present, it abolished the practice of granting letters of marque to privateers in war time. The question was even discussed of establishing some sanction by which the rules of international law agreed upon should be enforced upon recalcitrant states; and, though nothing was settled, a *vœu* to this effect was entered upon the protocol. The congress of Paris thus set a precedent more hopeful than those of the congresses held earlier in the century, because the issues were not confused by the supposed necessity for upholding "legitimacy" at all costs, it was a stage in the progress from the ideals of the Grand Alliance to those of the Hague Conference.

Preponderance of France.

Napoleon and Italy. War of 1859.

Napoleon and Germany.

The conclusion of the Crimean War left the emperor Napoleon the most influential personage in Europe; and Paris, the seat of the congress, became also the centre of the diplomatic world. Russia had been bled almost to death by the war; Austria was discredited and isolated owing to the dubious part she had played in it; Prussia had not recovered from the humiliation of Olmütz; Great Britain was soon plunged into the critical struggle of the Indian Mutiny. The time was obviously opportune for the realization of some of the aspirations implied in the Napoleonic idea. The opportunity came from the side of Italy. By sending Sardinian troops to fight in a quarrel not their own, alongside the Allies in the Crimea, Cavour had purchased for Piedmont the right to be heard in the councils of the powers—a right of which he had made use at the Paris congress to denounce before all Europe the Austrian misrule in Italy. The Italian unionists were at one with Napoleon in desiring to overset "the treaties"; and the Franco-Italian alliance which, in 1859, drove the Austrians out of Lombardy and established the nucleus of the Italian kingdom was the beginning of a process which, within twelve years, was to change the balance of Europe. It was ominous of the future that it was largely the menace of Prussian intervention that persuaded Napoleon to conclude the armistice of Villafranca (July 11, 1859), which, contrary to his agreement with Victor Emmanuel, left Venice to the Austrians. In spite of the peace of Zürich (November 10), indeed, the union of Italy continued during the succeeding years, and Savoy and Nice were the reward of the French emperor's connivance (see ITALY). France thus once more gained her "natural frontier" of the Alps; the question was whether she would be able to regain her other natural frontier on the Rhine. The times were not unpropitious for an enterprise which was undoubtedly one of the main objects of Napoleon's policy. The European concert had ceased to exist as an effective force; the treaties had been violated with impunity; in Germany, where the tension between the two great powers had not been eased by Prussia's dubious attitude during the war, there was little prospect of a united opposition to French aggression, and the conditions seemed highly favourable for reviving the traditional policy of exploiting German disunion for the aggrandizement of France. Prussia was arming, but her armaments were directed not against Napoleon but against Austria; and the beginning of the reign of William I., who had become regent in 1858 and king in 1861, pointed to the development of a situation in which the French emperor would once again become the arbiter of Germany. On the 29th of March 1862 Prussia signed a commercial treaty with France on a basis that involved the exclusion of Austria from the Zollverein, and replied to the protests of the court of Vienna by recognizing the new kingdom of Italy. In September of the same year King William placed the supreme direction of Prussian policy in the hands of Otto von Bismarck, whose views on the exclusion of Austria from Germany were known to all the world.

Decline of Napoleon's influence.

The outcome of the Polish insurrection of 1863, however, again altered the aspect of things, and in a direction unfavourable to France (see POLAND: *History*). Napoleon had been forced by French public opinion to come forward as the protector of the Poles; but the spectacle of a Bonaparte posing as the champion of "the treaties" was not impressive; his brave words were not translated into action; and he only succeeded in offending Russia by his protests and alienating Great Britain by his tergiversations. The proffered intervention of Austria, France and Great Britain was rejected in a note of Prince Gorchakov to Baron Brunnow, the Russian ambassador in London (July 1, 1863); no action followed; and the last effort to put forward the treaties of Vienna as the common law of Europe ended in a fiasco. British ministers, who had been made to look somewhat ridiculous, henceforth began to be chary of active intervention in continental affairs; Austria and France were alike discredited and isolated. Prussia which, under Bismarck's auspices, had aided Russia in suppressing the Poles (convention of February 8, 1863) alone emerged from the crisis with increased prestige. Bismarck, indeed, was too wary to accept the tsar's suggestion of an offensive alliance and an immediate combined attack on Austria and France; but in the coming struggle for the hegemony of Germany he was assured at least of Russia's neutrality.

Rivalry of Prussia and Austria. Schleswig-Holstein question.

The final act in this long rivalry began with the opening up of the Schleswig-Holstein question on the death of Frederick VII. of Denmark and the accession of the "protocol-king" Christian IX. (November 15, 1863). The German claim to the Elbe duchies, the Danish claim to at least Schleswig as an integral part of the northern kingdom, were but subordinate issues of questions far more fateful, the developments of which once more illustrated the hopeless enfeeblement of the idea of the European concert. In the struggle for the possession of the duchies the general sentiment of Germany was on one side, that of Europe on the other. By the protocol of 1852 the duchies had been treated as an integral part of Denmark, and France and Great Britain, as signatory powers, alike protested against the action of Austria and Prussia in asserting the German claim by force of arms. But, as in the case of Poland, protests were not followed by action; Napoleon in the end contented himself with proposing his favourite "Napoleonic idea" of a plebiscite, to discover the wishes of the populations concerned; Palmerston, who realized some of the important issues involved, allowed his warlike attitude, under exalted influences, to evaporate in words. Thus Great Britain earned the lasting resentment of Germans, without succeeding in preventing the establishment of German sea-power in the Baltic. For the Prussian war-harbour of Kiel and the Kiel canal were in Bismarck's mind from the outset. Throughout he intended to make the duchies a part of Prussia and to use the whole question as a means for the solution of that of Germany. The Austro-Prussian War of 1866 grew inevitably out of the Dano-German War of 1864; and the treaty of Prague (Aug. 23, 1866), which excluded Austria from Germany and established the North German Confederation under the headship of Prussia, not only absorbed into Prussia the North German states which had sided with Austria, but by the annexation to her of Schleswig and Holstein laid the foundations of German power in the North Sea, and of German rivalry with England in the future.

Austro-Prussian War of 1866. Prussia supreme in Germany.

Napoleon and Prussia.

More immediate were the effects of the campaign of Königgrätz on France. The rapid and overwhelming victory of Prussia overthrew all the calculations of Napoleon, who had looked to intervening as arbiter between exhausted combatants. The sudden menace of the new German power alarmed him, and he sought to secure the Rhine frontier for France, by negotiations with Prussia, in the form of "compensations" at the expense of the South German states. He succeeded only in placing a fresh weapon in Bismarck's hands. The communication of the French overtures to the South German courts was enough to throw them into the arms of Prussia; and treaties of offensive and defensive alliance were signed in August 1866 between Prussia and Württemberg (3rd), Baden (17th), and Bavaria (22nd), by which the king of Prussia was to receive the supreme command of the allied armies in time of war. In vain Napoleon tried to retrieve his damaged prestige by securing compensation elsewhere. His proposal that the grand-duchy of Luxemburg, which had not been included in the new German Confederation, should fall to France by agreement with Prussia was no more successful than his other demands for "compensation." Luxemburg was declared a neutral state by the convention of London in 1867 (see LUXEMBURG), and the French proposal, published by Bismarck in *The Times* at the outset of the war of 1870, only damaged the French emperor's cause in the eyes of Europe.

Meanwhile public feeling in France had become seriously excited by this sudden menace of a hostile power on her eastern frontier, and this excitement was raised to fever heat when it became known that the vacant throne of Spain had been offered to and accepted by a prince of the house of Hohenzollern. Napoleon's policy had become hopelessly discredited by the successive fiascos in Poland, Mexico and Germany, and even the establishment of a liberal constitution in 1869 could not avail to restore confidence in him. He knew the risk he ran in challenging a conflict with a power whose military efficiency had been so strikingly displayed; but by refusing to do so, in the excited state of public feeling, he would have risked his throne. He reckoned on the traditional jealously of the South German states for Prussia and their traditional friendship with France; he was assured, too, of the support of Austria, in the event of a victorious opening of the campaign. On the other hand Bismarck was bent on war, which, in accordance with his policy of "blood and iron," he believed to be the sole effective means of binding the heterogeneous elements of Germany into a coherent whole. The device of the "Ems telegrams" (see BISMARCK) was sufficient to end the hesitations of Napoleon by giving an irresistible volume to the cry of the war party in France; and on the 19th of July the French emperor's declaration of war was handed in at Berlin.

The Franco-German War, 1870-1871.

The new German Empire.

The story of the struggle that followed is told elsewhere (see FRANCO-GERMAN WAR). The hopes that Napoleon had based on the action of the South German courts was belied; and the first crushing German victories (Weissenburg, August 4, and Wörth, August 6) not only removed all chance of Austrian co-operation but brought down with a crash the imposing façade of the Second Empire. On the 2nd of September Napoleon surrendered, with his army, at Sedan; and two days later the Empire was overthrown and a provisional republican government set up at Paris. On the 19th Paris itself was invested and, after a heroic defence, capitulated on the 28th of January 1871. On the 18th of January, at the palace of Versailles, William I., king of Prussia, was proclaimed German emperor. On the 26th of February were signed the preliminaries of peace, by which France agreed to cede to the German empire Alsace (except Belfort and its territory) and German Lorraine, with Metz and Thionville (Diedenhofen), and to pay a war indemnity of five milliards of francs (£200,000,000) in three years, to be secured by the occupation of French territory. The definitive treaty was signed at Frankfort-on-Main on the 10th of May 1871.

Dual system in Austria-Hungary.

Union of Italy.

The most important outcome of the events which culminated in the Franco-German War and its result was the establishment of a powerful German empire, which was destined to dominate the continent for years to come, and the expansive ambitions of which remain pregnant with menace for the future. So great an overturn, however, involved other changes in the territorial system, which may be briefly summarized. The most notable of these was the reconstruction of the Austrian monarchy as a result of the war of 1866. By the treaty of Vienna (October 3, 1866) between Austria and Italy, Austria recognized the Italian kingdom and ceded to it the city and territory of Venice, thus surrendering the traditional claim of the Habsburgs to domination in Italy. This was followed in 1867 by the establishment of the Dual Monarchy in the Habsburg dominions under the auspices of Bismarck's rival, Count Beust,—Francis Joseph being crowned king of Hungary, and a separate constitution being established for Hungary and the *Cis-Leithan* dominions of the Austrian emperor (see AUSTRIA: *History*). In Italy, meanwhile, the unification of the kingdom had continued after the conclusion of the war of 1859 by the treaty of Zürich. In 1860 Tuscany, Parma and Modena were united to the monarchy of Victor Emmanuel, at the cost of the cession of Nice and Savoy to Napoleon. In May of the same year Garibaldi and his "Thousand" landed in Sicily, which he reduced by the end of June; in August he crossed to the mainland, and the capitulation of Francis II. of the Two Sicilies at Gaeta on the 13th of February 1861 ended the Bourbon kingdom in southern Italy. On the 17th of March Victor Emmanuel II. was proclaimed king of United Italy. This title, as mentioned above, was recognized by Austria in 1866, when Italy was increased by the cession of Venice. Finally, Rome, which had been preserved to the papacy by Napoleon's troops, was on their withdrawal occupied by the Italians on the 20th of September 1870. Thus the temporal power of the popes came to an end; and the unification of Italy was completed (see ITALY: *History*).

Another significant outcome of the collapse of France was the denunciation by Russia of the "Black Sea" clauses of the treaty of Paris of 1856, an action rendered possible by the *entente* between the governments of Berlin and St Petersburg. In the note addressed to the signatory powers announcing that Russia no longer felt herself bound by the clauses of the treaty limiting her sovereign rights in the Black Sea, Prince Gorchakov wrote: "It would be difficult to affirm that the written law founded on the respect for treaties, as the basis of public right and rule of the relations of states, has preserved the same moral sanction as in former times." The action of Russia was, in fact, a practical illustration of Bismarck's *dicta* that "*rebus sic stantibus* is involved in all treaties that require performance" (*Mem.* ii. 280), and that "*ultra posse nemo obligatur* holds good in spite of all treaty obligations whatsoever, nor can any treaty guarantee the discharge of obligations when the private interest of those who lie under them no longer reinforces the text" (*ib.* ii. 270). Great Britain did her best to counteract a doctrine so subversive of international confidence. For a moment at least a diplomatic breach with Russia seemed inevitable. At Bismarck's suggestion, however, a conference was held at London to arrange the affair. There was, in the circumstances, no chance of forcing Russia to recede from her position; but in order "to reconcile facts with principles" the conference on the 17th of January 1871 agreed on a formula announcing that "contracting powers can only rid themselves of their treaty engagements by an understanding with their co-signatories." Thus the principle of the European concert was saved. But, for the time at least, it seemed that the triumph of Bismarck's diplomacy had re-established

> . . the simple plan
> That they should take who have the power
> And they should keep who can.

Beust was not far wrong when he exclaimed, "*Je ne vois plus de l'Europe!*" (W. A. P.)

By the Franco-German War of 1870–71 and the creation of the German empire the political condition of Europe was profoundly changed. Germany became for a time the leading power on the continent of Europe, and German statesmanship had to devise means for preventing, until the new edifice was thoroughly consolidated, the formation of a hostile coalition of jealous rivals. The first thing to be done in this direction was to secure the support of Russia and Austria to the new order of things.

Russian policy towards Germany.

With regard to Russia there was little cause for apprehension. She had aided Bismarck to carry out his audacious schemes in the past, and there was no reason to suppose that she would change her policy in the immediate future. The *rapprochement* dated from the Polish insurrection of 1863, when the governments of France and England, yielding to popular excitement, made strong diplomatic representations to Russia in favour of the Poles, whereas Bismarck not only refused to join in the diplomatic campaign, but made a convention with the cabinet of St Petersburg by which the Russian and German military authorities on the frontiers should aid each other in suppressing the disturbances. From that time the friendship ripened steadily. The relations between the two powers were not, it is true, always without a cloud. More than once the bold designs of Bismarck caused uneasiness and dissatisfaction in St Petersburg, especially during the Schleswig-Holstein complications of 1864 and the Austro-Prussian conflict of 1866; but the wily statesman of Berlin, partly by argument and partly by dexterously manipulating the mutual trust and affection between the two sovereigns, always succeeded in having his own way without producing a rupture, so that during the Franco-German War of 1870–71 Russia maintained an extremely benevolent neutrality, and prevented Austria and Italy from taking part in the struggle. So benevolent was the neutrality that the emperor William at the end of the campaign felt constrained to write to the tsar that he owed to His Majesty the happy issue of the campaign and would never forget the fact. Having thus helped to create the German empire, Alexander II. was not likely to take an active part in destroying it, and Bismarck could look forward confidently to a long continuance of the cordial relations between the two courts.

Austrian relations with Germany.

The second part of the German chancellor's programme, the permanent conciliation of Austria, was not so easily carried out. Austria had been the great sufferer, more perhaps even than France, from Bismarck's aggressive policy. For generations she had resisted strenuously and successfully the efforts of the Hohenzollerns to play the leading part in Germany, and she had always considered her own influence in Germany as essential to the maintenance of her position as a first-class power. By the disastrous campaign of 1866 and the consequent treaty of Prague, Austria had been formally excluded from all direct influence in German affairs. With these events still fresh in his recollection, the emperor Francis Joseph could hardly be expected to support the new empire created by his rival at Austria's expense, and it was known that on the eve of the Franco-German War he had been negotiating with the French government for a combined attack on Prussia. To an ordinary statesman the task of permanently conciliating such a power might well have seemed hopeless, but Bismarck did not shrink from it, and even before the signature of the treaty of Prague he had prepared the way for attaining his object. "With regard to Austria," he himself explained on one occasion, "I had two courses open to me after her defeat, either to destroy her entirely or to respect her integrity and prepare for our future reconciliation when the fire of revenge had died out. I chose the latter course, because the former would have been the greatest possible act of folly. Supposing that Austria had disappeared, consider the consequences." He then described very graphically those probable consequences, and drew the conclusion: "for the sake of our own life Austria must live. I had no hesitation, therefore, and ever since 1866 my constant effort has been to stitch up the great torn texture and to re-establish amicable relations with our ancient associate of the Confederation." For this purpose he tried to soothe Austrian susceptibilities, and suggested confidentially that compensation for the losses of territory, influence and prestige in Italy and Germany might be found in south-eastern Europe, especially by the acquisition of Bosnia and Herzegovina; but so long as his rival Count Beust was minister for foreign affairs in Vienna, and Austria had the prospect of being able to recover her lost position by the assistance of Russia and France, these efforts had no success. It was only when Prince Gorchakov had declined Count Beust's advances, which took the form of suggesting the abolition of the Black Sea clauses of the treaty of Paris, and when France had been paralysed for some years by her war with Germany, that a *rapprochement* between the cabinets of Vienna and Berlin became possible. Bismarck lost no time in making advances. From the German headquarters at Versailles he sent a despatch to Vienna suggesting the establishing of more cordial relations between the two countries, and Count Beust replied in an equally amicable tone. The emperor Francis Joseph, finding himself isolated, had evidently accepted the inevitable with his customary resignation, and abandoned his dreams of again playing the leading part in Germany. As a further proof of the change in his disposition and aims he replaced Count Beust by Count Andrássy, who was a personal friend of Bismarck, and who wished, as a Hungarian, to see Austria liberated from her German entanglement, and he consented to pay a visit to Berlin for the purpose of drawing still closer the relations between the two governments.

The Dreikaiserbund.

Bismarck was delighted at this turn of affairs, but he advanced with his usual caution. He gave it to be clearly understood that improvement in his relations with Vienna must not disturb the long-established friendship with St Petersburg. The tsar, on hearing privately of the intended meeting, gave a hint to Prince Reuss, the German ambassador, that he expected an invitation, and was invited accordingly. The meeting of the three sovereigns took place at Berlin at the end of August 1872. The three ministers, Prince Bismarck, Prince Gorchakov and Count Andrássy, held daily conferences, on the basis that the chief aim in view should be the maintenance of peace in Europe, and that in all important international affairs the three powers should consult with each other and act in concert. As a result of three days' consultation the Three Emperor's League was founded, without any formal treaty being signed. In this way the danger of a powerful coalition being formed against the young German empire was averted, for in the event of a conflict with France, Germany could count on at least the benevolent neutrality of Russia and Austria, and from the other powers she had nothing to fear. What ulterior designs Bismarck may have had in forming the league, or "Alliance" as it is often called, must be to some extent a matter of conjecture, but we shall probably not be far wrong in adopting the view of a competent Russian authority, who defines the policy of the German chancellor thus: "To make Austria accept definitively her deposition as a Germanic power, to put her in perpetual conflict with Russia in the Balkan Peninsula, and to found on that irreconcilable rivalry the hegemony of Germany."

For more than two years there was an outward appearance of extreme cordiality between the three powers. They acted together diplomatically, and on all suitable occasions the three allied monarchs exchanged visits and sent each other congratulations and good wishes. There was, however, from the beginning very little genuine confidence between them. Before the breaking up of the conferences at Berlin, Alexander II. and his chancellor had conversations with the French ambassador, in which they not only showed that they had suspicions of future aggressive designs on the part of Germany, but also gave an assurance that so long as France fulfilled her engagements to Germany she had nothing to fear. A few months later, when the emperor William paid his return visit to the tsar in St Petersburg, a defensive convention was concluded by the two monarchs behind the back of their Austrian ally. Without knowing anything about the existence of this convention, the Austrian ally did not feel comfortable in his new position. In Vienna the old anti-Prussian feeling was still strong. The so-called party of the archdukes and the military resisted the policy of Andrássy, and sought to establish closer relations with Russia, so that German support might be unnecessary, but as Bismarck has himself testified, "Russia did not yet respond. The wound caused by the conduct of Austria during the Crimean War was not yet healed. Andrássy made himself very popular in the court society of St Petersburg during his visit there with his imperial master, but the traditional suspicion of Austrian policy remained." Altogether, the new league was not a happy family. So long as all the members of it were content to accept the *status quo*, the latent germs of dissension remained hidden from the outside world, but as soon as the temporary state of political quietude was replaced by a certain amount of activity and initiative, they forced their way to the surface. No one of the three powers regarded the *status quo* as a satisfactory permanent arrangement. In Berlin much anxiety was caused by the rapid financial and military recovery of France, and voices were heard suggesting that a new campaign and a bigger war indemnity might be necessary before the recuperation was complete. In St Petersburg there was a determination to take advantage of any good opportunity for recovering the portion of Bessarabia ceded by the treaty of Paris, and thereby removing the last tangible results of the Crimean War. In Vienna there was a desire to obtain in the Balkan Peninsula, in accordance with the suggestion of Bismarck, compensation for the losses in Italy and Germany. Thus each of the members of the league was hatching secretly a little aggressive scheme for its own benefit, and the danger for the rest of Europe lay in the possibility of their reconciling their schemes so far as to admit of an agreement for action in common. Fortunately for the onlookers there were important conflicting interests, and the task of reconciling them was extremely difficult, as the subsequent course of events proved.

The storm-cloud of 1875.

The first of the three powers to move was Germany. In February 1875 M. de Radowitz was despatched to St Petersburg on a secret mission in order to discover whether, in the event of hostilities between Germany and France, Russia would undertake to maintain a neutral attitude as she had done in 1870–1871; in that case Germany might be relied on to co-operate with her in her great designs in the East. Prince Gorchakov did not take the bait with the alacrity that was expected. Having overcome in some measure his hatred of Austria, which had distorted for so many years his political vision, he had come to understand that it was not for the interests of his own country to have as neighbour a powerful united Germany instead of a weak confederation of small states, and he now perceived that it would be a grave error of policy to allow Germany to destroy still more to her own advantage the balance of power in Europe by permanently weakening France. No doubt he desired to recover the lost portion of Bessarabia and to raise Russian prestige in the East, but he did not wish to run the risk of exciting a great European war, and he believed that what he desired might be effected without war by the diplomatic skill which had warded off European intervention during the Polish troubles of 1863, and had recovered for Russia her freedom of action in the Black Sea during the Franco-Prussian War of 1870–71. In reply, therefore, to M. de Radowitz's inquiries and suggestions, he declared that the Russian court fostered no ambitious designs in the East or in the West, and desired only peace and the maintenance of the *status quo*, with possibly an amelioration in the miserable condition of the Christian subjects of the sultan. This rebuff did not suffice to dispel the gathering storm. The warlike agitation in the German inspired press continued, and the French government became thoroughly alarmed. General Leflô, the French ambassador in St Petersburg, was instructed to sound the Russian government on the subject. Prince Gorchakov willingly assured him that Russia would do all in her power to incline the Berlin cabinet to moderation and peace, and that the emperor would take advantage of his forthcoming visit to Berlin to influence the emperor William in this sense. A few days later General Leflô received similar assurances from the emperor himself, and about the same time the British government volunteered to work likewise in the cause of peace. Representations were accordingly made by both governments during the tsar's visit to Berlin, and both the emperor William and his chancellor declared that there was no intention of attacking France.

Russia and Germany divided.

The danger of war, which the well-informed German press believed to be "in sight," was thus averted, but the incident sowed the seeds of future troubles, by awakening in Bismarck a bitter personal resentment against his Russian colleague. By certain incautious remarks to those around him, and still more by a circular to the representatives of Russia abroad, dated Berlin and beginning with the words *maintenant la paix est assurée*, Gorchakov seemed to take to himself the credit of having checkmated Bismarck and saved Europe from a great war. Bismarck resented bitterly this conduct on the part of his old friend, and told him frankly that he would have reason to regret it. In the Russian official world it is generally believed that he took his revenge in the Russo-Turkish War and the congress of Berlin. However this may be, he has himself explained that "the first cause of coldness" was the above incident, "when Gorchakov, aided by Decazes, wanted to play at my expense the part of a saviour of France, to represent me as the enemy of European peace, and to procure for himself a triumphant *quos ego* to arrest by a word and shatter my dark designs!" In any case the incident marks the beginning of a new phase in the relations of the three powers; henceforth Bismarck can no longer count on the unqualified support of Russia, and in controlling the Russo-Austrian rivalry in south-eastern Europe, while professing to be impartial, he will lean to the side of Count Andrássy rather than to that of Prince Gorchakov. He is careful, however, not to carry this tendency so far as to produce a *rapprochement* between Russia and France. The danger of a Franco-Russian alliance hostile to Germany is already appearing on the political horizon, but it is only a little cloud no bigger than a man's hand.

The next move in the aggressive game was made by Austria, with the connivance of Russia. During the summer of 1875 an insurrection of the Christian Slavs in Herzegovina, which received support from the neighbouring principalities of Montenegro and Servia, was fostered by the Austrian authorities and encouraged by the Russian consuls on the Adriatic coast. A European concert was formed for the purpose of settling the disturbance by means of local administrative reforms, but the efforts of the powers failed, because the insurgents hoped to obtain complete liberation from Turkish rule; and in the beginning of July, with a view to promoting this solution, Servia and Montenegro declared war against the Porte. Thereupon Russia began to show her hand more openly. The government allowed volunteers to be recruited in Moscow and St Petersburg, and the Russian general Chernayev, who had distinguished himself in Central Asia, was appointed to the

Austro-Russian agreement, 1876.

command of the Servian army. When the ball had thus been set rolling, the two powers chiefly concerned considered that the time had come for embodying the result of their informal confidential pourparlers in a secret agreement, which is known as the convention of Reichstadt, because it was signed at a meeting of the two emperors in the little Bohemian town of that name. It bore the date of the 8th of July 1876—exactly a week after Servia and Montenegro had declared war—and it contained the following stipulations: (1) That so long as the struggle which had just begun remained undecided, the two sovereigns should refrain from interference, and that in the event of the principalities being defeated, any modification of the territorial or political *status quo ante* to their detriment should be prevented; (2) that in the event of the principalities proving victorious, and territorial changes taking place, Austria should claim compensation in Bosnia and Herzegovina, and Russia should demand the restitution of the portion of Bessarabia which she had lost by the Crimean War; (3) that in the event of the collapse of the Ottoman empire, the two powers should act together to create autonomous principalities in European Turkey, to unite Thessaly and Crete to Greece, and to proclaim Constantinople a free town. The contracting parties evidently expected that the two principalities would be victorious in their struggle with the Porte, and that the compensations mentioned would be secured without a great European war. Their expectations were disappointed. Montenegro made a brave stand against superior forces, but before five months had passed Servia was at the mercy of the Turkish army, and Russia had to come to the assistance of her protégé. A Russian ultimatum stopped the advance of the Turks on Belgrade, and an armistice, subsequently transformed into a peace, was signed.

Bulgarian Question.

Russia and Austria had now to choose between abandoning their schemes and adopting some other course of action, and unforeseen incidents contributed towards making them select the latter alternative. In June 1876 an attempt at insurrection in Bulgaria had been repressed with savage brutality by the Turks, and the details, as they became known some weeks later, produced much indignation all over Europe. In England the excitement, fanned by the eloquence of Gladstone, became intense, and compelled the Disraeli cabinet to take part, very reluctantly, in a diplomatic campaign, with the object of imposing radical reforms on Turkey. In Russia the excitement and indignation were equally great, and the tsar gradually formed the resolution that if the powers would not act collectively and energetically, so as to compel the Porte to yield, he would undertake the work single-handed. This resolution he announced publicly in a speech delivered at Moscow on the 10th of November 1876. The powers did not like the idea of separate Russian action, and in order to prevent it they agreed to hold a conference in Constantinople for the purpose of inducing the Porte to introduce the requisite reforms. The Porte was at that moment under the influence of popular patriotic excitement which made it indisposed to accept orders, or even well-meant advice, from governments more or less hostile to it, and the inconsiderate mode of procedure suggested by General Ignatiev, and adopted by the other delegates, made it still more unconciliatory. At the first plenary sitting of the conference the proceedings were disturbed by the sound of artillery, and the Turkish representative explained that the salvo was in honour of the new Ottoman constitution, which was being promulgated by the sultan. The inference suggested was that as Turkey had spontaneously entered on the path of liberal and constitutional reform for all Ottoman subjects, it became superfluous and absurd to talk of small reforms for particular provinces, such as the conference was about to propose. The deliberations continued, but finally the Porte refused to accept what the plenipotentiaries considered an irreducible minimum, and the conference broke up without obtaining any practical result. The tsar's Moscow declaration about employing single-handed the requisite coercive measures now came to be fulfilled.

San Stefano.

In order to make a successful aggressive move on Turkey, Russia had first of all to secure her rear and flank by an arrangement with her two allies. In Berlin she encountered no difficulties. Bismarck had no objection to seeing Russia weaken herself in a struggle with Turkey, provided she did not upset the balance of power in south-eastern Europe, and he felt confident that he could prevent by diplomatic means any such catastrophe. He was inclined, therefore, to encourage rather than restrain the bellicose tendencies of St Petersburg. In Vienna the task of coming to a definite arrangement was much more difficult, and it was only after protracted and laborious negotiations that a convention was concluded on the 15th of January 1877, and formally signed three months later. It was a development of the agreement of Reichstadt, modified according to the changes in the situation, but retaining the essential principle that in the event of the territorial *status quo* being altered, Russia should recover the lost portion of Bessarabia, and Austria should get Bosnia and a part of Herzegovina. Having made these preliminary arrangements, Russia began the campaign simultaneously in Europe and Asia Minor, and after many reverses and enormous sacrifices of blood and treasure, she succeeded in imposing on the Turks the "preliminary peace" of San Stefano (3rd March 1878). That peace was negotiated with very little consideration for the interests of the other powers, and as soon as the terms of it became known in Vienna and London there was an outburst of indignation. In negotiating the treaty General Ignatiev had ignored the wishes of Austria, and had even, according to the contention of Andrássy, infringed the convention signed at the beginning of the war. However this may be, the peace of San Stefano brought to the surface the latent conflict of interests between the two empires. Russia's aim was to create a big Bulgaria under the influence of St. Petersburg, and to emancipate Servia and Montenegro as far as possible from Austrian influence, whereas Austria objected to the creation of any large Slav state in the Balkan Peninsula, and insisted on maintaining her influence at Belgrade and Tsetigne (Cetinje). In vain Prince Gorchakov endeavoured to conciliate Austria and to extract from Count Andrássy a clear statement of the terms he would accept. Count Andrássy was in no hurry to extricate Russia from her difficulties, and suggested that the whole question should be submitted to a European congress. The suggestion was endorsed by Great Britain, which likewise objected to the San Stefano arrangements, and Bismarck declined to bring any pressure to bear on the cabinet of Vienna.

Berlin Congress.

Deceived in her expectations of active support from her two allies, Russia found herself in an awkward position. From a military point of view it was absolutely necessary for her to come to an arrangement either with Austria or with England, because the communications of her army before Constantinople with its base could be cut by these two powers acting in concert—the land route being dominated by Austria, and the Black Sea route by the British fleet, which was at that time anchored in the Sea of Marmora. As soon, therefore, as the efforts to obtain the support of her two allies against the demands of England had failed, negotiations were opened in London, and on the 30th of May a secret convention was signed by Lord Salisbury and Count Schuvalov. By that agreement the obstacles to the assembling of the congress were removed. The congress met in Berlin on the 13th of June, and after many prolonged sittings and much secret negotiation the treaty of Berlin was signed on the 13th of July. By that treaty the preliminary peace of San Stefano was considerably modified. The big Bulgaria defined by General Ignatiev was divided into three portions, the part between the Danube and the Balkans being transformed into a vassal principality, the part between the Balkans and the Rhodope being made into an autonomous province, called Eastern Rumelia, under a Christian governor named by the sultan with the assent of the powers, and the remainder being placed again under the direct rule of the Porte. The independence of Montenegro, Servia and Rumania was formally recognized, and each of these principalities received a considerable accession of territory. Rumania, however, in return for the Dobrudja, which it professed not to desire, was obliged to give back to Russia the portion of Bessarabia ceded after the Crimean War. In Asia Minor Russia agreed to confine her annexations to the districts of Kars, Ardahan and Batum, and to restore to Turkey the remainder of the occupied territory. As a set-off against the large acquisitions of the Slav races, the powers recommended that the sultan should cede to the kingdom of Greece the greater part of Thessaly and Epirus, under the form of a rectification of frontiers. At first the sultan refused to act on this recommendation, but in March 1881 a compromise was effected by which Greece obtained Thessaly without Epirus. Bosnia and Herzegovina were to be occupied and administered by Austria-Hungary, and the Austrian authorities were to have the right of making roads and keeping garrisons in the district of Novi-Bazar, which lies between Servia and Montenegro. In all the provinces of European Turkey for which special arrangements were not made in the treaty, the Porte undertook (Art. 23) to introduce organic statutes similar to that of Crete, adapted to the local conditions. This article, like many of the subordinate stipulations of the treaty, remained a dead letter. We may mention specially Art. 61, in which the Sublime Porte undertook to realize without delay the ameliorations and reforms required in the provinces inhabited by Armenians, and to guarantee their safety against the Circassians and Kurds. Equally unreliable proved the scheme of Lord Beaconsfield to secure good administration throughout the whole of Asia Minor by the introduction of reforms under British control, and to prevent the further expansion of Russia in that direction by a defensive alliance with the Porte.

Cyprus Convention.

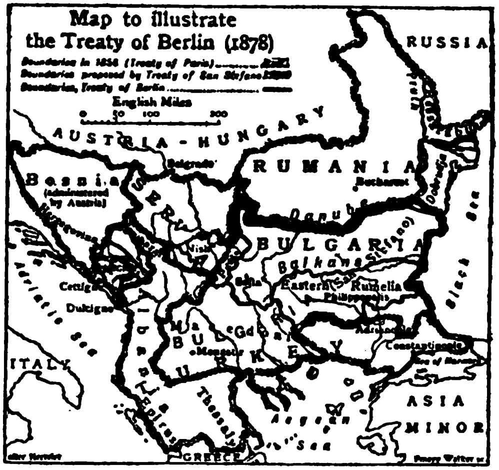
A convention to that effect was duly signed at Constantinople a few days before the meeting of the congress (4th June 1878), but the only part of it which was actually realized was the occupation and administration of Cyprus by the British government. The new frontiers stipulated in the treaty of San Stefano, and subsequently rectified by the treaty of Berlin, are shown in the accompanying sketch-map.

The secret schemes of Russia and Austria, in so far as they were defined in the agreement of Reichstadt and the subsequent Austro-Russian treaty of Vienna, had thus been realized. Russia had recovered the lost portion of Bessarabia, and Austria had practically annexed Bosnia and Herzegovina, though the nominal suzerainty of the sultan over the two provinces was maintained. But Russia was far from satisfied with the results, which seemed to her not at all commensurate with the sacrifices imposed on her by the war, and her dissatisfaction led to a new grouping of the powers. Before the opening of the Berlin congress Bismarck had announced publicly that he would refrain from taking sides with any of the contending parties, and would confine himself to playing the part of an honest broker. The announcement was received by the Russians with astonishment and indignation. What they expected was not an impartial arbiter, but a cordial and useful friend in need. In 1871 the emperor William, as we have seen, had spontaneously declared to the tsar that Germany owed to His Majesty the happy issue of the war, and that she would never forget it, and we may add that on that occasion he signed himself "Your ever grateful Friend." Now, in 1878, when the moment had come for paying at least an instalment of this debt, and when Russia was being compelled to make concessions which she described as incompatible with her dignity, Bismarck had nothing better to offer than honest brokerage.

Russian resentment against Bismarck.

The indignation in all classes was intense, and the views commonly held regarding Bismarck's "duplicity" and "treachery" were supposed to receive ample confirmation during the sittings of the congress and the following six months. On the 4th of February 1879 Prince Gorchakov wrote to the ambassador in Vienna. "Needless to say, that in our eyes the Three Emperors' Alliance is practically torn in pieces by the conduct of our two allies. At present it remains for us merely to terminate the liquidation of the past, and to seek henceforth support in ourselves alone." The same view of the situation was taken in Berlin and Vienna, though the result was attributed, of course, to different causes, and the danger of serious complications became so great that Bismarck concluded with Andrássy in the following October (1879) a formal defensive alliance, which was avowedly directed against Russia, and which subsequently developed into the Triple Alliance, directed against Russia and France.

The causes of the rupture are variously described by the different parties interested. According to Bismarck the Russian government began a venomous campaign against Germany in the press, and collected, with apparently hostile intentions, enormous masses of troops near the German and Austrian frontiers, whilst the tsar adopted in his correspondence with the emperor William an arrogant and menacing tone which could not be tolerated. On the other hand, the Russians declare that the so-called Press-Campaign was merely the spontaneous public expression of the prevailing disappointment among all classes in Russia, that the military preparations had a purely defensive character, and that the tsar's remarks, which roused Bismarck's ire, did not transgress the limits of friendly expostulation such as sovereigns in close friendly relations might naturally employ.



Subsequent revelations tend rather to confirm the Russian view. After an exhausting war and without a single powerful ally, Russia was not likely to provoke wantonly a great war with Germany and Austria. The press attacks were not more violent than those which frequently appear in newspapers which draw their inspiration from the German foreign office, and the accusations about the arrogant attitude and menacing tone of Alexander II. are not at all in harmony with his known character, and are refuted by the documents since published by Dr Busch. The truth seems to be that the self-willed chancellor was actuated by nervous irritation and personal feeling more than by considerations of statecraft. His imperial master was not convinced by his arguments, and showed great reluctance to permit the conclusion of a separate treaty with Austria. Finally, with much searching of heart, he yielded to the importunity of his minister; but in thus committing an unfriendly act towards his old ally, he so softened the blow that the personal good relations between the two sovereigns suffered merely a momentary interruption. Bismarck himself soon recognized that the permanent estrangement of Russia would be a grave mistake of policy, and the very next year (1880), negotiations for a treaty of defensive alliance between the two cabinets were begun. Nor did the accession to the throne of Russia of Alexander III., who had long enjoyed the reputation of being systematically hostile to Germans, produce a rupture, as was expected. Six months after his father's death, the young tsar met the old kaiser at Danzig

(September 1881), and some progress was made towards a complete renewal of the traditional friendship. Immediately afterwards a further step was taken towards re-establishing the old state of things with regard also to Austria. On his return to St Petersburg, Alexander III. remembered that he had received some time previously a telegram of congratulation from the emperor Francis Joseph, and he now replied to it very cordially, referring to the meeting at Danzig, and describing the emperor William as "that venerable friend with whom we are united in the common bonds of a profound affection." The words foreshadowed a revival of the Three Emperors' League, which actually took place three years later.

Growth of the Triple Alliance.

The removal of all immediate danger of a Franco-Russian alliance did not prevent Bismarck from strengthening in other ways the diplomatic position of Germany, and the result of his efforts soon became apparent in the alliance of Italy with the two central powers. Ever since the Franco-German War of 1870–71, and more especially since the congress of Berlin in 1878, the Italian government had shown itself restless and undecided in its foreign policy. As it was to France that Italy owed her emancipation from Austrian rule, it seemed natural that the two countries should remain allies, but anything like cordial co-operation was prevented by conflicting interests and hostile feeling. The French did not consider the acquisition of Savoy and Nice a sufficient compensation for the assistance they had given to the cause of Italian unity, and they did not know, or did not care to remember, that their own government was greatly to blame for the passive attitude of Italy in the hour of their great national misfortunes. On the other hand, a considerable amount of bitterness against France had been gradually accumulating in the hearts of the Italians. As far back as the end of the war of 1859, popular opinion had been freely expressed against Napoleon III., because he had failed to keep his promise of liberating Italy "from the Alps to the Adriatic." The feeling was revived and intensified when it became known that he was opposing the annexation of central and southern Italy, and that he obtained Savoy and Nice as the price of partly withdrawing his opposition. Subsequently, in the war of 1866, he was supposed to have insulted Italy by making her conclude peace with Austria, on the basis of the cession of Venetia, before she could wipe out the humiliation of her defeats at Custozza and Lissa. Then came the French protection of the pope's temporal power as a constant source of irritation, producing occasional explosions of violent hostility, as when the new Chassepot rifles were announced to have "worked wonders" among the Garibaldians at Mentana. When the Second Empire was replaced by the Republic, the relations did not improve. French statesmen of the Thiers school had always condemned the imperial policy of permitting and even encouraging the creation of large, powerful states on the French frontiers, and Thiers himself publicly attributed to this policy the misfortunes of his country. With regard to Italy, he said openly that he regretted what had been done, though he had no intention of undoing it. The first part of this statement was carefully noted in Italy, and the latter part was accepted with scepticism. In any case his hand might perhaps be forced, for in the first republican chamber the monarchical and clerical element was very strong, and it persistently attempted to get something done in favour of the temporal power. Even when the party of the Left undertook the direction of affairs in 1876, the government did not become anti-clerical in its foreign policy, and Italian statesmen resigned themselves to a position of political isolation. The position had its advantages. Events in the Balkan Peninsula foreshadowed a great European war, and it seemed that in the event of Europe's being divided into two hostile camps, Italy might have the honour and the advantage of regulating the balance of power. By maintaining good relations with all her neighbours and carefully avoiding all inconvenient entanglements, she might come forward at the critical moment and dictate her own terms to either of the contending parties, or offer her services to the highest bidder. This Machiavellian policy did not give the expected results. Being friends with everybody in a general way may be the best course for an old, conservative country which desires merely the maintenance of the *status quo*, but it does not secure the energetic diplomatic support required by a young enterprising state which wishes to increase its territory and influence. At the congress of Berlin, when several of the powers got territorial acquisitions, Italy got nothing. The Italians, who were in the habit of assuming, almost as a matter of principle, that from all European complications they had a right to obtain some tangible advantage, were naturally disappointed, and they attributed their misfortune to their political isolation. The policy of the free hand consequently fell into disrepute, and the desire for a close, efficient alliance revived. But with what power or powers should an alliance be made? The remnants of the old party of action, who still carried the *Italia Irredenta* banner, had an answer ready. They recommended that alliances should be concluded with a view to wresting from Austria the Trentino and Trieste, with Dalmatia, perhaps, into the bargain. On the other hand, the Conservatives and the Moderates considered that the question of the Trentino and Trieste was much less important than that of political influence in the Mediterranean. A strong Austria was required, it was said, to bar the way of Russia to the Adriatic, and France must not be allowed to pursue unchecked her policy of transforming the Mediterranean into a French lake. Considerations of this kind led naturally to the conclusion that Italy should draw closer to the powers of central Europe. So the question appeared from the standpoint of "la haute politique." From the less elevated standpoint of immediate political interests, it presented conflicting considerations. A *rapprochement* with the central powers might prevent the conclusion of a commercial treaty with France, and thereby increase the financial and economic difficulties with which the young kingdom was struggling, whereas a *rapprochement* with France would certainly excite the hostility of Bismarck, who was retiring from the *Kulturkampf* and journeying towards Canossa, and who might possibly conciliate the pope by helping him to recover his temporal sovereignty at the expense of Italy. Altogether the problem was a very complicated one. The conflicting currents so nearly balanced each other, that the question as to which way the ship would drift might be decided by a little squall of popular sentiment. A very big squall was brewing.

France and Tunis.

During the congress of Berlin the French government was very indignant when it discovered that Lord Beaconsfield had recently made a secret convention with the sultan for the British occupation of Cyprus, and in order to calm its resentment Lord Salisbury gave M. Waddington to understand that, so far as England was concerned, France would be allowed a free hand in the Regency of Tunis, which she had long coveted. Though the conversations on the subject and a subsequent exchange of notes were kept strictly secret, the Italian government soon got wind of the affair, and it was at first much alarmed. It considered, in common with Italians generally, that Tunis, on the ground of historic right and of national interests, should be reserved for Italy, and that an extension of French territory in that direction would destroy, to the detriment of Italy, the balance of power in the Mediterranean. These apprehensions were calmed for a time by assurances given to the Italian ambassador in Paris. M. Gambetta assured General Cialdini that he had no intention of making Italy an irreconcilable enemy of France, and M. Waddington declared, on his word of honour, that so long as he remained minister of foreign affairs nothing of the sort would be done by France without a previous understanding with the cabinet of Rome. M. Waddington honourably kept his word, but his successor did not consider himself bound by the assurance; and when it was found that the Italians were trying systematically to establish their influence in the Regency at the expense of France, the French authorities, on the ground that a Tunisian tribe called the Kroumirs had committed depredations in Algeria, sent an armed force into the Regency, and imposed on the bey the Bardo treaty, which transformed Tunis into a French protectorate.

The establishment of a French protectorate over a country which the Italians had marked out for themselves as necessary for the defence and colonial expansion of the kingdom had the effect which Gambetta had foreseen—it made Italy, for a time at least, the irreconcilable enemy of France. Whilst the French were giving free expression to their patriotic exultation, and even Gambetta himself, in defiance of what he had said to Cialdini, was congratulating Jules Ferry on having restored France to her place among the nations, the Italians were trying to smother their indignation and to discover some means of retrieving what they had lost. The only remedy seemed to be to secure foreign alliances, and there was now no hesitation as to where they should be sought. Simple people in Italy imagined that if an alliance had been concluded sooner with Germany and Austria, these powers would have prevented France from trampling on the sacred interests of Italy. This idea was entirely erroneous, because Austria had little or no interest in the Tunisian Question, and Bismarck was not at all sorry to see France embark on an enterprise which distracted her attention from Alsace-Lorraine and removed all danger of a Franco-Italian alliance. The illusion, however, had a powerful influence on Italian public opinion. The government was now urged to conclude without further delay an alliance with the central powers, and the recommendation was not unwelcome to the king, because most of the Italian Gallophils had anti-dynastic and republican tendencies, and he was naturally disposed to draw nearer to governments which proclaimed themselves the defenders of monarchical institutions and the opponents of revolutionary agitation. After protracted negotiations, in which Italy tried in vain to secure protection for her own separate interests in the Mediterranean, defensive treaties of alliance were concluded with the cabinets of Vienna and Berlin in May 1882. Though the Italian statesmen did not secure by these treaties all they wanted, they felt that the kingdom was protected against any aggressive designs which might be entertained by France or the Vatican, and when the treaties were renewed in 1887 they succeeded in getting somewhat more favourable conditions.

Triple Alliance signed 1882.

By the creation of this Triple Alliance, which still subsists, the diplomatic position of Germany was greatly strengthened, but Bismarck was still haunted by the apprehension of a Franco-Russian alliance, and he made repeated attempts to renew the old cordial relations with the court of St Petersburg. He was bold enough to hope that, notwithstanding the Austro-German treaty of October 1879, avowedly directed against Russia, and the new Triple Alliance, by which the Austro-German Alliance was strengthened, he might resuscitate the Three Emperors' League in such a form as to ensure, even more effectually than he had done on the former occasion, the preponderance of Germany in the arrangement. With this object he threw out a hint to the Russian ambassador, M. Sabourof, in the summer of 1883, that the evil results of the congress of Berlin might be counteracted by a formal agreement between the three emperors. The suggestion was transmitted privately by M. Sabourof to the tsar, and was favourably received. Alexander III. was disquieted by the continuance of the Nihilist agitation, and was not averse from drawing closer to the conservative powers; and as he desired tranquillity for some time in the Balkan Peninsula, he was glad to have security that his rival would do nothing in that part of the world without a previous understanding. M. de Giers, who had now succeeded Prince Gorchakov in the direction of foreign affairs, was accordingly despatched to Friedrichsruh to discuss the subject with Bismarck. The practical result of the meeting was that negotiations between the two governments were begun, and on the 21st of March 1884 a formal document was signed in Berlin. About six months later, in the month of September, the three emperors met at Skiernevice and ratified the agreement. Thus, without any modification of the Triple Alliance, which was directed against Russia, the old Three Emperors' League, which included Russia, was revived. Germany and Austria, being members of both, were doubly protected, for in the event of being attacked they could count on at least the benevolent neutrality of both Russia and Italy. France was thereby completely isolated.

Dreikaiserbund revived 1884.

In drawing up the secret treaty of Skiernevice, which may be regarded as the *chef-d'œuvre* of Bismarckian diplomacy, the German chancellor's chief aims evidently were to paralyse Russia by yoking her to Germany and Austria, to isolate France, and to realize his old scheme of holding the balance between Russia and Austria in the Balkan Peninsula. With a view to attaining the first two objects it was stipulated that if any one of the three powers were forced to make war on a fourth power, the two other contracting parties should observe a benevolent neutrality towards their ally. If we may believe a well-informed Russian authority, Bismarck wished it to be understood that in the event of *two* of the powers being at war with a fourth, the stipulation about benevolent neutrality should still hold good, but Alexander III. objected, on the ground that he could not remain a passive spectator of a duel in which France would be confronted by two antagonists. In his third object Bismarck was successful, for it was expressly laid down that in all cases of a disagreement between two of the parties in the affairs of the Balkan Peninsula, the third power should decide between them. This meant, of course, that in all discussions between Russia and Austria, the two great rivals in the Eastern Question, Bismarck should always have a casting vote. In return for all this, Russia obtained two small concessions: firstly, that Germany and Austria should seek to restrain the sultan from permitting the passage of the Dardanelles to an English fleet, as he had done in 1878, when the Russian army was before Constantinople; and, secondly, that they should not oppose the union of Bulgaria and Eastern Rumelia, if it was accomplished by the force of things and within the limits traced by the congress of Berlin.

This new form of the Three Emperors' League had all the organic defects of its predecessor, and was destined to be still more shortlived. The claims of Russia and Austria might be reconcilable in theory, but in practice they were sure to conflict; and however much Bismarck might try to play the part of an honest broker, he was certain to be suspected of opposing Russia and favouring Austria. It was therefore only during a period of political stagnation in south-eastern Europe that the arrangement could work smoothly. The political stagnation did not last long. Prince Alexander of Bulgaria had for some time been fretting under the high-handed interference of the Russian agents in the principality, and had begun to oppose systematically what the Russians considered their legitimate influence. Relations between Sofia and St Petersburg had consequently become strained, when a crisis was suddenly brought about by the revolution of Philippopolis in September 1885. The conspirators arrested and expelled the governor-general, who had been appointed by the sultan with the assent of the powers, and at the same time proclaimed the union of the autonomous province of Eastern Rumelia with the principality of Bulgaria, in defiance of the stipulations of the treaty of Berlin. The revolution had been effected with the connivance and approval of the regularly accredited Russian agents in Philippopolis, but it had not received the sanction of the Russian government, and was resented as a new act of insubordination on the part of Prince Alexander. When he arrived in Philippopolis and accepted the declaration of union, the cabinet of St Petersburg protested against any such infraction of the Berlin treaty, and the Porte prepared to send an army into the province. It was restrained from taking this step by the ambassadors in Constantinople, so that an armed conflict between Turks and Bulgarians was prevented; but no sooner had the Bulgarians been relieved from this danger on their eastern frontier, than they were attacked from the west by the Servians, who were determined to get ample compensation for any advantage which the Bulgarians might obtain. The Bulgarian army defeated the Servians at Slivnitza (November 19–20, 1885), and was marching on Belgrade when its advance was stopped and an armistice arranged by the energetic intervention of the Austrian government. Following the example of the Servians, the Greeks were preparing

Bulgarian crisis.

to exact territorial compensation likewise; but as their mobilization was a slow process, the powers had time to restrain them from entering on active hostilities, first by an ultimatum (April 26, 1886), and afterwards by a blockade of their ports (May 1886). By that time, thanks to the intervention of the powers, a peace between Bulgaria and Servia had been signed at Bucharest (March 3); and with regard to Eastern Rumelia a compromise had been effected by which the formal union with the principality was rejected, and the prince was appointed governor-general of the province for a term of five years. This was in reality union in disguise.

The diplomatic solution of the problem averted the danger of a European war, but it left a great deal of dissatisfaction, which soon produced new troubles. Not only had Prince Alexander escaped punishment for his insubordination to Russia, but he and the anti-Russian party among the Bulgarians had obtained a decided success. This could not well be tolerated. Before six months had passed (August 21, 1886) Prince Alexander was kidnapped by conspirators in his palace at Sofia and conveyed secretly to Russian Bessarabia. As soon as the incident was reported to the tsar, the prince was released, and he at once returned to Sofia, where a counter-revolution had been effected in his favour; but he considered his position untenable, and formally abdicated. A fortnight after his departure General Kaulbars arrived from St Petersburg with instructions from the tsar to restore order in accordance with Russian interests. In St Petersburg it was supposed that the Bulgarian people were still devoted to Russia, and that they were ready to rise against and expel the politicians of the Nationalist party led by Stambolof. General Kaulbars accordingly made a tour in the country and delivered speeches to the assembled multitudes, but Stambolof's political organization counteracted all his efforts, and on the 20th of November he left Bulgaria and took the Russian consuls with him. Stambolof maintained his position, suppressed energetically several insurrectionary movements, and succeeded in getting Prince Ferdinand of Coburg elected prince (July 7, 1887), in spite of the opposition of Russia, who put forward as candidate a Russian subject, Prince Nicholas of Mingrelia. Prince Ferdinand was not officially recognized by the sultan and the powers, but he continued to reign under the direction of Stambolof, and the Russian government, passively accepting the accomplished facts, awaited patiently a more convenient moment for action.

Russian hostility to Germany.

These events in the Balkan Peninsula necessarily affected the mutual relations of the powers composing the Three Emperors' League. Austria could not remain a passive and disinterested spectator of the action of Russia in Bulgaria. Her agents had given a certain amount of support to Prince Alexander in his efforts to emancipate himself from Russian domination; and when the prince was kidnapped and induced to abdicate, Count Kalnoky had not concealed his intention of opposing further aggression. Bismarck resisted the pressure brought to bear on him from several quarters in favour of the anti-Russian party in Bulgaria, but he was suspected by the Russians of siding with Austria and secretly encouraging the opposition to Russian influence. This revived the hatred against him which had been created by his pro-Austrian leanings after the Russo-Turkish War. The feeling was assiduously fomented by the Russian press, especially by M. Katkoff, the editor of the *Moscow Gazette*, who exercised great influence on public opinion and had personal relations with Alexander III. On the 31st of July 1886, three weeks before the kidnapping of Prince Alexander, he had begun a regular journalistic campaign against Germany, and advocated strongly a new orientation of Russian policy. M. de Giers, minister of foreign affairs, was openly attacked as a partisan of the German alliance, and his "pilgrimages to Friedrichsruh and Berlin" were compared to the humiliating journeys of the old Russian grand-princes to the Golden Horde in the time of the Tatar domination. The moment had come, it was said, for Russia to emancipate herself from German diplomatic thraldom, and for this purpose a *rapprochement* with France was suggested. The idea was well received by the public, and it seemed to be not unpalatable to the tsar, for the *Moscow Gazette* was allowed to continue its attacks on M. de Giers's policy of maintaining the German alliance. In Berlin such significant facts could not fail to produce uneasiness, because one of the chief aims of Bismarck's policy had always been to prevent a Russo French *entente cordiale*. The German press were instructed to refute the arguments of their Russian colleagues, and to prove that if Russia had really lost her influence in the Balkan Peninsula, the fact was due to the blunders of her own diplomacy. The controversy did not produce at once a serious estrangement between the two cabinets, but it marked the beginning of a period of vacillation on the part of Alexander III. When the treaty of Skiernevice was about to expire in 1887, he positively refused to renew the Three Emperors' League, but he consented to make, without the cognizance of Austria, a secret treaty of alliance with Germany for three years. Not satisfied with this guarantee against the danger of a Franco-Russian alliance, Bismarck caused attacks to be made in the press on Russian credit, which was rapidly gaining a footing on the Paris bourse, and he imprudently showed his hand by prohibiting the Reichsbank from accepting Russian securities as guarantees. From that moment the tsar's attitude changed. All his dormant suspicions of German policy revived. When he passed through Berlin in November 1887, Bismarck had a long audience, in which he defended himself with his customary ability, but Alexander remained unmoved in his conviction that the German government had systematically opposed Russian interests, and had paralysed Russian action in the Balkan Peninsula for the benefit of Austria; and he failed to understand the ingenious theory put forward by the German chancellor, that two powers might have a severe economic struggle without affecting their political relations. Bismarck had to recognize that, for the moment at least, the Three Emperors' League, which had served his purposes so well, could not be resuscitated, but he had still a certain security against the hostility of Russia in the secret treaty. Soon, however, this link was also to be broken. When the treaty expired in 1890 it was not renewed. By that time Bismarck had been dismissed, and he subsequently reproached his successor, Count Caprivi, with not having renewed it, but in reality Count Caprivi was not to blame. Alexander III. was determined not to renew the alliance, and was already gravitating slowly towards an understanding with France.

Franco-Russian entente.

No treaty or formal defensive engagement of any kind existed between Russia and France, but it was already tolerably certain that in the event of a great war the two nations would be found fighting on the same side, and the military authorities in both countries felt that if no arrangements were made beforehand for concerted action,—such arrangements having been long ago completed by the powers composing the Triple Alliance,—they would begin the campaign at a great disadvantage. This was perfectly understood by both governments; and after some hesitation on both sides, Generals Vannovski and Obruchev, on the one side, and Generals Saussier, Miribel and Boisdeffre on the other, were permitted to discuss plans of co-operation. At the same time a large quantity of Lebel rifles were manufactured in France for the Russian army, and the secret of making smokeless powder was communicated to the Russian military authorities. The French government wished to go further and conclude a defensive alliance, but the tsar was reluctant to bind himself with a government which had so little stability, and which might be induced to provoke a war with Germany by the prospect of Russian support. Even the military convention was not formally ratified until 1894. The enthusiastic partisans of the alliance flattered themselves that the tsar's reluctance had been overcome, when he received very graciously Admiral Gervais and his officers during the visit of the French fleet to Cronstadt in the summer of 1891, but their joy was premature. The formal *rapprochement* between the two governments was much slower than the unofficial *rapprochement* between the two nations. More than two years passed before the Cronstadt visit was returned by the Russian fleet, under Admiral Avelan. The enthusiastic ovations which the admiral and his subordinates received in Toulon and Paris (October 1893) showed how eager and anxious the French people were for an alliance with Russia, but the Russian government was in no hurry to gratify their wishes. Of the official action all we know with certainty is, that immediately after the Cronstadt visit in 1891 a diplomatic protocol about a defensive alliance was signed; that during the special mission of General Boisdeffre to St Petersburg in 1892 negotiations took place about a military convention; that in 1894 the military convention was ratified; that in the summer of 1895 M. Ribot, when prime minister, first spoke publicly of an alliance; and that during the visit of the president of the French Republic to St Petersburg, in August 1897, France and Russia were referred to as allies in the complimentary speeches of the tsar and of M. Félix Faure. Though we are still in the dark as to the precise terms of the arrangement, there is no doubt that close friendly relations were established between the two powers, and that in all important international affairs they sought to act in accord with each other. It is equally certain that for some years Russia was the predominant partner, and that, in accordance with the pacific tendencies of the tsar, she systematically exercised a restraining influence on France.

The Triple entente and the Triple Alliance.

The great expectations excited among the French people by the *entente cordiale* were consequently not realized, and there appeared gradually premonitory symptoms of a reaction in public opinion, but the alliance between the two governments was maintained, and though the Triple Alliance was weakened by the internal troubles of Austria-Hungary and by a tendency on the part of Italy to gravitate towards France, the grouping of the great powers was not radically changed till the Russo-Japanese War of 1904–5. By that war the balance of power in Europe was seriously disturbed. Russia inadvertently provoked a struggle with Japan which made such a drain on her energies and material resources that her political influence in Europe necessarily suffered a partial eclipse. Thus the Triple Alliance outweighed its rival, and there was a danger of the German emperor's taking advantage of the situation to secure for himself a diplomatic predominance in Europe. France at once perceived that there was a grave danger for herself, and naturally looked about for some diplomatic support to replace that of Russia, which had lost much of its value. From her uncomfortable isolation there were only two possible exits—a *rapprochement* with Germany or a *rapprochement* with England. Both of these demanded sacrifices. The former required a formal abandonment of all ideas of recovering Alsace and Lorraine; the latter a formal recognition of British predominance in Egypt. Under the influence of M. Delcassé the French government chose what seemed the lesser of two evils, and concluded with the English foreign office in April 1904 a general agreement, of which the most important stipulation was that France should leave England a free hand in Egypt, and that England in return should allow France, within certain limits, a free hand in Morocco. On that basis was effected a *rapprochement* between the two governments which soon developed into an *entente cordiale* between the two nations. The efforts of the German emperor to undermine the *entente* by insisting on the convocation of a conference to consider the Morocco question caused M Delcassé to resign, and produced considerable anxiety throughout Europe, but the desired result was not attained On the contrary, the conference in question, which met at Algeciras in January 1906, ended in strengthening the *entente* and in accentuating the partial isolation of Germany

The grouping of the great continental states into two opposite but not necessarily hostile camps helped to preserve the balance of power and the peace of Europe The result was that the causes of conflict which arose from time to time up to the end of the 19th century were localized Some of the principal questions involved may be more particularly mentioned.

The Armenian Question was brought prominently before Europe by the Russo-Turkish War of 1877–78. In the treaties of San Stefano and Berlin the Sublime Porte undertook "to carry out without delay the ameliorations and reforms required by local needs in the provinces inhabited by the Armenians, and to guarantee their security against the Circassians and the Kurds." This stipulation remained a dead letter, and the relations between the Armenians and the Mussulmans became worse than before, because the protection of the powers encouraged in the oppressed nationality far-reaching political aspirations, and the sultan regarded the political aspirations and the intervention of the powers as dangerous for the integrity and independence of his empire. For some fifteen years the Armenians continued to hope for the efficacious intervention of their protectors, but when their patience became exhausted and the question seemed in danger of being forgotten, they determined to bring it again to the front. Some of them confined themselves to agitating abroad, especially in England, in favour of the cause, whilst others made preparations for exciting an insurrectionary movement in Constantinople and Asia Minor. These latter knew very well that an insurrection could be suppressed by the Turkish government without much difficulty, but they hoped that the savage measures of repression which the Turks were sure to employ might lead to the active intervention of Europe and ensure their liberation from Turkish rule, as the famous "atrocities" of 1876 had led to the political emancipation of Bulgaria. In due course—1895–1896—the expected atrocities took place, in the form of wholesale massacres in Constantinople and various towns of Asia Minor. The sultan was subjected to diplomatic pressure and threatened with more efficient means of coercion. In the diplomatic campaign England took the lead, and was warmly supported by Italy, but Germany, Austria and France showed themselves lukewarm, not to say indifferent, and Russia, departing from her traditional policy of protecting the Christians of Turkey, vetoed the employment of force for extracting concessions from the sultan. In these circumstances the Porte naturally confined itself to making a few reforms on paper, which were never carried out. Thus the last state of the Armenians was worse than the first, but the so-called European concert was maintained, and the danger of a great European war was averted.

Armenia.

The next attempt to raise the Eastern Question was made by the Greeks. In 1896 a semi-secret society called the Ethniké Hetairia began a Panhellenic agitation, and took advantage of one of the periodical insurrections in Crete to further its projects. In February 1897 the Cretan revolutionary committee proclaimed the annexation of the island to the Hellenic kingdom, and a contingent of Greek regular troops landed near Canea under the command of Colonel Vassos to take possession of the island in the name of King George. The powers, objecting to this arbitrary proceeding, immediately occupied Canea with a mixed force from the ships of war which were there at the time, and summoned the Greek government to withdraw its troops. The summons was disregarded, and the whole of the Greek army was mobilized on the frontier of Thessaly and Epirus. In consequence of a raid into Turkish territory the Porte declared war on the 17th of April, and the short campaign ended in the defeat of the Greeks. The powers intervened to put an end to the hostilities, and after prolonged negotiations a peace was concluded by which Greece had to consent to a strategical rectification of frontier and to pay a war indemnity of £4,000,000. Thus a second time the European concert acted effectually in the interests of peace, but it did not stand the strain of the subsequent efforts to solve the Cretan Question. Finding the Turks less conciliatory after their military success, and being anxious to remain in cordial relations with the Porte, Germany withdrew from further co-operation with the powers, and Austria followed her example. They did not, however, offer any active opposition, and the question received a temporary solution by the appointment of Prince George, second son of the king of Greece, as high commissioner and governor-general of the island. (See CRETE)

Crete.

The conflicting desires of several of the powers to obtain colonial possessions in various parts of the world, and to forestall their competitors in the act of taking possession, were bound to introduce complications in which England, as the greatest of colonial powers, would generally be involved; and as the unappropriated portions of the earth's surface at the beginning of the period under discussion were to be found chiefly in Africa, it was in the Dark Continent that the conflicts of interests mostly took place. England's chief competitors were France and Germany. Her traditional policy, except in the south of the continent, where the conditions of soil and climate were favourable to European colonists, had been purely commercial. She had refrained from annexation of territory, as involving too much expenditure and responsibility, and confined her protection to the trading stations on the coast. When France came into the field this policy had to be abandoned. The policy of France was also commercial in a certain sense, but the methods she adopted were very different. She endeavoured to bring under her authority, by annexation or the establishment of protectorates, the largest possible extent of territory, in order to increase her trade by a system of differential tariffs; she encroached on the hinterland of British settlements, and endeavoured to direct artificially the native inland trade towards her own ports. A glance at the map of the African West Coast will suffice to show the success with which this policy was carried out. When the British government awoke to the danger, all that could be done was to prevent further encroachments by likewise annexing territory. The result is shown in the article Africa: § 5. In her dealings with France about the partition of Africa, England was generally conciliatory, but she was always inflexible in guarding carefully the two entrances to the Mediterranean. There was, therefore, a permanent danger of conflict in Egypt and Morocco. When England in 1882 considered it necessary to suppress the Arabi insurrection, she invited France to co-operate, but the French government declined, and left the work to be done by England alone. England had no intention of occupying the country permanently, but she had to take precautions against the danger of French occupation after her withdrawal, and these precautions were embodied in an Anglo-Turkish convention signed at Constantinople in May 1887. France prevented the ratification of the convention by the sultan, with the result that the British occupation has been indefinitely prolonged. She still clung persistently, however, to the hope of obtaining a predominant position in the valley of the Nile, and she tried to effect her purpose by gaining a firm foothold on the upper course of the river. The effort which she made in 1898 to attain this end, by simultaneously despatching the Marchand mission from her Congo possessions and inciting the emperor Menelek of Abyssinia to send a force from the east to join hands with Major Marchand at Fashoda, was defeated by the overthrow of the Khalifa and the British occupation of Khartum. For a few days the two nations seemed on the brink of war, but the French government, receiving no encouragement from St Petersburg, consented to withdraw the Marchand mission, and a convention was signed defining the respective spheres of influence of the two countries.

Africa.

In Morocco the rivalry between the two powers was less acute but not less persistent and troublesome. France aspired to incorporate the sultanate with her north African possessions, whilst England had commercial interests to defend and was firmly resolved to prevent France from getting unfettered possession of the southern coast of the Straits of Gibraltar. As in Egypt, so in Morocco the dangers of conflict were averted, in 1904, by a general agreement, which enabled France to carry out in Morocco, as far as England was concerned, her policy of pacific penetration, but debarred her from erecting fortifications in the vicinity of the straits. Germany thereafter strongly opposed French claims in Morocco, but after a period of great tension, and the holding of an ineffectual conference at Algeciras in 1906, an understanding was come to in 1909 (see Morocco: *History*).

With Germany likewise, from 1880 onwards, England had some diplomatic difficulties regarding the partition of Africa, but they never reached a very acute phase, and were ultimately settled by mutual concessions. By the arrangement of 1890, in which several of the outstanding questions were solved, Heligoland was ceded to Germany in return for concessions in East Africa. A conflict of interests in the southern Pacific was amicably arranged by the Anglo-German convention of April 1886, in which a line of demarcation was drawn between the respective spheres of influence in the islands to the north and east of the Australian continent, and by the convention of 1899, in virtue of which Germany gained possession of Samoa and renounced in favour of England all pretensions to the Tonga Archipelago.

Asia.

In Asia the tendencies of the European powers to territorial expansion, and their desire to secure new markets for their trade and industry, have affected from time to time their mutual relations. More than once England and Russia have had disputes about the limits of their respective spheres of influence in central Asia, but the causes of friction have steadily diminished as the work of frontier delimitation has advanced. The important agreement of 1872–1873 was supplemented by the protocol of the 22nd of July 1887 and the Pamir delimitation of 1895, so that the Russo-Afghan frontier, which is the dividing line between the Russian and British spheres of influence, has now been carried right up to the frontier of the Chinese empire. The delimitation of the English and French spheres of influence in Asia has also progressed. In 1885 France endeavoured to get a footing on the Upper Irrawaddy, the hinterland of British Burma, and England replied in the following year by annexing the dominions of King Thebaw, including the Shan States as far east as the Mekong. Thereupon France pushed her Indo-Chinese frontier westwards, and in 1893 made an attack on the kingdom of Siam, which very nearly brought about a conflict with England. After prolonged negotiations an arrangement was reached and embodied in a formal treaty (January 1896), which clearly foreshadows a future partition between the two powers, but guarantees the independence of the central portion of the kingdom, the Valley of the Menam, as a buffer-state. Farther north, in eastern China, the aggressive tendencies and mutual rivalries of the European powers have produced a problem of a much more complicated kind. Firstly Germany, then Russia, next England, and finally France took portions of Chinese territory, under the thin disguise of long leases. They thereby excited in the Chinese population and government an intense anti-foreign feeling, which produced the Boxer movement and culminated in the attack on the foreign legations at Pekin in the summer of 1900. (See China: *History*.)

In 1899–1901 the relations of the European powers were disturbed by the Boer War in South Africa. In nearly every country of Europe popular feeling was much excited against England, and in certain influential quarters the idea was entertained of utilizing this feeling for the formation of a coalition against the British empire; but in view of the decided attitude assumed by the British government, and the loyal enthusiasm displayed by the colonies, no foreign government ventured to take the initiative of intervention, and it came gradually to be recognized that no European state had any tangible interest in prolonging the independence and maladministration of the Boer republics.

One permanent factor in the history of Europe after the war of 1870–71 was the constant increase of armaments by all the great powers, and the proportionate increase of taxation. The fact made such an impression on the young emperor of Russia, Nicholas II., that he invited the powers to consider whether the further increase of the burdens thereby imposed on the nations might not be arrested by mutual agreement; and a conference for this purpose was convened at the Hague (May 18–July 29, 1899), but the desirable object in view was not attained. (See Arbitration, International.) (D. M. W.)

Progress of the Peace movement.

Though neither the first Hague Conference nor the second, which met in 1907, did much to fulfil the expectations of those who hoped for the establishment of a system which should guarantee the world against the disasters of war, they undoubtedly tended to create a strong public opinion in favour of peaceful methods in the solution of international problems which has not been without its effect. Any attempt to organize the concert of the powers must always fail, as it failed in the early part of the 19th century, so long as the spirit of national and racial rivalry is stronger than the consciousness of common interests; and the early years of the 20th century showed no diminution, but rather an accentuation of this rivalry. The court of arbitration established at the Hague early in 1901 may deal effectively with questions as to which both parties desire a *modus vivendi*, and the pacific efforts of King Edward VII., which did so much to prevent misunderstandings likely to lead to war, resulted from 1903 onwards in a series of arbitration treaties between Great Britain and other powers which guaranteed the Hague court an effective activity in such matters. But more perilous issues, involving deep-seated antagonisms, have continued to be dealt with by the methods of the old diplomacy backed by the armed force of the powers. How far the final solution of such problems has been helped or hindered by the general reluctance to draw the sword must for some time to come remain an open question. Certainly, during the early years of the 20th century, many causes of difference which a hundred years earlier would assuredly have led to war, were settled, or at least shelved, by diplomacy. Of these the questions of Crete, of Armenia, and of contested claims in Africa have already been mentioned. Other questions of general interest which might have led to war, but which found a peaceful solution, were those of the separation of Norway and Sweden, and the rivalry of the powers in the northern seas. In October 1905 Sweden formally recognized the separate existence of Norway (see NORWAY: *History* and SWEDEN: *History*). On the 23rd of April 1908 were signed the "Declarations"; the one, signed by the four Baltic littoral powers, recognized "in principle" the maintenance of the territorial *status quo* in that sea; the other—to which Great Britain, France, Germany, Denmark, Sweden and Holland were the parties—sanctioned a similar principle in regard to the North Sea. These were followed, in June of the same year, by two agreements intended to apply the same principles to the southern European waters, signed by France and Spain and Great Britain and Spain respectively. Another agreement, that signed between Russia and Great Britain in 1907 for the delimitation of their spheres of influence in Persia and the northern borders of the Indian empire, though having no direct relation to European affairs, exercised considerable influence upon them by helping to restore the international prestige of Russia, damaged by the disasters of the war with Japan and the internal disturbances that followed. The new cordial understanding between the British and Russian governments was cemented by the meeting of King Edward VII. and the emperor Nicholas II. at Reval in June 1908.

Revival of the Eastern Question.

More perilous to European peace, however, than any of these issues was the perennial unrest in Macedonia, which threatened sooner or later to open up the whole Eastern Question once more in its acutest form. The situation was due to the internecine struggle of the rival Balkan races—Greek, Bulgarian, Servian—to secure the right to the reversion of territories not yet derelict. But behind these lesser issues loomed the great secular rivalries of the powers, and beyond these again the vast unknown forces of the Mahommedan world, ominously stirring. The very vastness of the perils involved in any attempt at a definitive settlement compelled the powers to accept a compromise which, it was hoped, would restore tolerable conditions in the wretched country. But the "Mürzsteg programme," concerted between the Austrian and Russian emperors in 1903, and imposed upon the Porte by the diplomatic pressure of the great powers, did not produce the effects hoped for. The hideous tale of massacres of helpless villagers by organized Greek bands, and of equally hideous, if less wholesale, reprisals by Bulgarian bands, grew rather than diminished, and reached its climax in the early months of 1908. The usefulness of the new *gendarmerie*, under European officers, which was to have co-operated with the Ottoman authorities in the restoration of order, was from the outset crippled by the passive obstruction of the Turkish government. The sultan, indeed, could hardly be blamed for watching with a certain cynical indifference the mutual slaughter of those "Christians" whose avowed ideal was the overthrow of Mahommedan rule, nor could he be expected to desire the smooth working of a system against which he had protested as a violation of his sovereign rights. In 1908 the powers were still united in bringing pressure to bear on the Porte to make the reforms effective; but the proposal of Great Britain to follow the precedent of the Lebanon and commit the administration of Macedonia to a Mussulman governor appointed by the sultan, but removable only by consent of the powers, met with little favour either at Constantinople or among the powers whose ulterior aims might have been hampered by such an arrangement.

Young Turkish revolution, 1908.

European results.

European crisis provoked by Austria.

Such was the condition of affairs when in October 1908 the revolution in Turkey altered the whole situation. The easy and apparently complete victory of the Young Turks, and the re-establishment without a struggle of the constitution which had been in abeyance since 1876, took the whole world by surprise, and not least those who believed themselves to be most intimately acquainted with the conditions prevailing in the Ottoman empire. The question of the Near East seemed in fair way of settlement by the action of conflicting races themselves, who in the enthusiasm of new-found freedom appeared ready to forget their ancient internecine feuds and to fraternize on the common ground of constitutional liberty (see TURKEY: *History*). By the European powers the proclamation of the constitution was received, at least outwardly, with unanimous approval, general admiration being expressed for the singular moderation and self-restraint shown by the Turkish leaders and people. Whatever views, however, may have been openly expressed, or secretly held, as to the revolution so far as it affected the Ottoman empire itself, there could be no doubt that its effects on the general situation in Europe would be profound. These effects were not slow in revealing themselves. On the 5th of October Prince Ferdinand of Bulgaria proclaimed himself king (*tsar*) of the Bulgarians; and two days later the emperor Francis Joseph issued a rescript announcing the annexation of Bosnia and Herzegovina to the Habsburg monarchy (see BULGARIA: *History* and BOSNIA AND HERZEGOVINA: *History*). Whatever cogent reasons there may have been for altering the status of these countries in view of the changed conditions in Turkey, there could be no doubt that the method employed was a violation of the public law of Europe. By the declaration of London of 1871, to which Austria-Hungary herself had been a principal party, it had been laid down that "contracting powers could only rid themselves of their treaty engagements by an understanding with their co-signatories." This solemn reaffirmation of a principle on which the whole imposing structure of international law had, during the 19th century, been laboriously built up was now cynically violated. The other powers, confronted with the *fait accompli*, protested; but the astute statesman who had staked his reputation as foreign minister of the Dual Monarchy on the success of this *coup* had well gauged the character and force of the opposition he would have to meet. Baron von Aehrenthal, himself more Slav than German, in spite of his name, had served a long apprenticeship in diplomacy at Belgrade and St Petersburg; he knew how fully he could rely upon the weakness of Russia, and that if Russian Pan-Slav sentiment could be cowed, he need fear nothing from the resentment of the Servians. He was strong, too, in the moral and—in case of need—the material support of Germany. With Germany behind her, Austria-Hungary had little to fear from the opposition of the powers of the triple *entente*, Great Britain, France and Russia. This diagnosis of the situation was justified by the event. For months, indeed, Europe seemed on the verge of a general war. During the autumn the nationalist excitement in Servia and Montenegro rose to fever-heat, and Austria responded by mobilizing her forces on the frontiers and arming the Catholic Bosnians as a precaution against a rising of their Orthodox countrymen. Only the winter seemed to stand between Europe and a war bound to become general, and men looked forward with apprehension to the melting of the snows. It is too early as yet to write the history of the diplomatic activities by which this disaster was avoided. Their general outline, however, is clear enough. The protests of Turkey at a violation of treaty rights, doubly resented as likely to damage the prestige of the new constitutional régime, were sympathetically received by the powers of the triple *entente*. An international conference was at once suggested as the only proper authority for carrying out any modifications of the treaty of Berlin necessitated by the new conditions in Turkey; the right of Austria-Hungary to act on her own initiative was strenuously denied; Bulgarian independence and Prince Ferdinand's title of king were meantime refused recognition. In the assertion of these principles Great Britain, Russia and France were united. Germany, on the other hand, maintained an attitude of reserve, though diplomatically "correct"; she accepted the principle of a conference, but made her consent to its convocation conditional on that of her ally Austria-Hungary. But the latter refused to agree to any conference in which the questions at issue should be reopened; the most that she would accept was a conference summoned merely to register the *fait accompli* and to arrange "compensations" not territorial but financial.

The German-Austrian victory.

For a while it seemed as though Baron Aehrenthal's ambition had o'erleaped itself. The reluctance of the Russian government, conscious of its military and political weakness, to take extreme measures seemed likely to be overborne by the Pan-Slav enthusiasm of the Russian people, and the Austrian statesman's policy to have placed him in an *impasse* from which it would be difficult to extricate himself, save at an expense greater than that on which he had calculated. At this point Germany, conscious throughout of holding the key to the situation, intervened with effect. Towards the end of March 1909 the German ambassador at St Petersburg, armed with an autograph letter from the emperor William II., had an interview with the tsar. What were the arguments he used is not known; but the most powerful are supposed to have been the German forces which had been mobilized on the Polish frontier. In any case, the result was immediate and startling. Russia, without previous discussion with her allies, dissociated herself from the views she had hitherto held in common with them, and accepted the German-Austrian standpoint. All question of a conference was now at an end; and all that the powers most friendly to Turkey could do was to persuade her to make the best of a bad bargain. The Ottoman government, preoccupied with the internal questions which were to issue in the abortive attempt at counter-revolution in April, was in no condition to resist friendly or unfriendly pressure. The principle of a money payment in compensation for the shadowy rights of the sultan over the lost provinces was accepted,[1] and Bulgarian independence under King Ferdinand was recognized on the very eve of the new victory of the Young Turks which led to the deposition of Abd-ul-Hamid II. and the proclamation of Sultan Mahommed V. (see TURKEY: *History*).

Its moral.

The change made by these events in the territorial system of Europe was of little moment. A subject principality, long practically independent, became a sovereign state; the *Almanack de Gotha* was enriched with a new royal title; the sentiment of the Bulgarian people was gratified by the restoration of their historic tsardom. Two provinces long annexed to the Habsburg monarchy *de facto* became so *de jure*, and the vision of a Serb empire with a free outlet to the sea, never very practicable, was finally dissolved. Of vastly greater importance were the moral and international issues involved. The whole conception of an effective concert of Europe, or of the World, based on the supposed sacred obligation of treaties and the validity of international law, was revealed, suddenly and brutally, as the baseless fabric of a dream. The most momentous outcome of the international debates caused by Austria's high-handed action was the complete triumph of Bismarck's principle that treaties cease to be valid "when the private interest of those who lie under them no longer reinforces the text." Henceforth, it was felt, no reaffirmation of a principle of international comity and law, so successfully violated, could serve to disguise the brutal truth that in questions between nations, in the long-run, might is right—that there is no middle term between the naked submission preached by Tolstoy and his disciples and Napoleon's *dictum* that "Providence is with the big battalions." In Great Britain, especially, public opinion was quick to grasp this truth. It was realized that it was the immense armed power of Germany that had made her the arbiter in a question vitally affecting the interests of all Europe. Germany alone emerged from the crisis with prestige enormously enhanced; for without her intervention Austria could not have resisted the pressure of the powers. The cry for disarmament, encouraged by the action of Sir Henry Campbell-Bannerman's government, suddenly died down in England; and the agitation in favour of an increased ship-building programme, that followed the revelation by the first lord of the admiralty (April 1909) of Germany's accelerated activity in naval construction, showed that public opinion had been thoroughly awakened to the necessity of maintaining for Great Britain her maritime supremacy, on which not only her position in Europe but the existence of her over-sea empire depended.

BIBLIOGRAPHICAL NOTE.—(1) *Bibliographies.*—Lists of the principal works on the history of the various European countries, and of their main sources, are given in the bibliographies attached to the separate articles (see also those appended to the articles PAPACY; CHURCH HISTORY; DIPLOMACY; CRUSADES; FEUDALISM, &c.). For the sources of the medieval history of Europe see Ulysse Chevalier's monumental *Répertoire des sources historiques du moyen âge; Bio-Bibliographie* (Paris, 1877, &c.), which with certain limitations (notably as regards the Slav, Hungarian and Scandinavian countries) gives references to published documents for all names of people, however obscure, occurring in medieval history. In 1894 M. Chevalier began the publication of a second series of his *Répertoire*, under the somewhat misleading title of *Topo-Bibliographie*, intended as a compendious guide to the places, institutions, &c., of the middle ages; though very useful, this is by no means so complete as the *Bio-Bibliographie*. August Potthast's *Bibliotheca historica medii aevi* (2nd ed., Berlin, 1895–1896) gives a complete catalogue of all the annals, chronicles and other historical works which appeared in Europe between the years 375 and 1500 and have since been printed, with short notes on their value and significance, and references to critical works upon them. See also the article RECORD. For authorities on the history of Europe from the end of the 15th to the 19th centuries inclusive the excellent bibliographies appended to the volumes of the *Cambridge Modern History* are invaluable

(2) *Works.*—Of general works the most important are the *Histoire générale du IV^{me} siècle à nos jours*, published under the direction of E. Lavisse and A. Rambaud (Paris, 1894, &c.), in 12 vols., covering the period from the 4th to the end of the 19th century: Leopold von Ranke's *Weltgeschichte* (Leipzig, 1881, &c.), in 9 vols., covering (i.) the oldest group of nations and the Greeks; (ii.) the Roman Republic; (iii.) the ancient Roman Empire; (iv.) the East Roman empire and the origin of the Romano-German kingdoms; (v.) the Arab world-power and the empire of Charlemagne; (vi.) dissolution of the Carolingian and foundation of the German empire; (vii.) zenith and decay of the German empire; the hierarchy under Gregory VII.; (viii.) crusades and papal world-power (12th and 13th centuries); (ix.) period of transition to the modern world (14th and 15th centuries). To this may be added Ranke's works on special periods: *e.g. Die Fürsten und Völker von Süd-Europa im 16ten und 17ten Jahrhundert* (2nd ed., Leipzig, 1837–1839); *Geschichten der romanischen und germanischen Völker*, 1494–1514 (2nd ed., Leipzig, 1874, Eng. trans. 1887). In English the most important general work is the *Cambridge Modern History* (1903, &c.). produced by the collaboration of English and foreign scholars, and covering the ground from the end of the 15th to the 19th century inclusive. The *Historians' History of the World*, edited by Dr H. Smith Williams (1908), is a compilation from the works of eminent historians of all ages, and the value of its various parts is therefore that of the historians responsible for them. Its chief merit is that it makes accessible to English readers many foreign or obscure sources which would otherwise have remained closed to the general reader. It also contains essays by notable modern scholars on the principal epochs and tendencies of the world's history, the texts of a certain number of treaties, &c., not included as yet in other collections, and comprehensive bibliographies. On a less ambitious scale are the volumes of the "Periods of European History" series (London, 1893, &c.): Per. I. *The Dark Ages, 476–918*, by C. W. C. Oman (1893); Per. II. *The Empire and the Papacy, 918–1273*, by T. F. Tout (1898); Per. III. *The Close of the Middle Ages, 1273–1494*, by R. Lodge (1901); *Europe in the 16th Century, 1494–1598*, by A. H. Johnson (1897); *The Ascendancy of France*, by H. O. Wakeman (1894); *The Balance of Power*, by A. Hassal (1896); *Revolutionary Europe*, by H. Morse Stephens (1893); *Modern Europe*, by W. Alison Phillips (1901,

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[1] The Austro-Turkish protocol had been signed at Constantinople on the 5th of March; it was now ratified by the Turkish parliament on the 5th of April.

9th ed., 1908). See also T. H. Dyer, *History of Modern Europe from the fall of Constantinople*, revised and continued to the end of the 19th century by A. Hassal (6 vols., London, 1901). Besides the above may be mentioned, for European history since the outbreak of the French Revolution, A. Sorel, *L'Europe et la Révolution Française* (7 vols., Paris, 1885, &c.), a work of first-class importance; A. Stern, *Geschichte Europas seit den Wiener Verträgen von 1815* (Stuttgart and Berlin, 1894, &c.), based on the study of much new material, still in progress (1908); C. Seignobos, *Histoire politique de l'Europe contemporaine* (Paris, 1897), a valuable text-book with copious bibliography (Eng. trans., London, 1901); C. M. Andrews, *Historical development of Europe*, 2 vols. (New York, 1896–1898).

(3) *Published Documents.*—For the vast mass of published sources reference must be made to the bibliographies mentioned above. It must be borne in mind, however, that these represent but a fraction of the unpublished material, and that the great development of original research is constantly revealing fresh sources, throwing new light on old problems, and not seldom upsetting conclusions long established as final. For these latest developments of scholarship the numerous historical and archaeological reviews published in various countries should be consulted: *e.g. The English Historical Review* (London), *The Scottish Hist. Rev.* (Glasgow); *The American Hist. Rev.* (London and New York); the *Revue historique* (Paris); the *Historische Zeitschrift* (Munich). The most notable collections of treaties are J. Dumont's *Corps diplomatique*, covering the period from A.D. 800 to 1731 (Amsterdam and the Hague, 1726–1731); F. G. de Martens and his continuators, *Recueil des traités*, &c. (1791, &c.), covering with its supplements the period from 1494 to 1874; F. (T. T.) de Martens, *Recueil des traités conclus par la Russie*, &c. (14 vols., St Petersburg, 1874, &c.); A. and J. de Clercq, *Recueil des traités de la France* (Paris, 1864; new ed., 1880, &c.); L. Neumann, *Recueil des traités conclus par l'Autriche* (from 1763), (6 vols., Leipzig, 1855); new series, by L. Neumann and A. de Plason (16 vols., Vienna, 1877–1903); *Österreichische Staatsverträge* (vol. i. *England*, 1526–1748), published by the Commission for the modern history of Austria (Innsbruck, 1907), with valuable introductory notes; *British and Foreign State Papers* (from the termination of the war in 1814), compiled at the Foreign Office by the Librarian and Keeper of the Papers (London, 1819, &c.); Sir E. Hertslet, *The Map of Europe by Treaty* (from 1814), (4 vols., London, 1875–1891). See the article TREATIES. (W. A. P.)

EUROPIUM, a metallic chemical element, symbol Eu, atomic weight 152·0 (O=16). The oxide Eu_2O_3 occurs in very small quantity in the minerals of the rare earths, and was first obtained in 1896 by E. A. Demarçay from Lecoq de Boisbaudran's samarium; G. Urbain and H. Lacombe in 1904 obtained the pure salts by fractional crystallization of the nitric acid solution with magnesium nitrate in the presence of bismuth nitrate. The salts have a faint pink colour, and show a faint absorption spectrum; the spark spectrum is brilliant and well characterized.

EURYDICE (Εὐρυδίκη), in Greek mythology, the wife of Orpheus (*q.v.*). She was the daughter of Nereus and Doris, and died from the bite of a serpent when fleeing from Aristaeus, who wished to offer her violence (Virgil, *Georgics*, iv. 454-527; Ovid, *Metam.* x. 1 ff.).

EURYMEDON, one of the Athenian generals during the Peloponnesian War. In 428 B.C. he was sent by the Athenians to intercept the Peloponnesian fleet which was on the way to attack Corcyra. On his arrival, finding that Nicostratus with a small squadron from Naupactus had already placed the island in security, he took the command of the combined fleet, which, owing to the absence of the enemy, had no chance of distinguishing itself. In the following summer, in joint command of the land forces, he ravaged the district of Tanagra; and in 425 he was appointed, with Sophocles, the son of Sostratides, to the command of an expedition destined for Sicily. Having touched at Corcyra on the way, in order to assist the democratic party against the oligarchical exiles, but without taking any steps to prevent the massacre of the latter, Eurymedon proceeded to Sicily. Immediately after his arrival a pacification was concluded by Hermocrates, to which Eurymedon and Sophocles were induced to agree. The terms of the pacification did not, however, satisfy the Athenians, who attributed its conclusion to bribery; two of the chief agents in the negotiations were banished, while Eurymedon was sentenced to pay a heavy fine. In 414 Eurymedon, who had been sent with Demosthenes to reinforce the Athenians at the siege of Syracuse, was defeated and slain before reaching land (Thucydides iii., iv., vii.; Diod. Sic. xiii. 8, 11, 13).

EUSDEN, LAURENCE (1688–1730), English poet, son of the Rev. Laurence Eusden, rector of Spofforth, Yorkshire, was baptized on the 6th of September 1688. He was educated at St Peter's school, York, and at Trinity College, Cambridge. He became a minor fellow of his college in 1711, and in the next year was admitted to a full fellowship. He was made poet laureate in 1718 by the lord chancellor, the duke of Newcastle, as a reward for a flattering poem on his marriage. He was rector of Coningsby, Lincolnshire, where he died on the 27th of September 1730. His name is less remembered by his translations and gratulatory poems than by the numerous satirical allusions of Pope, *e.g.*

> "Know, Eusden thirsts no more for sack or praise;
> He sleeps among the dull of ancient days."
> *Dunciad*, bk. i. 11. 293-294.

EUSEBIUS (Gr. Εὐσέβιος, from εὐσεβής, pious, cf. the Latin name Pius), a name borne by a large number of bishops and others in the early ages of the Christian Church. Of these the most important are separately noticed below. No less than 25 saints of this name (sometimes corrupted into Eusoge, Euruge, Usoge, Usuge, Uruge and St Sebis) are venerated in the Roman Catholic Church, of whom 23 are included in the Bollandist *Acta Sanctorum*; many are obscure martyrs, monks or anchorites, but two deserve at least a passing notice.

EUSEBIUS, bishop of Vercelli (d. 371), is notable not only as a stout opponent of Arianism, but also as having been, with St Augustine, the first Western bishop to unite with his clergy in adopting a strict monastic life after the Eastern model (see Ambrose, *Ep. 63 ad Vercellenses*, § 66). The legend that he was stoned to death by the Arians was probably invented for the edification of the Orthodox.

EUSEBIUS, bishop of Samosata (d. 380), played a considerable part in the later stages of the Arian controversy in the East. He is first mentioned among the Homoean and Homoeusian bishops who in 363 accepted the Homousian formula at the synod of Antioch presided over by Meletius, with whose views he seems to have identified himself (see MELETIUS OF ANTIOCH). According to Theodoret (5, 4, 8) he was killed at Doliche in Syria, where he had gone to consecrate a bishop, by a stone cast by an Arian woman. He thus became a martyr, and found a place in the Catholic calendar (see the article by Loofs in Herzog-Hauck, *Realencykl.*, ed. 1898, v. p. 620).

EUSEBIUS OF LAODICEA, though not included among the saints, was noted for his saintly life. He was an Alexandrian by birth, and gained so great a reputation for his self-denial and charity that when in 262 the city was besieged by the troops of the emperor Gallienus he obtained permission, together with Anatolius, from their commander Theodotus, to lead out the non-combatants, whom he tended "like a father and physician." He went with Anatolius to Syria, and took part in the controversy against Paul of Samosata, bishop of Antioch. He became bishop of Laodicea, probably in the following year (263), and died some time before 268. His friend Anatolius succeeded him as bishop in the latter year (see the article by E. Hennecke in Herzog-Hauck, v. 619).

EUSEBIUS, bishop of Rome for four months under the emperor Maxentius, in 309 or 310. The Christians in Rome, divided on the question of the reconciliation of apostates, on which Eusebius held the milder view, brought forward a competitor, Heraclius. Both competitors were expelled by the emperor, Eusebius dying in exile in Sicily. He was buried in the cemetery of St Calixtus at Rome; and the extant epitaph, in eight hexameter lines, set up here by his successor Damasus, contains all the information there is about his life.

EUSEBIUS [OF CAESAREA] (*c.* 260–*c.* 340), ecclesiastical historian, who called himself Eusebius Pamphili, because of his devotion to his friend and teacher Pamphilus, was born probably in Palestine between A.D. 260 and 265, and died as bishop of Caesarea in the year 339 or 340. We know little of his youth beyond the fact that he became associated at an early day with Pamphilus, presbyter of the Church of Caesarea, and founder of a theological school there (see *Hist. Eccl.* vii. 32). Pamphilus gathered about him a circle of earnest students who devoted themselves especially to the study of the Bible and the transcription of Biblical codices, and also to the defence and spread of the writings of Origen, whom they regarded as their master. Pamphilus had a magnificent library, which Eusebius made diligent use of, and a catalogue of which he published in his lost *Life* of Pamphilus (*Hist. Eccl.* vi. 32). In the course of the Diocletian persecution, which broke out in 303, Pamphilus was imprisoned for two years, and finally suffered martyrdom. During the time of his imprisonment (307–309) Eusebius distinguished himself by assiduous devotion to his friend, and assisted him in the preparation of an apology for Origen's teaching (*Hist. Eccl.* vi. 33), the first book of which survives in the Latin of Rufinus (printed in Routh's *Reliquiae sacrae*, iv. 339 sq., and in Lommatzsch's edition of Origen's Works, xxiv. p. 293 sq.). After the death of Pamphilus Eusebius withdrew to Tyre, and later, while the Diocletian persecution was still raging, went to Egypt, where he seems to have been imprisoned, but soon released. He became bishop of Caesarea between 313 and 315, and remained such until his death. The patriarchate of Antioch was offered him in 331, but declined (*Vita Constantini*, iii. 59 sq.).

Eusebius was a very important figure in the church of his day. He was not a great theologian nor a profound thinker, but he was the most learned man of his age, and stood high in favour with the emperor Constantine. At the council of Nicaea in 325 he took a prominent part, occupying a seat at the emperor's right hand, and being appointed to deliver the panegyrical oration in his honour. He was the leader of the large middle party of Moderates at the council, and submitted the first draft of the creed which was afterwards adopted with important changes and additions. In the beginning he was the most influential man present, but was finally forced to yield to the Alexandrian party, and to vote for a creed which completely repudiated the position of the Arians, with whom he had himself been hitherto more in sympathy than with the Alexandrians. He was placed in a difficult predicament by the action of the council, and his letter to the Caesarean church explaining his conduct is exceedingly interesting and instructive (see Socrates, *Hist. Eccl.* i. 8, and cf. McGiffert's translation of Eusebius' *Church History*, p. 15 sq.). To understand his conduct, it is necessary to look briefly at his theological position. By many he has been called an Arian, by many his orthodoxy has been defended. The truth is, three stages are to be distinguished in his theological development. The first preceded the outbreak of the Arian controversy, when, as might be expected in a follower of Origen, his interest was anti-Sabellian and his emphasis chiefly upon the subordination of the Son of God. In his works written during this period (for instance, the *Praeparatio evangelica* and *Demonstratio evangelica*), as in the works of Origen himself and other ante-Nicene fathers, expressions occur looking in the direction of Arianism, and others looking in the opposite direction. The second stage began with the outbreak of the controversy in 318, and continued until the Nicene Council. During this period he took the side of Arius in the dispute with Alexander of Alexandria, and accepted what he understood to be the position of Arius and his supporters, who, as he supposed, taught both the divinity and subordination of the Son. It was natural that he should take this side, for in his traditional fear of Sabellianism, in which he was one with the followers of Origen in general, he found it difficult to approve the position of Alexander, who seemed to be doing away altogether with the subordination of the Son. And, moreover, he believed that Alexander was misrepresenting the teaching of Arius and doing him great injustice (cf his letters to Alexander and Euphration preserved in the proceedings of the second council of Nicaea, Act. vi. tom. 5: see Mansi's *Concilia*, xiii 316 sq., English translation in McGiffert, *op cit.* p. 70). Meanwhile at the council of Nicaea he seems to have discovered that the Alexandrians were right in claiming that Arius was carrying his subordinationism so far as to deny all real divinity to Christ. To this length Eusebius himself was unwilling to go, and so, convinced that he had misunderstood Arius, and that the teaching of the latter was imperilling the historic belief in the divinity of Christ, he gave his support to the opposition, and voted for the Nicene Creed, in which the teachings of the Arians were repudiated. From this time on he was a supporter of Nicene orthodoxy over against Arianism (cf., *e.g.*, his *Contra Marcellum*, *De ecclesiastica theologia*, and *Theophania*). But he never felt in sympathy with the extreme views of the Athanasian party, for they seemed to him to savour of Sabellianism, which always remained his chief dread (cf. his two works against Marcellus of Ancyra). His personal friends, moreover, were principally among the Arians, and he was more closely identified with them than with the supporters of Athanasius. But he was always a man of peace, and while commonly counted one of the opponents of Athanasius, he did not take a place of leadership among them as his position and standing would have justified him in doing, and Athanasius never spoke of him with bitterness as he did of other prominent men in the party. (For a fuller description of the development of Eusebius' Christology and of his attitude throughout the Arian controversy, see McGiffert, *op. cit* p. 11 sq.)

Eusebius was one of the most voluminous writers of antiquity, and his labours covered almost every field of theological learning. If we look in his works for brilliancy and originality we shall be disappointed. He was not a creative genius like Origen or Augustine. His claim to greatness rests upon his vast erudition and his sound judgment. Nearly all his works possess genuine and solid merits which raise them above the commonplace, and many of them still remain valuable. His exegesis is superior to that of most of his contemporaries, and his apologetic is marked by fairness of statement, breadth of treatment, and an instinctive appreciation of the difference between important and unimportant points. His style, it is true, is involved and obscure, often rambling and incoherent. This quality is due in large part to the desultory character of his thinking. He did not always clearly define his theme before beginning to write, and he failed to subject what he produced to a careful revision. Ideas of all sorts poured in upon him while he was writing, and he was not always able to resist the temptation to insert them whether pertinent or not. His great learning is evident everywhere, but he is often its slave rather than its master. It is as an historian that he is best known, and to his *History of the Christian Church* he owes his fame and his familiar title "The Father of Church History." This work, which was published in its final form in ten books in 324 or early in 325, is the most important ecclesiastical history produced in ancient times. The reasons leading to the great undertaking, in which Eusebius had no predecessors, were in part historical, in part apologetic. He believed that he was living at the beginning of a new age, and he felt that it was a fitting time, when the old order of things was passing away, to put on record for the benefit of posterity the great events which had occurred during the generations that were past. He thus wrote, as any historian might, for the information and instruction of his readers, and yet he had all the time an apologetic purpose, to exhibit to the world the history of Christianity as a proof of its divine origin and efficacy. His plan is stated at the very beginning of the work:—

> "It is my purpose to write an account of the successions of the holy Apostles as well as of the times which have elapsed from the day of our Saviour to our own, to relate how many and important events are said to have occurred in the history of the church, and to mention those who have governed and presided over the church in the most prominent parishes, and those who in each generation have proclaimed the divine word either orally or in writing. It is my purpose also to give the names and number and times of those who through love of innovation have run into the greatest errors, and proclaiming themselves discoverers of knowledge, falsely so called, have like fierce wolves unmercifully devastated the flock of Christ. It is my intention, moreover, to recount the misfortunes which immediately came on the whole Jewish nation in consequence of their plots against our Saviour, and to record the ways and times in which the divine word has been attacked by the Gentiles, and to describe the character of those who at various periods have contended for it in the face of blood and tortures, as well as the confessions which have been made in our own day, and the gracious and kindly succour which our Saviour has accorded them all."

The value of the work does not lie in its literary merit, but in the wealth of the materials which it furnishes for a knowledge of the early church. Many prominent figures of the first three centuries are known to us only from its pages. Many fragments, priceless on account of the light which they shed upon movements of far-reaching consequence, have been preserved in it alone. Eusebius often fails to appreciate the significance of the events which he records; in many cases he draws unwarranted conclusions from the given premises; he sometimes misinterprets his documents and misunderstands men and movements; but usually he presents us with the material upon which to form our own judgment, and if we differ with him we must at the same time thank him for the data that enable us independently to reach other results. But the work is not merely a thesaurus, it is a history in a true sense, and it has an intrinsic value of its own, independent of its quotations from other works. Eusebius possessed extensive sources of knowledge no longer accessible to us. The number of books referred to as read is enormous. He also had access to the archives of state, and gathered from them information beyond the reach of most. But the value of his work is due, not simply to the sources employed, but also to the use made of them. Upon this matter there has been, it is true, some diversity of opinion among modern scholars, but it is now generally admitted, and can be abundantly shown, that he was not only diligent in gathering material, but also far more thorough-going than most writers of antiquity in discriminating between trustworthy and untrustworthy reports, frank in acknowledging his ignorance, scrupulous in indicating his authorities in doubtful cases, less credulous than most of his contemporaries, and unfailingly honest. His principal faults are his carelessness and inaccuracy in matters of chronology, his lack of artistic skill in the presentation of his material, his desultory method of treatment, and his failure to look below the surface and grasp the real significance and vital connexion of events. He commonly regards an occurrence as sufficiently accounted for when it is ascribed to the activity of God or of Satan. But in spite of its defects the *Church History* is a monumental work, which need only be compared with its continuations by Socrates, Sozomen, Theodoret, Rufinus and others, to be appreciated at its true worth.

In addition to the *Church History* we have from Eusebius' pen a *Chronicle* in two books (*c.* 303; later continued down to 325), the first containing an epitome of universal history, the second chronological tables exhibiting in parallel columns the royal succession in different nations, and accompanied by notes marking the dates of historical events. A revised edition of the second book with a continuation down to his own day was published in Latin by St Jerome, and this, together with some fragments of the original Greek, was our only source for a knowledge of the Chronicle until the discovery of an Armenian version of the whole work, which was published by Aucher in 1818 (Latin translation in Schoene's edition), and of two Syriac versions published in Latin translation respectively in 1866 (by Roediger in Schoene's edition) and in 1884 (by Siegfried and Gelzer). Other historical works still extant are the *Martyrs of Palestine* and the *Life of Constantine*. The former is an account of martyrdoms occurring in Palestine during the years 303 to 310, of most of which Eusebius himself was an eye-witness. The work exists in a longer and a shorter recension, the former in a Syriac version (published with English translation by Cureton, 1861), the latter in the original Greek attached to the *Church History* in most MSS (printed with the History in the various editions). The *Life of Constantine*, in four books, published after the death of the emperor, which occurred in 337, is a panegyric rather than a sober history, but contains much valuable material. Of Eusebius' apologetic works we still have the *Contra Hieroclem*, *Praeparatio evangelica*, *Demonstratio evangelica*, and *Theophania*. The first is a reply to a lost work against the Christians written by Hierocles, a Roman governor and contemporary of Eusebius. The second and third, taken together, are the most elaborate and important apologetic work of the early church. The former, in fifteen books, aims to show that the Christians are justified in accepting the sacred writings of the Hebrews, and in rejecting the religion and philosophy of the Greeks. The latter, in twenty books, of which only the first ten and fragments of the fifteenth are extant, endeavours to prove from the Hebrew Scriptures themselves that the Christians are right in going beyond the Jews and adopting new principles and practices. The former is thus a preparation for the latter, and the two together constitute a defence of Christianity against all the world, heathen as well as Jews. In grandeur of conception, comprehensiveness of treatment, and breadth of learning, this apology surpasses all other similar works of antiquity. The *Praeparatio* is also valuable because of its large number of quotations from classical literature, many of them otherwise unknown to us. The *Theophania*, though we have many fragments of the original Greek, is extant as a whole only in a Syriac version first published by Lee in 1842. Its subject is the manifestation of God in the incarnation of the Word, and it aims to give with an apologetic purpose a brief exposition of the divine authority and influence of Christianity. Of Eusebius' dogmatic and polemic writings, we still have two works against his contemporary, Marcellus, bishop of Ancyra, the one known as *Contra Marcellum*, the other as *De theologia ecclesiastica*. The former and briefer aims simply to expose the errors of Marcellus, whom Eusebius accuses of Sabellianism, the latter to refute them. We also have parts of a General Introduction (Ἡ καθόλου στοιχειώδης εἰσαγωγή), which consisted of ten books (the sixth to the ninth books and a few other fragments still extant), under the title of *Prophetical Extracts* (Προφητικαὶ ἐκλογαί). Although this formed part of a larger work it was complete in itself and circulated separately. It contains prophetical passages from the Old Testament relating to the person and work of Christ, accompanied by explanatory notes. Of Biblical and exegetical works we have a considerable part of Eusebius' Commentaries on the Psalms and on Isaiah, which are monuments of learning, industry and critical acumen, though marred by the use of the allegorical method characteristic of the school of Origen; also a work on the names of places mentioned in Scripture, or the *Onomasticon*, the only one extant of a number of writings on Old Testament topography; and an epitome and some fragments of a work in two parts on Gospel Questions and Solutions, the first part dealing with the genealogies of Christ given in Matthew and Luke, the second with the apparent discrepancies between the various gospel accounts of the resurrection. Other important works which have perished wholly or in large part, and some orations and minor writings still extant, it is not necessary to refer to more particularly. (See Preuschen's list in Harnack's *Alt-christliche Litteraturgeschichte*, i. 2, p. 55 sq. Preuschen gives thirty-eight titles, besides orations and letters, but it is doubtful whether all of the Commentaries mentioned really existed.)

Bibliography.—The only edition of Eusebius' extant works which can lay claim even to relative completeness is that of Migne (*Patrologia graeca*, tom. xix.-xxiv.). The publication of a new critical edition was begun in 1902 in the Berlin Academy's *Greek Fathers* (*Die griechischen christlichen Schriftsteller der ersten drei Jahrhunderte*, Leipzig). Many of Eusebius' works have been published separately. Thus the *Church History*, first by Stephanus (Paris, 1554); by Valesius with copious notes, together with the *Life of Constantine*, the *Oration in Praise of Constantine*, and the Histories of Socrates, Sozomen, Theodoret, &c. (best edition that of Reading (Cambridge, 1720), in three volumes, folio); by Heinichen (1827, second edition 1868–1870 in three volumes, a very useful edition, containing also the *Life of Constantine* and the *Oration in Praise of Constantine*, with elaborate notes); by Burton (1838; a handy reprint in a single volume by Bright, 1881), and by many others. The most recent and best edition is that of Schwartz in the Berlin Academy's *Greek Fathers*, of which the first half has appeared, accompanied by the Latin version of Rufinus edited by Mommsen. The history was early put into Syriac (edited by Bedjan, Leipzig, 1897; also by Wright, McLean and Merx, London, 1898), Armenian (edited by Djarian, Venice, 1877), and Latin, and has been translated into many modern languages, the latest English version being that of McGiffert, in the *Nicene and Post-Nicene Fathers*, second series, volume i. (New York, 1890). Of the *Chronicle*, the best edition is by Schoene in two volumes (Berlin, 1866–1875). The *Life of Constantine* and the *Oration in Praise of Constantine* are published by Valesius, Heinichen and others in their editions of the *Church History*, also in the first volume of the Berlin Academy's edition (ed. by Heikel), and an English translation by Richardson in the volume containing McGiffert's translation of the *Church History*. Gaisford published the *Prophetical Extracts* (Oxford, 1842), the *Praeparatio evangelica* (1843), the *Demonstratio evangelica* (1852), and the works against Hierocles and Marcellus (1852), and the works against Marcellus have appeared in the edition of the Berlin Academy (vol. iv.). The *Onomasticon* has been published frequently, among others by Lagarde (Gottingen, 1870, 2nd ed., 1887), and is contained in the edition of the Berlin Academy (vol. iii.). The *Theophania* was first published by Lee (Syriac version, 1842, English translation, 1843). A German translation of the Syriac version, with the extant fragments of the original Greek, is given in the edition of the Berlin Academy (vol. iii.)

Acacius, the pupil of Eusebius and his successor in the see of Caesarea, wrote a life of him which is unfortunately lost. His own writings contain little biographical material, but we get information from Athanasius, Philostorgius, Socrates, Sozomen, Theodoret, Jerome's *De vir. ill.*, and Photius. Among the many modern accounts in church histories, histories of Christian literature, encyclopaedias, &c., may be mentioned a monograph by Stein, *Eusebius Bischof von Caesarea* (Würzburg, 1859), meagre but useful as far as it goes; the magnificent article by Lightfoot in the *Dictionary of Christian Biography*, the account by McGiffert in his translation of the *Church History*; Erwin Preuschen's article in Herzog Hauck, *Realencyklop.* (3rd ed., 1898), the treatment of the Chronology of Eusebius writings in Harnack's *Alt-christliche Litteraturgeschichte*, ii. 2, p. 106 sq.; and Bardenhewer's *Patrologie*, p. 2260 f. The many special discussions of Eusebius' separate works, particularly of his *Church History*, and of his character as an historian, cannot be referred to here. Elaborate bibliographies will be found in McGiffert's translation, and in Preuschen's article in Herzog-Hauck. (A.C. McG.)

EUSEBIUS [of Emesa] (d. *c.* 360), a learned ecclesiastic of the Greek church, was born at Edessa about the beginning of the 4th century. After receiving his early education in his native town, he studied theology at Caesarea and Antioch and philosophy and science at Alexandria. Among his teachers were Eusebius of Caesarea and Patrophilus of Scythopolis. The reputation he acquired for learning and eloquence led to his being offered the see of Alexandria in succession to the deposed Athanasius at the beginning of 339, but he declined, and the council (of Antioch) chose Gregory of Cappadocia, "a fitter agent for the rough work to be done." Eusebius accepted the small bishopric of Emesa (the modern Homs) in Phoenicia, but his powers as mathematician and astronomer led his flock to accuse him of practising sorcery, and he had to flee to Laodicea. A reconciliation was effected by the patriarch of Antioch, but tradition says that Eusebius finally resigned his charge and lived a studious life in Antioch. His fame as an astrologer commended him to the notice of the emperor Constantius II., with whom he became a great favourite, accompanying him on many of his expeditions. The theological sympathies of Eusebius were with the semi-Arian party, but his interest in the controversy was not strong. His life was written by his friend George of Laodicea. He was a man of extraordinary learning, great eloquence and considerable intellectual power, but of his numerous writings only a few fragments are now in existence.

See Migne, *Patrol. Graec.* vol. lxxxvi.

EUSEBIUS [of Myndus], Greek philosopher, a distinguished Neoplatonist and pupil of Aedesius who lived in the time of Julian, and who is described by Eunapius as one of the "Golden Chain" of Neoplatonism. He ventured to criticize the magical and theurgic side of the doctrine, and exasperated the emperor, who preferred the mysticism of Maximus and Chrysanthius. He devoted himself principally to logic. Stobaeus in the *Sermones* collected a number of ethical dicta of one Eusebius, who may perhaps be identical with the Neoplatonist.

The fragments have been collected by Mullach in his *Fragmenta Phil. Graec.*, and by Orelli, in *Opuscula veter. graec. sentent. et moral.*

EUSEBIUS [of Nicomedia] (d. 341?), Greek bishop and theologian, was the defender of Arius in a still more avowed manner than his namesake of Caesarea, and from him the Eusebian or middle party specially derived its name, giving him in return the epithet of Great. He was a contemporary of the bishop of Caesarea, and united with him in the enjoyment of the friendship and favour of the imperial family. He is said to have been connected by his mother with the emperor Julian, whose early tutor he was. His first bishopric was Berytus (Beirut) in Phoenicia, but his name is especially identified with the see of Nicomedia, which, from the time of Diocletian till Constantine established his court at Byzantium, was regarded as the capital of the eastern part of the empire. He warmly espoused the cause of Arius in his quarrel with his bishop Alexander, and wrote a letter in his defence to Paulinus, bishop of Tyre, which is preserved in the *Church History* of Theodoret. Trained in the school of Lucian of Antioch, his views appear to have been identical with those of Eusebius of Caesarea in placing Christ above all created beings, the only begotten of the Father, but in refusing to recognize him to be "of the same substance" with the Father, who is alone in essence and absolute being.

At the council of Nicaea Eusebius of Nicomedia earnestly opposed, along with his namesake of Caesarea, the insertion of the Homousian clause, but after being defeated in his object he also signed the creed in his own sense of *ὅμοιος κατ' οὐσίαν*. He refused, however, to sign the anathema directed against the Arians, not, as he afterwards explained, because of his variance from the Athanasian theology, but "because he doubted whether Arius really held what the anathema imputed to him" (Sozom. ii. 15). After the council he continued vigorously to espouse the Arian cause, and was so far carried away in his zeal against the Athanasians that he was temporarily banished from his see as a disturber of the peace of the church. But his alienation from the court was of short duration. He retained the confidence of the emperor's sister Constantia, through whose influence he was promoted to the see of Nicomedia, and by her favour he was restored to his position, and speedily acquired an equal ascendancy over the emperor. He was selected to administer baptism to him in his last illness. There seems no doubt that Eusebius of Nicomedia was more of a politician than a theologian. He was certainly a partisan in the great controversy of his time, and is even credited (although on insufficient evidence) with having used unworthy means to procure the deposition of Eustathius the "orthodox" bishop of Antioch (Theodoret i. 21). His restless ambition and love of power are not to be denied. To the last he defended Arius, and at the time of the latter's sudden death, 336, it was chiefly through his menace, as representing the emperor, that the church of Constantinople was thrown into anxiety as to whether the leader should be readmitted to the bosom of the church. The death of Constantine followed hard upon that of Arius; and Eusebius, who was promoted in 339 to the see of Constantinople, became the leader of the anti-Nicene party till his own death in (probably) 341. The real activity of Eusebius and his party must be studied in connexion with the Arian controversy (see Arius).

EUSKIRCHEN, a town of Germany, in the Prussian Rhine province, on a plateau lying to the E. of the Eifel range, at the junction of railways from Cologne and Bonn and 10 m. W. of the latter. Pop. (1905) 10,285. It has an Evangelical and a Roman Catholic church, and its industries include cloth, sugar and stocking manufactures, besides breweries and tanneries.

EUSTACE, the name of four counts of Boulogne.

Eustace I., a son of Count Baldwin II., held the county from 1046 until his death in 1049.

His son, Eustace II. (d. 1093), count of Boulogne, was the husband of Goda, daughter of the English king Æthelred the Unready, and aunt of Edward the Confessor. Eustace paid a visit to England in 1051, and was honourably received at the Confessor's court. A brawl in which he and his servants became involved with the citizens of Dover led to a serious quarrel between the king and Earl Godwine. The latter, to whose jurisdiction the men of Dover were subject, refused to punish them. His contumacy was made the excuse for the outlawry of himself and his family. In 1066 Eustace came to England with Duke William, and fought at the battle of Hastings. In the following year, probably because he was dissatisfied with his share of the spoil, he assisted the Kentishmen in an attempt to seize Dover Castle. The conspiracy failed, and Eustace was sentenced to forfeit his English fiefs. Subsequently he was reconciled to the Conqueror, who restored a portion of the confiscated lands.

Eustace died in 1093, and was succeeded by his son, Eustace III., who went on crusade in 1096, and died about 1125. On his death the county of Boulogne came to his daughter, Matilda, and her husband Stephen, count of Blois, afterwards king of England, and in 1150 it was given to their son, Eustace IV.

Eustace IV. (d. 1153) became the heir-apparent to his father's possessions by the death of an elder brother before 1135. In 1137 he did homage for Normandy to Louis VII. of France whose sister, Constance, he subsequently married. Eustace was knighted in 1147, at which date he was probably from sixteen to eighteen years of age; and in 1151 he joined Louis in an abortive raid upon Normandy, which had accepted the title of the empress Matilda, and was now defended by her husband, Geoffrey of Anjou. At a council held in London on the 6th of April 1152 Stephen induced a small number of barons to do homage to Eustace as their future king; but the primate, Theobald, and the other bishops declined to perform the coronation ceremony on the ground that the Roman curia had declared against the claim of Eustace. The death of Eustace, which occurred during the next year, was hailed with general satisfaction as opening the possibility of a peaceful settlement between Stephen and his rival, the young Henry of Anjou. The *Peterborough Chronicle*, not content with voicing this sentiment, gives Eustace a bad character. "He was an evil man and did more harm than good wherever he went; he spoiled the lands and laid thereon heavy taxes." He had used threats against the recalcitrant bishops, and in the war against the Angevin party had demanded contributions from religious houses; these facts perhaps suffice to account for the verdict of the chronicler.

See Sir James Ramsay, *Foundations of England*, vol. ii. (London, 1898); J. M. Lappenberg, *History of England under the Norman Kings* (trans. B. Thorpe, Oxford, 1857); and E. A. Freeman, *History of the Norman Conquest* (Oxford, 1867–1879).

EUSTATHIUS, of Antioch, sometimes styled "the Great" (fl. 325), was a native of Side in Pamphylia. About 320 he was bishop of Beroea, and he was patriarch of Antioch before the council of Nicaea in 325. In that assembly he distinguished himself by his zeal against the Arians, though the *Allocutio ad Imperatorem* with which he has been credited is hardly genuine. His anti Arian polemic against Eusebius of Caesarea made him unpopular among his fellow-bishops in the East, and a synod convened at Antioch in 330 passed a sentence of deposition, which was confirmed by the emperor. He was banished to Trajanopolis in Thrace, where he died, probably about 337, though possibly not till 360.

The only complete work by Eustathius now extant is the *De Engastrimytho contra Origenem* (ed. by A. Jahn in *Texte und Untersuchungen*, ii. 4). Other fragments are enumerated by F. Loofs in Herzog-Hauck's *Realencyklopädie*.

EUSTATHIUS, or EUMATHIUS, surnamed Macrembolites ("living near the long bazaar"), the last of the Greek romance writers, flourished in the second half of the 12th century A.D. His title *Protonobilissimus* shows him to have been a person of distinction, and if he is also correctly described in the MSS. as μέγας χαρτοφύλαξ (chief keeper of the ecclesiastical archives), he must have been a Christian. He was the author of *The Story of Hysmine and Hysminias*, in eleven books, a tedious and inferior imitation of the *Cleitophon and Leucippe* of Achilles Tatius. There is nothing original in the plot, and the work is tasteless and often coarse. Although the author borrowed from Homer and other Attic poets, the chief source of his phraseology was the rhetorician Choricius of Gaza. The style is remarkable for the absence of hiatus and an extremely laboured use of antithesis. The digressions on works of art, apparently the result of personal observation, are the best part of the work. A collection of eleven *Riddles*, of which solutions were written by the grammarian Manuel Holobolos, is also attributed to Eustathius.

The best edition of both romance and riddles is by I. Hilberg (1876, who fixes the date of Eustathius between 850 and 988), with critical apparatus and prolegomena, including the solutions; of the *Riddles* alone by M. Treu (1893). On Eustathius generally, see J. C. Dunlop, *History of Fiction* (1888, new ed. in Bohn's *Standard Library*); E. Rohde, *Der griechische Roman* (1900); K. Krumbacher, *Geschichte der byzantinischen Litteratur* (1897). There are many translations in modern languages, of which that by P. le Bas (1825) may be recommended; there is an English version from the French by L. H. le Moine (London and Paris, 1788).

EUSTATHIUS, archbishop of Thessalonica, Byzantine scholar and author (probably a native of Constantinople), flourished during the second half of the 12th century. He was at first a monk, and afterwards deacon of St Sophia and teacher of rhetoric in his native city. In 1174 he was chosen bishop of Myra in Lycia, but in 1175 was transferred to Thessalonica. He was outspoken and independent, and did not hesitate to oppose the emperor Manuel, when the latter desired an alteration in the formula of abjuration necessary for converts from Mahommedanism. In 1185, when Thessalonica was captured by the Normans under William II. of Sicily, Eustathius secured religious toleration for the conquered. He died about 1193. His best known work is his *Commentary on the Iliad and Odyssey of Homer* (παρεκβολαί, critical compilations), valuable as containing numerous extracts from the scholia of other critics, whose works have now perished. He also wrote a commentary on the geographical epic of Dionysius Periegetes, in which much of Stephanus of Byzantium and the lost writings of Arrian is preserved. A commentary on Pindar has been lost, with the exception of the preface, which contains an essay on lyric poetry, a life of Pindar, and an account of the Olympic games. A history of the conquest of Thessalonica by the Normans, a congratulatory address to the emperor Manuel, a plea for an improved water-supply for Constantinople, and an extensive correspondence with clerical and lay dignitaries, are evidence of his versatility. He is also the author of various religious works, chiefly directed against the prevailing abuses of his time, which almost anticipate, though in a milder form, the denunciations of Luther; the most important of these is *The Reform of Monastic Life*. A commentary on the pentecostal hymn of John of Damascus may also be mentioned.

Editions: Homer Commentary, by G. Stallbaum (1825–1830); preface to Pindar Commentary, by F. W. Schneidewin (1837); Dionysius Commentary in C. W. Müller, *Geographici Graeci minores*, ii.; pentecostal hymn, in A. Mai, *Spicilegium Romanum*, v. 2 (1841). The smaller works have been edited (1832) and the *De Thessalonica* (1839) by L. F. Tafel; many will be found in J. P. Migne, *Patrologia Graeca*, cxxxv., cxxxvi. Five new speeches have been edited by W. Regel, *Fontes rerum Byzantinarum*, i. (1892).

EUSTYLE (from Gr. εὖ, well, and στῦλος, column), the architectural term for the intercolumniation defined by Vitruvius (iii. 3) as being of the best proportion, *i.e.* two and a half diameters (see INTERCOLUMNIATION).

EUTAWVILLE, a town of Berkeley county, South Carolina, U.S.A., about 55 m. N.N.W. of Charleston. Pop. (1900) 305; (1910) 405. It is served by the Atlantic Coast Line railway. The town lies on high ground near the Santee river, in a region abounding in swamps, limestone cliffs and pine forests. At present its chief interest is in lumber, but in colonial days it was a settlement of aristocratic rice planters. The neighbouring Eutaw Springs issue first from the foot of a hill and form a large stream of clear, cool water, but this, only a few yards away, again rushes underground to reappear about ½ m. farther on. At Eutaw Springs, on the 8th of September 1781, was fought the last battle in the field in the Southern States during the War of American Independence. About 2300 Americans under General Nathanael Greene here attacked a slightly inferior force under Colonel Alexander Stewart; at first the Americans drove the British before them, but later in the day the latter took a position in a brick house and behind palisades, and from this position the Americans were unable to drive them. On the night of the 9th, however, Colonel Stewart retreated toward Charleston, abandoning 1000 stand of arms. The battle has been classed as a tactical victory for the British and a strategical victory for the Americans, terminating a campaign which left General Greene in virtual possession of the Carolinas, the British thereafter confining themselves to Charleston. The Americans lost in killed and wounded 408 men (including Colonel William Washington, wounded and captured); the British, 693.

EUTHYDEMUS, a native of Magnesia, who overturned the dynasty of Diodotus of Bactria, and became king of Bactria about 230 B.C. (Polyb. xi. 34; Strabo xi. 515 wrongly makes him the first king). In 208 he was attacked by Antiochus the Great, whom he tried in vain to resist on the shores of the river Arius, the modern Herirud (Polyb. x. 49). The war lasted three years, and was on the whole fortunate for Antiochus. But he saw that he was not able to subdue Bactria and Sogdiana, and so in 206 concluded a peace with Euthydemus, through the mediation of his son Demetrius, in which he recognized him as king (Polyb. xi. 34). Soon afterwards Demetrius (*q.v.*) began the conquest of India. There exist many coins of Euthydemus; those on which he is called god are struck by the later king Agathocles. Other coins with the name Euthydemus, which show a youthful face, are presumably those of Euthydemus II., who cannot have ruled long and was probably a son of Demetrius. (ED. M.)

EUTIN, a town of Germany, capital of the principality of Lübeck, which is an enclave in the Prussian province of Schleswig-Holstein and belongs to the grand-duchy of Oldenburg, picturesquely situated on the Lake Eutin, 20 m. N. from Lübeck by the railway to Kiel. Pop. (1905) 5204. It possesses a Roman Catholic and two Protestant churches, a palace with a fine park, and a monument to Weber, the composer, who was born here. Towards the end of the 18th century Eutin acquired some fame as the residence of a group of poets and writers, of whom the best-known were Johann Heinrich Voss, the brothers Stolberg, and Friedrich Heinrich Jacobi. In the neighbourhood is a beautiful tract of country, rich in beech forests and fjords, known as "the Holstein Switzerland," largely frequented in summer by the Hamburgers.

Eutin was, according to tradition, founded by Count Adolf II. of Holstein. In 1155 it fell to the bishopric of Lübeck and was often the residence of the prelates of that see. After some vicissitudes of fortune during the middle ages and the Thirty Years' War, it came into the possession of the house of Holstein, and hence to Prussia in 1866.

EUTROPIUS, Roman historian, flourished in the latter half of the 4th century A.D. He held the office of secretary (*magister memoriae*) at Constantinople, accompanied Julian on his expedition against the Persians (363), and was alive during the reign of Valens (364–378), to whom he dedicates his history. This work (*Breviarium historiae Romanae*) is a complete compendium, in ten books, of Roman history from the foundation of the city to the accession of Valens. It was compiled with considerable care from the best accessible authorities, and is written generally with impartiality, and in a clear and simple style. Although the Latin in some instances differs from that of the purest models, the work was for a long time a favourite elementary school-book. Its independent value is small, but it sometimes fills a gap left by the more authoritative records. The *Breviarium* was enlarged and continued down to the time of Justinian by Paulus Diaconus (*q.v.*); the work of the latter was in turn enlarged by Landolfus Sagax (*c.* 1000), and taken down to the time of the emperor Leo the Armenian (813–820) in the *Historia Miscella*.

Of the Greek translations by Capito Lycius and Paeanius, the version of the latter is extant in an almost complete state. The best edition of Eutropius is by H. Droysen (1879), containing the Greek version and the enlarged editions of Paulus Diaconus and Landolfus; smaller critical editions, C. Wagener (1884), F. Rühl (1887). J. Sorn's *Der Sprachgebrauch des Historikers Eutropius* (1892) contains a systematic account of the grammar and style of the author. There are numerous English school editions and translations.

EUTYCHES (*c.* 380–*c.* 456), a presbyter and archimandrite at Constantinople, first came into notice in A.D. 431 at the council of Ephesus, where, as a zealous adherent of Cyril (*q.v.*) of Alexandria, he vehemently opposed the doctrine of the Nestorians (*q.v.*) They were accused of teaching that the divine nature was not incarnated in but only attendant on Jesus, being superadded to his human nature after the latter was completely formed. In opposition to this Eutyches went so far as to affirm that after the union of the two natures, the human and the divine, Christ had only *one nature*, that of the incarnate Word, and that therefore His human body was essentially different from other human bodies. In this he went beyond Cyril and the Alexandrine school generally, who, although they expressed the unity of the two natures in Christ so as almost to nullify their duality, yet took care verbally to guard themselves against the accusation of in any way circumscribing or modifying his real and true humanity. It would seem, however, that Eutyches differed from the Alexandrine school chiefly from inability to express his meaning with proper safeguards, for equally with them he denied that Christ's human nature was either transmuted or absorbed into his divine nature. The energy and imprudence of Eutyches in asserting his opinions led to his being accused of heresy by Domnus of Antioch and Eusebius, bishop of Dorylaeum, at a synod presided over by Flavian at Constantinople in 448. As his explanations were not considered satisfactory, the council deposed him from his priestly office and excommunicated him; but in 449, at a council held in Ephesus convened by Dioscurus of Alexandria and overawed by the presence of a large number of Egyptian monks, not only was Eutyches reinstated in his office, but Eusebius, Domnus and Flavian, his chief opponents, were deposed, and the Alexandrine doctrine of the "one nature" received the sanction of the church. This judgment is the more interesting as being in distinct conflict with the opinion of the bishop of Rome—Leo—who, departing from the policy of his predecessor Celestine, had written very strongly to Flavian in support of the doctrine of the two natures and one person. Meanwhile the emperor Theodosius died, and Pulcheria and Marcian who succeeded summoned, in October 451, a council (the fourth ecumenical) which met at Chalcedon (*q.v.*). There the synod of Ephesus was declared to have been a "robber synod," its proceedings were annulled, and, in accordance with the rule of Leo as opposed to the doctrines of Eutyches, it was declared that the two natures were united in Christ, but without any alteration, absorption or confusion. Eutyches died in exile, but of his later life nothing is known. After his death his doctrines obtained the support of the Empress Eudocia and made considerable progress in Syria. In the 6th century they received a new impulse from a monk of the name of Jacob, who united the various divisions into which the Eutychians, or Monophysites (*q.v.*), had separated into one church, which exists at the present time under the name of the Jacobite Church, and has numerous adherents in Armenia, Egypt and Ethiopia.

See R. L. Ottley, *The Doctrine of the Incarnation*, ii. 97 ff.; A. Harnack, *History of Dogma*, iv. *passim*; F. Loofs, *Dogmengeschichte* (4th ed., 1906), 297 f., and the art. in Herzog-Hauck, *Realencyk. für prot. Theol.*, with a full bibliography.

EUTYCHIANUS, pope from 275 to 283. His original epitaph was discovered in the catacombs (see Kraus, *Roma sotterranea*, p. 154 et seq.), but nothing more is known of him.

EUTYCHIDES, of Sicyon in Achaea, Greek sculptor of the latter part of the 4th century B.C., was a pupil of Lysippus. His most noted work was a statue of Fortune, which he made for the city of Antioch, then newly founded. The goddess, who embodied the idea of the city, was seated on a rock, crowned with towers, and having the river Orontes at her feet. There is a small copy of the statue in the Vatican (see GREEK ART). It was imitated by a number of Asiatic cities; and indeed most statues of cities since erected borrow something from the work of Eutychides.

EUYUK, or EYUK (the *eu* pronounced as in French), a small village in Asia Minor, in the Angora vilayet, 12 m. N.N.E. of Boghaz Keui (*Pteria*), built on a mound which contains some remarkable ruins of a large building—a palace or sanctuary—anterior to the Greek period and belonging to the same civilization as the ruins and rock-reliefs at Pteria. These ruins consist of a gateway and an approach enclosed by two lateral walls, 15 ft. long, from the outer end of which two walls return outwards at right angles, one to right and one to left. The gateway is flanked by two huge blocks, each carved in front into the shape of a sphinx, while on the inner face is a relief of a two-headed eagle with wings displayed. Of the approach and its returning walls only the lower courses remain: they consist of large blocks adorned with a series of bas-reliefs similar in type to those carved on the rocks of Boghaz Keui. Behind the gateway is another vestibule leading to another portal which gives entrance to the building, the lateral walls and abutments of the portal being also decorated with reliefs much worn. These reliefs belong to that pre-Greek oriental art generally called Hittite, of which there are numerous remains in the eastern half of the peninsula. It is now generally agreed that the scenes represented are religious processions. On the left returning wall is a train of priestly attendants headed by the chief priest and priestess (the latter carrying a *lituus*), clad in the dress of the deities they serve and facing an altar, behind which is an image of a bull on a pedestal (representing the god); then comes an attendant leading a goat and three rams for sacrifice, followed by more priests with *litui* or musical instruments, after whom comes a bull bearing on his back the sacred *cista* (?). On the lateral walls of the approach we have a similar procession of attendants headed by the chief priestess and priest, who pours a libation at the feet of the goddess seated on her throne; while on the right returning wall are fragments of a third procession approaching another draped figure of the goddess on her throne (placed at the angle opposite the bull on the pedestal), the train being again brought up by a bull.

These are all scenes in the ritual of the indigenous naturalistic religion which was spread, in slightly varying forms, all over Asia Minor, and consisted in the worship of the self-reproductive powers of nature, personified in the great mother-goddess (called by various names Cybele, Leto, Artemis, &c.) and the god her husband-and-son (Attis, Men, Sabazios, &c.), representing the two elements of the ultimate divine nature (see GREAT MOTHER OF THE GODS). Here, as in the oriental mysteries generally, the goddess is made more prominent. Where Greek influence affects the native religion, emphasis tends to be laid on the god, but the character of the religion remains everywhere ultimately the same (see Ramsay, *Cities and Bishoprics of Phrygia*, ch. iii.).

AUTHORITIES.—Perrot, *Explor. de la Galatie* (1862) and *Hist. de l'art* (Eng. trans., 1890); Humann and Puchstein, *Reisen in Kleinasien u. Nordsyrien* (1890); Hogarth in Murray's *Handbook to Asia Minor* (1895); Chantre, *Mission en Cappadoce* (1898). See also HITTITES. (J. G. C. A.)

EVAGORAS, son of Nicocles, king of Salamis in Cyprus 410–374 B.C. . He claimed descent from Teucer, half-brother of Ajax, son of Telamon, and his family had long been rulers of Salamis until supplanted by a Phoenician exile. When the usurper was in turn driven out by a Cyprian noble, Evagoras, fearing that his life was in danger, fled to Cilicia. Thence he returned secretly in 410, and with the aid of a small band of adherents regained possession of the throne. According to Isocrates, whose panegyric must however be read with caution, Evagoras was a model ruler, whose aim was to promote the welfare of his state and of his subjects by the cultivation of Greek refinement and civilization, which had been almost obliterated in Salamis by a long period of barbarian rule. He cultivated the friendship of the Athenians, and after the defeat of Conon at Aegospotami he afforded him refuge and hospitality. For a time he also maintained friendly relations with Persia, and secured the aid of Artaxerxes II. for Athens against Sparta. He took part in the battle of Cnidus (394), in which the Spartan fleet was defeated, and for this service his statue was placed by the Athenians side by side with that of Conon in the Ceramicus. But the energy and enterprise of Evagoras soon roused the jealousy of the Great King, and relations between them became strained. From 391 they were virtually at war. Aided by the Athenians and the Egyptian Hakor (Acoris), Evagoras extended his rule over the greater part of Cyprus, crossed over to Asia Minor, took several cities in Phoenicia, and persuaded the Cilicians to revolt. After the peace of Antalcidas (387), to which he refused to agree, the Athenians withdrew their support, since by its terms they recognized the lordship of Persia over Cyprus. For ten years Evagoras carried on hostilities single-handed, except for occasional aid from Egypt. At last he was totally defeated at Citium, and compelled to flee to Salamis. Here, although closely blockaded, he managed to hold his ground, and took advantage of a quarrel between the Persian generals to conclude peace (376). Evagoras was allowed to remain nominally king of Salamis, but in reality a vassal of Persia, to which he was to pay a yearly tribute. The chronology of the last part of his reign is uncertain. In 374 he was assassinated by a eunuch from motives of private revenge.

The chief authority for the life of Evagoras is the panegyric of Isocrates addressed to his son Nicocles; see also Diod. Sic. xiv. 115, xv. 2-9; Xenophon, *Hellenica*, iv. 8; W. Judeich, *Kleinasiatische Studien* (Marburg, 1892), and art. HELLENISM.

EVAGRIUS (*c.* 536–600), surnamed SCHOLASTICUS, Church historian, was born at Epiphania in Coele-Syria. His surname shows him to have been an advocate, and it is supposed that he practised at Antioch. He was the legal adviser of Gregory, patriarch of that city, whom he successfully defended at Constantinople against certain serious charges. Through this connexion he was brought under the notice of the emperor Tiberius Constantine, who honoured him with the rank of quaestorian; Maurice Tiberius made him master of the rolls. His influence and reputation were so considerable that on the occasion of his second marriage a public festival was celebrated in his honour, which was interrupted by a terrible earthquake. Evagrius's name has been preserved by his *Ecclesiastical History* in six books, extending over the period from the third general council (that of Ephesus, 431) to the year 593. It thus continues the work of Eusebius, Socrates, Sozomen and Theodoret. Though not wholly trustworthy, and often very credulous, this work is on the whole impartial, and appears to have been compiled from original documents, from which many valuable excerpts are given. It is particularly helpful to the student of the history of dogma during the 5th and 6th centuries, while the political history of the time is by no means neglected. Evagrius made use of the writings of Eustathius, John of Epiphania, John Malalas, Procopius, and (possibly) Menander Protector.

The best edition of the History is that of L. Parmentier and J. Bidez (London, 1898), which contains the Scholia; it is also included in Migne's *Patrologia Graeca*, lxxxvi. There is an English translation in Bohn's *Ecclesiastical Library*. See Krumbacher, *Geschichte der byzantinischen Litteratur* (1897); F. C. Baur, *Die Epochen der kirchlichen Geschichtsschreibung* (1852); L. Jeep, *Quellenuntersuchungen zu den griechischen Kirchenhistorikern* (1884).

EVANDER (Gr. Εὔανδρος, "good man"), in Roman legend, son of Mercury and Carmenta, or of Echemus, king of Arcadia. According to the story, Evander left the Arcadian town of Pallantion about sixty years before the Trojan War and founded Pallanteum or Palatium on the hill afterwards called the Palatine. This is only one of the many Greek legends adopted by the Romans for the purpose of connecting places in Italy with others of like-sounding name in Greece. To Evander was attributed the introduction of Greek rites and customs into his new country; of writing, music and other arts; of the worship of Pan (called Faunus by the Italians) and the festival of Lupercalia. In Virgil he receives Aeneas hospitably, and assists him against Turnus. Probably Evander was identical with the god Faunus (the "favourer"), and the tale of his Arcadian origin was due to the desire to establish connexion with Greece; the name of his reputed mother (or wife) Carmenta is genuinely Italian.

See Livy i. 6. 7; Ovid, *Fasti*, i. 471, v. 99; Dion. Halic. i. 31-33; Virgil, *Aeneid*, viii. 335.

EVANGELICAL ALLIANCE, an association of individual Christians of different denominations formed in London in August 1846, at a conference of over 900 clergymen and laymen from all parts of the world, and representing upwards of fifty sections of the Protestant church. The idea originated in Scotland in the preceding year, and was intended "to associate and concentrate the strength of an enlightened Protestantism against the encroachments of popery and Puseyism, and to promote the interests of a scriptural Christianity," as well as to combat religious indifference. A preliminary meeting was held at Liverpool in October 1845. The movement obtained wide support in other countries, more especially in America, and organizations in connexion with it now exist in the different capitals throughout the world. The object of the alliance, according to a resolution of the first conference, is "to enable Christians to realize in themselves and to exhibit to others that a living and everlasting union binds all true believers together in the fellowship of the church." At the same conference the following nine points were adopted as the basis of the alliance: "Evangelical views in regard to the divine inspiration, authority and sufficiency of the Holy Scriptures; the right and duty of private judgment in the interpretation of the Holy Scriptures; the unity of the Godhead and the Trinity of persons therein; the utter depravity of human nature in consequence of the fall; the incarnation of the Son of God, His work of atonement for sinners of mankind, and His mediatorial intercession and reign; the justification of the sinner by faith alone; the work of the Holy Spirit in the conversion and sanctification of the sinner; the immortality of the soul, the resurrection of the body, the judgment of the world by our Lord Jesus Christ, with the eternal blessedness of the righteous and the eternal punishment of the wicked; the divine institution of the Christian ministry, and the obligations and perpetuity of the ordinances of Baptism and the Lord's Supper," it being understood, however, (1) that such a summary "is not to be regarded in any formal or ecclesiastical sense as a creed or confession," and (2) that "the selection of certain tenets, with the omission of others, is not to be held as implying that the former constitute the whole body of important truth, or that the latter are unimportant."

Annual conferences of branches of the alliance are held in England, America and several continental countries; and it is provided that a general conference, including representatives of the whole alliance, be held every seventh year, or oftener if it be deemed necessary. Such conferences have been held in London in 1851; Paris, 1855; Berlin, 1857; Geneva, 1861; Amsterdam, 1867; New York, 1873; Basel, 1879; Copenhagen, 1885; Florence, 1891; London, 1896 and 1907. They are occupied with the discussion of the "best methods of counteracting infidelity, Romanism and ritualism, and the desecration of the Lord's Day," and of furthering the positive objects of the alliance. The latter are sometimes stated as follows: (*a*) "The world girdled by prayer"; a world-wide week of prayer is held annually, beginning on the first Sunday in the year. (*b*) "The maintenance of religious liberty throughout the world." (*c*) "The relief of persecuted Christians in all parts"; the alliance has agents in many countries to help the persecuted by distributing relief, &c., and in Russia there is a travelling agent who endeavours to help the Stundists. (*d*) "The manifestation of the unity of all believers and the upholding of the evangelical faith."

The following publications may be mentioned:—*The Evangelical Alliance Monthly Intelligencer*, *The Evangelical Alliance Quarterly*, both published in London; A. J. Arnold, *History of the Evangelical Alliance* (London, 1897); and the reports of the proceedings of the different conferences.

EVANGELICAL ASSOCIATION of North America, a religious denomination, founded about the beginning of the 19th century by Jacob Albright (1759–1808), a German Lutheran of Pennsylvania. About 1790 he began an itinerant mission among his fellow-countrymen, chiefly in Pennsylvania; and meeting with considerable success, he was, at an assembly composed of adherents from the different places he had visited, elected in 1800 presiding elder or chief pastor, and shortly afterwards rules of government were adopted somewhat similar to those of the Methodist Episcopal Church. The theological standards of the two bodies are also in close agreement. In 1807 Albright was appointed bishop of the community, which adopted its present name in 1818. In 1816 the first annual conference was held, and in 1843 there was instituted a general conference, composed of delegates chosen by the annual conferences and constituting the highest legislative and judicial authority in the church. The members of the general conference hold office for four years. In 1891 a long internal controversy resulted in a division. A law-suit awarded the property to the branch making its headquarters at Indianapolis, whereon the other party, numbering 40,000, that met at Philadelphia, constituted themselves the United Evangelical Church. The Association in 1906 had about 105,000 members, besides some 10,000 in Germany and Switzerland, and has nearly 2000 churches and 1200 itinerant and other preachers. There are four bishops. It distributes much evangelical literature, and supports a mission in Japan.

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PRINTED BY R. R. DONNELLEY & SONS COMPANY, CHICAGO, ON "BRITANNICA INDIA
PAPER," MANUFACTURED BY S. D. WARREN & COMPANY, BOSTON, MASS. BINDERS, THE
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